



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

JENNIFER COHAN
SECRETARY

VIA WEBSITE POSTING & MAILING

December 30, 2019

Contract No. T201504401.01
Federal Aid Project No. ESTP-N011(31)
Elkton Road, MD Line to Casho Mill Road
New Castle County

Ladies and Gentlemen:

Enclosed is Addendum No. 4 for the referenced contract consisting of the following:

1. One (1) page, the Bid Proposal Cover, **revised**, to be substituted for the same page of the Proposal. The Bid Due Date has been extended to January 14, 2020.
2. One (1) page, Table of Contents, page ix, **revised**, to be substituted for the same page in the Proposal.
3. Nine (9) pages, General Decision MD20190052, **new**, pages 39A through 39I, to be added to the Proposal.
4. Three (3) pages, Special Provision 705500 – Pedestrian Connection, Maryland, **deleted**, to be substituted for the same page of the Proposal.
5. Fourteen (14) pages, Special Provision 710504 - Water Services, **revised**, to be substituted for the twelve (12) pages in the Proposal.
6. Nineteen (19) pages, Special Provision 711501 - Sanitary Sewer System, **revised**, to be substituted for the same pages of the Proposal.
7. Five (5) pages, Special Provision 711505 - Horizontal Directional Drilling for Sanitary Sewer, **revised**, to be substituted for the same pages of the Proposal.
8. One (1) page, Special Provision 801500 - Maintenance of Traffic All Inclusive, **new**, page 140A, has been added.
9. Three (3) pages, Breakout Sheet 2, **revised**, to be substituted for the same pages of the Proposal.
10. One (1) page, Breakout Sheet 3, **deleted**, to be substituted for the same page of the Proposal.
11. Five (5) pages, Breakout Sheet 4, **revised**, to be substituted for the same pages of the Proposal.
12. One (1) page, Breakout Sheet 5, **new**, to be added to the Proposal following Breakout Sheet 4.
13. Twenty-six (26) pages, Bid Proposal Forms, **revised**, to be substituted for the same pages of the Proposal.
14. Bid Express Amendment File No. 2, **new**.

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

Sincerely,

~signature on file~

Jim Hoagland
Contract Services Administrator
Delaware Department of Transportation

STATE OF DELAWARE

Addendum No. 4
December 30, 2019



DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T201504401.01

FEDERAL AID PROJECT NO. ESTP-N011(31)

CFDA NO. 20.205

ELKTON ROAD, MD LINE TO CASHO MILL ROAD

NEW CASTLE COUNTY

ADVERTISEMENT DATE: October 28, 2019

COMPLETION TIME: 760 Calendar Days

SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
DELAWARE DEPARTMENT OF TRANSPORTATION
AUGUST 2016

Bids will be received in the Bidder's Room at the Delaware Department of Transportation's Administration Building, 800 Bay Road, Dover, Delaware prior to 2:00 P.M. local time ~~November 26 December 17, 2019~~
~~January 7, 2020~~ **January 14, 2020**

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"General Decision Number: MD20190052 01/04/2019

Superseded General Decision Number: MD20180067

State: Maryland

Construction Type: Highway

County: Cecil County in Maryland.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set

Contract No. T201504401.01

Burner.....	\$ 14.50	3.83
Common.....	\$ 17.38	3.33
Concrete Puddler.....	\$ 17.38	3.33
Concrete Surfacers.....	\$ 14.50	3.83
Concrete Tender.....	\$ 17.38	3.33
Concrete Vibrator.....	\$ 17.38	3.33
Density Gauge.....	\$ 17.38	3.33
Fireproofers-Mixer.....	\$ 17.38	3.33
Flagger.....	\$ 17.38	3.33
Grade Checker.....	\$ 17.38	3.33
Hand Roller.....	\$ 17.38	3.33
Hazardous Material Handler..	\$ 14.50	3.83
Jackhammer.....	\$ 17.38	3.33
Landscaping.....	\$ 17.38	3.33
Layout.....	\$ 17.38	3.33
Luteman.....	\$ 17.38	3.33
Mason Tender.....	\$ 14.50	3.83
Mortar Mixer.....	\$ 17.38	3.33
Pipelayer.....	\$ 14.50	3.83
Plasterer-Handler.....	\$ 17.38	3.33
Scaffold Builder.....	\$ 14.50	3.83
Tamper.....	\$ 17.38	3.33
 PAINTER: Bridge.....	\$ 40.00	10.40
 PILEDRIVERMAN.....	\$ 28.78	14.70
 PLUMBER.....	\$ 36.87	18.48
 POWER EQUIPMENT OPERATOR		
Asphalt Distributor.....	\$ 17.00	3.40
Backhoe.....	\$ 18.00	3.76
Boom Truck.....	\$ 23.50	6.96
Broom/Sweeper.....	\$ 18.00	4.48
Bulldozer.....	\$ 26.95	7.43
Crane.....	\$ 33.50	15.35
Excavator.....	\$ 27.10	5.63

Contract No. T201504401.01

Gradall.....	\$ 28.75	11.90
Grader.....	\$ 23.00	4.04
Guard Rail Post Driver.....	\$ 23.50	
Loader.....	\$ 27.75	11.90
Mechanic.....	\$ 24.55	5.95
Milling Machine.....	\$ 21.00	6.56
Paver.....	\$ 26.85	11.90
Roller-Asphalt.....	\$ 26.85	11.90
Roller-Earth.....	\$ 26.85	11.90
Scraper.....	\$ 17.95	5.22
Screed.....	\$ 13.00	0.06
Skid Steer (Bobcat).....	\$ 26.70	11.90
Trencher.....	\$ 18.50	4.23
Vaccum Truck.....	\$ 26.35	11.65

TRUCK DRIVER

Concrete Pump.....	\$ 20.00	2.25
Dump.....	\$ 18.39	3.47
Flatbed.....	\$ 21.68	
Lowboy.....	\$ 22.00	
Tack/Tar Truck.....	\$ 24.79	7.44
Tandem.....	\$ 21.00	5.30
Tractor Trailer.....	\$ 32.00	2.00
Water.....	\$ 18.25	0.61

a. PAID HOLIDAYS: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day.

b. PAID VACATIONS: Employees with 1 year service-1 week paid vacation; 2 years service-2 weeks paid vacation; 10 years service-3 weeks paid vacation.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour

Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

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705500 – PEDESTRIAN CONNECTION, MARYLAND

Description:

Furnish all materials to construct and/or remove Pedestrian Connection and associated Islands to Maryland State Highway Administration standards as shown on the details in Plans, at the location(s) shown on the Plans, to the requirements of the Maryland State Highway Administration and/or as directed by the Engineer.

Materials:

Provide materials as specified in:

Graded Aggregate Base Course	Section 1005
Bituminous Pavement	Section 1014
Bituminous Patching	Section 402
Portland Cement Concrete, Class B	Section 1022
Expansion Joint Material	Section 1042
Joint/Crack Sealant Material	Section 1042
Curing Compound	Section 1022
Delineator	Section 824

General: Submit all proposed sources of materials to Materials and Research Section in accordance with Subsection 106.01.

Construction Methods:

Provide an American Concrete Institute (ACI) or National Ready Mix Concrete Association (NRMCA) certified concrete flatwork technician to supervise all finishing. Provide proof of the flatwork certification to the Engineer prior to concrete placement.

Construction of Pedestrian Connection(s):

1. Sawcut existing bituminous concrete pavement or PCC pavement, if applicable;
 - a. For bituminous concrete pavements, sawcut 18" minimum from the proposed face of curb or gutter of the island to allow enough room to achieve compaction for hot-mix patching;
 - b. For PCC pavement, sawcut at the proposed face of curb or gutter.
2. Remove bituminous concrete pavement or PCC pavement and dispose of in accordance with Subsection 106.10 and/or permits, if applicable;
3. Prepare the foundation for the curb in accordance with Subsections 701.03;
4. Place Graded Aggregate Base Course (GABC) for curb installation at the location and depths shown on the plans in accordance with Section 301;
5. Layout and pour PCC Curb in accordance with Section 701 unless otherwise specified on the plans or directed by the Engineer;
 - a. Finish curb in accordance with Subsection 701.03;
 - b. Cure curb in accordance with Subsection 701.03;
 - c. Backfill curb in accordance with Subsection 701.03 after removal of forms, or upon completion of slip-form operation;

6. Prepare the foundation for the sidewalk in accordance with Subsection 705.03;
7. Place concrete for sidewalk at depth(s) shown on plans in accordance with Section 705;
 - a. Install 4" PVC sleeve for signs at locations shown on plans;
8. Construct Pedestrian Connection, if applicable, in accordance with the details shown on the plans, any modifications on the plans and to all the applicable requirements of the Maryland State Highway Administration.
9. Furnish and install Sidewalk Surface Detectable Warning System, if applicable, in accordance with the requirements of the Maryland State Highway Administration and to all the applicable requirements of Section 705.
10. Perform hot-mix patching in accordance with Section 402 and/or PCC patching in accordance with Section 503, if applicable, as shown on plans or otherwise match existing pavement structure;
11. Furnish and install Delineator(s) on the leading ends/corners of the island(s).

Method of Measurement:

The quantity of Pedestrian Connection, Maryland State Highway Administration will be measured

- Triangular Islands: the number of square feet, from face of curb to face of curb for triangular islands.
- Pedestrian Connection, curbed: the number of square feet from face of curb along the edge of road to the back of Pedestrian Connection, tapers and/or landings through the full extent of concrete placement.
- Pedestrian Connection, non-curbed: the number of square feet from edge of road to back of Pedestrian Connection, tapers and/or landing through the full extent of concrete placement.
- Removal of Pedestrian Connection: the number of square feet from edge of sawcut line to back of Pedestrian Connection, taper, and or landing through the full extent of concrete removal.

No measurement for payment will be made on vertical surfaces of curb or sidewalk.

Sidewalk Surface Detectable Warning System will be measured and paid for under Item No. 705007.

Basis of Payment:

The area of Pedestrian Connection shall be paid for at the Contract Unit Price per square foot. Price and payment constitutes full compensation for excavation within the template of this Item, grading and compacting, including the curb and pavement areas within the limits of the ramp, furnishing and placing all Materials including graded aggregate base course, curb, concrete, bituminous or concrete for patching along the curb line, expansion material, saw cutting, removal and disposal of the existing curb, gutter, sidewalk and pavement, and for all equipment, labor, tools, and incidentals necessary to complete the Work.

No additional payment will be made under other contract items for work necessary to construct the island except Item No. 705007 - Sidewalk Surface Detectable Warning System.

Note: The curb and sidewalk components are not to be placed monolithically unless otherwise directed by the Plans or the Engineer.

710504 - WATER SERVICES

Description:

This work consists of furnishing, transporting, installing, and testing the water main, line, laterals, and accessories in accordance with the locations, details and notes on the Contract Documents, and as directed by the Engineer. The work shall be performed in accordance with these Special Provisions, Delaware Standard Specifications, the requirements of the Standards and Specifications of Suez Water Delaware, and the requirements of the Standards and Specifications of the City of Newark Public Works and Water Resources. There are two Owners of the water utilities depicted on the plans, Suez Water Delaware and the City of Newark Public Works and Water Resources. For purposes of these specifications, the water utility owner is referred herein as the Utility Owner. Please refer to contract drawings for determining the proper Utility Owner that will take ownership of the proposed the water assets. In case of conflict between these Special Provisions, Delaware Standard Specifications, and the Standards and Specifications of the Utility Owner, the Standards and Specifications and all other requirements of the Utility Owner shall prevail.

Materials:

Provide Materials as specified in the following:

Portland Cement Concrete, Class B	Section 1022
Backfill, Borrow Type C	Section 1001
Stone, Delaware No. 8	Section 1004

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 Utility Owner. The Utility Owner shall have right to inspect and reject the materials, if his/her specifications requirements are not met. It is recommended that the Contractor should contact the Utility Owner and get himself/herself familiarized with the applicable requirements of the materials required under this Contract before submitting his/her 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.

The Contractor shall transport, handle, and store pipe and fittings as recommended by 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 the Utility Owner. 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 the Utility Owner or Department.

A. WATER LINE MATERIALS

All watermain pipes, 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.

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.

Warranty and Acceptance: Materials and workmanship shall have a one-year warranty to be free from defects in workmanship and materials. The warranty will be from the date of completion of construction. If work has been done to the requirements of this specification, a letter of acceptance shall be provided to the contractor upon final inspection. If deficiencies are discovered during the warranty period, the Contractor shall be required to correct these deficiencies without additional charge to the Owner or his agent. The Project Engineer shall determine the need for warranty repair work to be performed by the Contractor. The Project Engineers determination of a deficiency will bind the Contractor to make a repair in accordance with this Contract.

1. PIPE BEDDING MATERIAL - Pipe bedding material shall be in accordance with DelDOT Standard details.
2. DUCTILE IRON PIPE (DIP) - Ductile iron water mains shall be push on, Class 52, unless otherwise specified. DIP 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. DIP shall be cement lined in accordance with the requirements of ANSI/AWWA C104/121.4-80. A bituminous seal coating shall be applied to the interior and exterior as soon as the cement lining has sufficiently dried.
 - a. Suez Water Delaware: provide a minimum cover of 36 inches.
 - b. City of Newark Public Works and Water Resources: provide a minimum cover of 42 inches.
3. POLYETHYLENE PIPE (PE) - PE water mains shall be Class 200 unless otherwise specified. 1.5 or 2-inch PE shall conform to ASTM D3035, AWWA C901. Provide a minimum cover of 36 inches.
4. GATE VALVES
 - a. Suez Water Delaware: Main gate valves shall be Mueller A-2361, open left, or approved equal
 - b. City of Newark Public Works and Water Resources: Main gate valves shall be Mueller A-2362, open left, or approved equal
5. INSERTION VALVE
 - a. Suez Water Delaware: Main insertion valve shall be TEAM InsertValve with Resilient Seat Gate or approved equal.
 - b. City of Newark Public Works and Water Resources: Advanced Valve Technologies EZ Valve. 90-degree actuators will be required where burial depths will not accommodate a standard valve configuration. Insertion valves may be located in a manhole where existing burial depths are less than 42". A minimum of 6" must be maintained between the bottom of the manhole lid and the valves operating nut.
6. VALVE BOXES - Valve boxes shall be installed with lids reading "WATER"
 - a. Suez Water Delaware: Valve boxes shall be Mueller H-10350, or approved equal.

- b. City of Newark Public Works and Water Resources: H-10360, or approved equal.
- 7. DIP FITTINGS - DIP Fittings shall be ductile iron casting and have mechanical joints, Class 350 conforming to AWWA specification C153, covering compact fittings. Mechanical joints shall conform to AWWA Specification C111, latest revision, with gaskets made from vulcanized crude rubber compound. Fittings shall be cement lined and bituminous coated. Mastic spray is to be used where any uncoated pipe or fitting is exposed such as welds, Megalugs, scraped coating, etc.
- 8. BOLTS, NUTS & RODDING - All underground installed bolts, T-bolts, nuts and any rodding required shall be stainless steel, ASTM F 593 Type 316 for all watermain 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 City Engineer.
- 9. HYDRANTS - Hydrant laterals shall be retraining tee, 6 inch resilient wedge gate valve and box with 6 inch ductile iron pipe. Valve opening shall be 5 ¼ inch, open left. The nozzle arrangement shall be two 2 ½ inch hose connections and one 4 ½ inch pump connections, National Standard Thread. Lateral connection shall be 6 inch mechanical joint. Operating nut shall be 1 ½ inch pentagon.
 - a. Suez Water Delaware: Hydrants shall be Waterous Pacer WB-67-250.
 - b. City of Newark Public Works and Water Resources: Super Centurion 250/HS Mueller, A-423, buttressed and rodded.
- 10. TAPPING SLEEVES AND VALVES - Tapping sleeves shall be Mueller H-615, Mueller Stainless H-304. Tapping sleeves shall be a minimum of 6 feet from pipe joints or other fittings.
 - a. Suez Water Delaware: Tapping valve shall be Mueller T-2362, open left.
 - b. City of Newark Public Works and Water Resources: Mueller T-2360-19, open left
- 11. BUILDING SERVICES AND SERVICE SADDLES - Contractor shall be responsible for locating all water services; determining is active or abandoned; and confirming size and material. Locating and determining active status shall be incidental to the service connection item.
 - a. CURB STOPS
 - i. Suez Water Delaware: Curb stops shall be Ford Ball Valve with Pack Joint inlet and outlet, or approved equal.
 - ii. City of Newark Public Works and Water Resources: Curb stops shall be Mueller H-15209N or P-25209N.
 - b. CURB BOXES - Curb boxes Mueller-H10350, or approved equal.
 - c. CORPORATION STOPS -
 - i. Suez Water Delaware: Corporation Stops shall be Ford Ballcorp with AWWA inlet threads and Pack Joint outlet, or approved equal.
 - ii. City of Newark Public Works and Water Resources: ¾ inch Mueller H-15008N or B-25008N, tapped on upper 1/3 (45 degree).

12. POLYETHYLENE ENCASEMENT MATERIAL -
 - a. Suez Water Delaware: Polyethylene encasement material shall conform to the requirements of AWWA C-105 for tube type installation and 8 mil nominal film thicknesses.
 - b. City of Newark Public Works and Water Resources: V-Bio Enhanced Polyethylene Encasement manufactured by McWane Ductile or approved equal.
13. BENDS - All bends shall be concrete buttressed or utilize locking gaskets. Refer to construction details in the drawings.
14. RESTRAINED JOINTS - Restrained joints shall be provided at all transition connections. Restrained joints shall be MEGA-LUG series 1100 or approved equal. At locations where bends are required pre-cast thrust blocks. For connection between HDPE and DIP pipe, Contractor shall use a MJ Adapter for connection. Contractor is responsible for restraining DIP joints and fittings at alignment changes; at valve locations where a future tie-in may occur; at valve locations where existing pipe will be removed and replaced during future operations; and as shown on the drawings or required based on requirements of the construction details.
15. STIFFENERS INSERTS. Stainless steel stiffener inserts, ASTM 240, shall be used for all fittings and connections to HDPE pipe.
16. Backflow Preventer and Basket Strainer for Temporary Water Main and Hydrostatic Testing: Reduced pressure principal type, flanged and supplied complete with integral valves, following the American Society of Safety Engineers Standard No. 1013 and AWWA C510.
 - a. Materials: Bronze, or liquid epoxy coated cast iron body with bronze and stainless steel working parts.
 - b. Pressure Requirements: Suitable for supply pressure as high as 175 psi and hydrostatic test pressure of 350 psi.
 - c. Manufacturers: Conbraco, Febco, Zurn Industries, Watts Regulator or approved equal.
 - d. Basket Strainers.
 - i. Installation: Inlet side of backflow preventer following Drawings.
 - ii. Strainers: Flanged ends, unless otherwise noted.
 - (1) Strainer bodies: Ductile iron, gray iron, or bronze and designed to withstand maximum working pressure of 175 psi with tapped opening for flushing strained debris.
 - iii. Screens: Unless otherwise noted, stainless steel or brass sheet metal with ¼ inch perforations.
 - (1) Open area of screen: At least 4 times inside cross-sectional area of pipe.
 - iv. Manufacturers: Hersey Products, Inc., Mueller Co., or approved equal.

B. JACK AND BORE

Casing Pipe shall be welded steel pipe, minimum 3/8-inch wall thickness, meeting the requirements of ASTM A 139, Grade B of the nominal diameter and length depicted on the Drawings. Casing pipe shall include a bituminous asphaltic coating on the exterior of the casing pipe applied at the manufacturing facility and re-applied as needed in the field if damaged during delivery or installation. Steel casing sections shall be connected by seam welding a butt joint. Field welding shall be performed in accordance with AWWA C206, Field Welding of Steel Water Pipe.

Casing Spacer shall be in accordance with the following requirements:

1. Spacers shall be as shown on Contract Documents.
2. Spacers shall be stainless steel.
3. Spacers shall be bolt on style with a two-piece shell made from T-304 Stainless Steel of a minimum 14-gauge thickness.
4. Shell shall be lined with a ribbed PVC sheet of a 0.090-inch thickness that overlaps the edges.
5. Runners made from UHMW polymer, shall be attached to risers at appropriate positions to properly locate the carrier within the casing and to ease installation.
6. Risers to be made from T-304 Stainless Steel of a minimum 14-gauge thickness and shall be attached to the shell by MIG welding.
7. All welds shall be fully passivated.
8. All fasteners shall be made from T-304 Stainless Steel.
9. Model CCS as manufactured by Cascade Waterworks Manufacturing Company, Yorkville, IL. Or approved Equal.

Casing End Seals shall be in accordance with the following requirements:

1. Casing end seals shall be installed to create a barrier from water and debris.
2. The minimum thickness of seals shall be 1/8" of ethylene propylene diene monomer (M-Class) (EPDM) rubber, which conforms to ASTM Standard D-1418.
3. The tensile strength shall be no less than 1,000 PSI.
4. Bands shall be T-304 Stainless Steel.
5. Acceptable manufacturers:
 - a. Advance Products and Systems
 - b. Pipeline Seal and Insulator, Inc.
 - c. Approved Equal

Grout shall be in accordance with the following requirements:

1. Cement: ASTM C150, Type I or Type II.
2. Sand: ASTM C404, Size No. 1.
3. Voids between Casing and Existing Ground: Minimum compressive strength of 100 psi, attained within 24 hours, and sufficiently fluid to inject through lining and fill voids, with prompt setting to control grout flow.

Patches for all appurtenances adjusted after the paving operations will require a perimeter reservoir and will be sealed in accordance with Section 504.

Special Requirements:

Coordinate all water service construction activities with the Owner including, but not limited to, requests for system shut downs and inspections. Provide the Owner with reasonable time to respond to requests for information and coordination. Submit (3 weeks prior to beginning the Work), for approval, a plan describing the logical sequence for water service shut-downs and tie-ins.

If necessary, furnish, install, and remove bypass and temporary services pipes to maintain water service to customers during the Work. Furnishing, installing services and other branches, maintaining, providing safety precautions and removal of temporary services is the responsibility of the Contractor and shall be included as part of the bid item as incidental to the cost of installing pipe. Use only the highest quality service pipe, connections and branches that are able to withstand 150 pounds per square inch pressures and all conditions of use. Ensure that all pipes and fittings are watertight, and that care is exercised throughout the installation to avoid pollution of mains, hose services or temporary service pipe.

Place temporary service pipe in the gutters where possible. Provide pipe crossings at driveways with cold patch cover or other methods approved by the Engineer. At street crossings, place temporary pipe in shallow trenches covered with temporary surfacing or other methods approved by the Engineer. Use sanitary precautions that are satisfactory to both the Engineer and the Owner. Chlorinate the interior of temporary service pipe in accordance with the latest AWWA Manual C601-81 "AWWA Standard for Disinfecting Water Mains". Chlorine and bacteria testing will be performed by the Owner's inspector.

The Owner and the Engineer retain the sole right of determining the times that the Work can occur and the sequence of the Work. Do not begin Work until both the Owner and the Engineer grant permission to proceed. Notify the Owner a minimum of forty-eight (48) hours before beginning Work to allow the Owner to arrange inspection. Immediately notify both the Engineer and the Owner of all delays to the scheduled Work.

It is of prime importance that the Contractor, in the performance of the Work, does not disrupt the operation of the existing water facilities in any manner or at any time, without the expressed prior approval of the Owner. 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 will 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 in the Contract Documents. 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.

Before any shutdown, as specified above, the Contractor must give the utility owner and local 911 Center and Fire Department forty-eight (48) hour's 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 are not permitted if tapping sleeves and valves are specified for making the connections. Any and all emergency repairs required are the responsibility of the Contractor. Upon notification via telecommunication from the Owner, attend to any repairs immediately. In the event the Owner is unable to contact the Contractor, or the Contractor fails to make the emergency repairs in a length of time determined by the Owner, the Owner reserves the right to attend to any or all emergency repair work. In such a case, the Contractor is responsible for reimbursements due to the Owner for the costs of the repairs.

Remove and replace or repair all Materials and Work, or parts thereof, which are deemed unsatisfactory as to any or all requirements of the Owner or the Engineer or as specified herein, at no expense to the State or the Owner.

Guarantee all workmanship, Materials and Work performed is in strict accordance with the Contract Documents, for a period of two years from and after the date of Completion and Acceptance of the Work. 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, provisions and requirements of the Contract during such two-year period.

Only designated Utility Owner personnel shall have the authority to operate any hydrants or valves that make up the Artesian Water Company water distribution system. Contractors shall not operate existing gate valves or hydrants. It is the Contractors responsibility to make arrangements for receiving water from public or private sources, secure necessary permits and pay regular charges. Under no circumstances shall existing hydrants be used to supply water other than to Utility Customers. The Contractor under the direction of the Utility Owner personnel shall do the initial filling of new water mains for service installations and testing. Disposal of any wastewater or any test water into New Castle County's sanitary sewer system is subject to New Castle County's charge. Prior written approval must be obtained from New Castle County.

Construction Methods:

Patches for all appurtenances adjusted after the paving operations will require a perimeter reservoir and will be sealed in accordance with Section 504.

The construction of the water main shall be a combination of open cut excavation and jack and bore.

A. WATER PIPE INSTALLATION

1. **WORKING HOURS** - The Utility Owner shall be notified at least 48 hours prior to commencing any work. Contractors are subject to being shut down and or having work rejected if proper notification is not given to the Utility Owner. A schedule of work shall be submitted to the Engineer and Utility Owner prior to construction defining which 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 the Utility Owner and Engineer. 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** - Watermain and water services shall be placed with a minimum of 36 inches of finished ground cover from the top of pipe to finished grade. The laying and jointing of water pipe shall be in accordance with the Contract Documents and the requirements of the Utility Owner's 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 Work may be performed except under the supervision of the Utility 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 Work is 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 repaired 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 the Owner and the Engineer at the Contractor's expense.

Thrust blocks are to be made of Portland Cement Concrete, Class B with a Concrete minimum strength 3,000 psi. Thrust blocks of adequate size and weight shall be used on all pressure piping for all fittings and all bends equal to and greater than of 11 1/4 degrees to resist the force of water pressure and water hammer. Thrust blocks (buttresses) shall conform to the details shown on the Plans and/or the Owner's Standard Specifications. Thrust blocks must be used unless the Owner's specifications or the Contract Documents permit a different method to secure the fittings. All methods used to secure fittings, including, but not limited to, thrust blocks, couplings and service saddles are incidental to the fittings and no separate payment will be made for this Work.

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. Keep all excavations free from water or other liquids during the progress of the Work. Excavate and backfill trenches per the applicable requirements of Section 207. Remove all excess Material in accordance with Section 106.08.

3. 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 Section 207 of the DelDOT Standard Specifications.
 - a. Installation of Polyethylene Pipe (HDPE) and their appurtenances shall conform to the requirements of AWWA C906. The installation shall be to the bedding and backfill conditions specified by the Manufacturer, Plans, Specifications, or Special Provisions.
 - b. Installation of ductile iron water mains (DIP) and their appurtenances shall conform to the requirements of AWWA C-600 Specifications, the Plans, Specifications and Special Provisions.
4. PIPE LAYING OPERATIONS - 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. 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.

Mechanically compact trenches in accordance with DeIDOT 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.

5. POLYETHYLENE ENCASEMENT OF PIPELINE - For DIP water main, the pipeline, including valves, fittings, hydrant barrels, and appurtenances, shall be fully encased in polyethylene film meeting the requirements of these Specifications. The film shall be furnished in tube form for installation on pipe and all pipe-shaped appurtenances such as bends, reducers, off-sets, etc. Sheet film shall be provided and used for encasing all odd-shaped appurtenances such as valves, tees, crosses, etc. The polyethylene tubing shall be installed on the pipe prior to being lowered into the trench. Tubing length shall be sufficient to provide a minimum overlap at all joints of one foot or more. Overlap may be accomplished with a separate sleeve tube placed over one end of the pipe prior to connecting another section of pipe, or by bunching extra overlap material at the pipe ends in accordion fashion. After completing the pipe jointing and positioning the overlap material, the overlap shall be secured in place with plastic adhesive tape wrapped circumferentially around the pipe not less than three turns. After encasement, the circumferential slack in the tubing film shall be folded over at the top of the pipe to provide a snug fit along the barrel of the pipe. The fold shall be held in place with plastic adhesive tape applied at intervals of approximately three feet along the pipe length. Also, any rips, punctures, or other damage to the tubing shall be repaired as they are detected. These repairs shall be made with adhesive tape and overlapping patches cut from sheet or tubing material.

At odd-shaped appurtenances such as gate valves, the tubing shall overlap the joint and be secured with tape, after which the appurtenant piece shall be wrapped with a flat film sheet or split length of tubing by passing the sheet under the appurtenance and bringing it up around the body. Seams shall be made by bringing the edges together, folding over twice, and taping down. Wherever encasement is terminated, it shall extend for at least two feet beyond the joint area. Openings in the tubing for branches, service taps, air valves and similar appurtenances shall be made by cutting an X-shaped slit and temporarily folding back the film. After installing the appurtenance, the cut tabs shall be secured with tape and the encasement shall be completed as necessary for an odd-shaped appurtenance.

6. REACTION BACKING - Reaction backing shall be provided at all watermain fittings and at the hydrant in accordance with the typical backing detail shown on the standard details. In any instance where the Engineer determines that solid backing against undisturbed earth is not obtainable for fittings or hydrants, the Contractor shall use stainless steel tie rods, ASTM F 593 Type 316 or mechanical joint retainer glands as directed by the Engineer. Valves on branch lines or in hydrant leads shall in all cases be tied to an adjacent tee or cross fitting or back one full length of pipe.
7. EXCAVATION AND TRENCHING - Excavation shall be performed in accordance with Section 207 of the DeIDOT Standard Specifications and Excavation and Backfill for Pipe Trenches 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. For pipe under 24-inch, internal diameter, the excavation (excluding rock), backfill and backfilling shall be included in the price for installation of the water main(s). Furnishing and borrowing shall be performed in accordance with section 210 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/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) in advance of construction, the Contractor shall, if so directed, refill such trench or excavation at his/her own expense and shall not again open said trench until the Engineer determines that the Contractor is ready and able to progress the work.

Patches for all appurtenances adjusted after the paving operations will require a perimeter reservoir and will be sealed in accordance with Section 504.

Where rock is encountered and blasting is required for trenching, all rock excavation work shall be performed in accordance with Section 206.03.06 of the DeIDOT Standard Specifications except as modified herein; and the trench shall be excavated an additional six inches below grade. After the excavation is completed, a bed six inches in depth of Borrow Type C shall be placed in the bottom of the trench, leveled off and thoroughly tamped. If blasting is required to remove the rock, perform blasting operations in accordance with Section 107.08 of the DeIDOT Standard Specifications.

8. EMERGENCY REPAIRS TO DAMAGED UTILITIES

- a. Known or Field Located Utilities - In the event that the Contractor or his Subcontractor during the execution of the work breaks any known or field located pressure or gravity main causing the disruption of service and/or an eminent hazard, it shall be the responsibility of the Contractor/Subcontractor to immediately notify the Utility Owner at the designated emergency telephone number and immediately undertake measure to repair the damaged utility. To that effect the Contractor/Subcontractor shall ascertain prior to initiating the work that the necessary repair parts, tools, equipment, and labor are on ready and available onsite to complete the repair work without delays. The Utility Owner personnel and Engineer shall witness the repair work.
- b. If the Contractor/Subcontractor estimates or determines that he is not going to be able to restore service within a less than two-hour period, the Contractor shall immediately contact the Utility Owner's manager to initiate repair.
- c. The Utility Owner will undertake the repair work and will back charge the Contractor. The Utility Owner will submit an itemized bill within 30 calendar days from the occurrence of the event.
- d. Unknown or Inaccurately Located Utilities - If the utility was not field located or it was inaccurately located in accordance with the prescribed procedures under

the Sunshine State One-Call guidelines and the Contractor/Subcontractor cause a line break during the execution of the work, the same notification procedure as above must be followed. The Utility PCU Operations will undertake the repair work at no cost to the Contractor.

9. CONNECTIONS TO EXISTING MAINS: Only District personnel shall make connection to the existing water mains when and as directed by the District Inspector at the contractor's expense. In no case shall the Contractor shut off the water or operate the fire hydrants or gate valves of the existing distribution system without the expressed permission of the District Inspector. 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.
10. CONCRETE BLOCKING: All turns, fittings, fire hydrant connections, etc., that induce pressure which would cause separation of pipe, breakage, etc., shall be blocked with 3,000 lb. concrete. Blocking shall be formed and placed in such a manner that the pressure to be exerted at the point of blocking shall be transferred to firm, undisturbed earth at a maximum load of 2,000 lbs, per square foot. The Contractor shall insure that blocking at all tees, bends, plugs, etc., shall be sufficient to contain all pressure exerted by the pipe up to a pressure of 200 lbs. per square inch hydraulic pressure within the pipe, i.e. pressure at plug = 200 x (area of pipe in inches). The Contractor shall also be responsible for any damage or repairs caused by blowouts of any insufficiently blocked pipe. The contractor shall wrap all fittings, fire hydrant connections, etc. with District approved plastic wrap before any and all concrete pouring is started.
11. WATERMAIN TESTING - In order to assure quality materials and workmanship, the following tests shall be required unless waived by the Engineer. 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 CEAM 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 the Utility Owner. 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 Utility 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.
 - a. PRESSURE TESTING OF WATERMAIN - Hydrostatic pressure testing shall conform with AWWA C-605, latest revision as well as to the specifications of the Owner. Pressure testing shall be performed on all pipe, valves, hydrants, and fittings. The test shall be conducted on line segments from shut valve to shut valve in segments not exceeding 1,500 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 two (2) hours with the Utility Owner's inspector present and to the full satisfaction of the Engineer. The maximum allowable leakage is in accordance with AWWA C605. Install any taps required at high points on the line to expel trapped air prior to testing.

Following the tests, tightly plug all taps with suitable threaded brass plugs.
Repair all visible leaks regardless of total leakage shown by test.

- b. CONDUCTIVITY TESTING OF WATERMAIN - Conductivity testing of DIP watermain, copper straps or copper tipped gaskets shall be required to run at 350 amps for 5 minutes. PVC/HDPE watermain tracer lines shall be tested using standard underground utility locator, demonstrating that the lines can be located with standard equipment.
- c. STERILIZATION OF WATERMAIN - The method to be used for sterilization shall comply with AWWA C 601-81, C 651, and Owner requirements, with the plugs used in the pressure test still installed in the pipe prior to placement into service. 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 Utility Owner or the State and shall be included in the contract unit price per linear foot bid for the Water Main Installation.
- d. BACTERIA TESTING OF WATERMAIN - 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 performance of these tests by the Owner are borne by the Contractor. Upon final sanitary approval by the Owner, return water service for use by the consumer. Before the final connection is made, thoroughly clean all surfaces of the relocated line, including all gaskets and glands, and the existing water main that are to become part of the closing joint with a 5 percent solution of Sodium Hypochlorite. Exercise extreme care in order to prevent the entrance of any contaminants into the main. All expenses and cost incurred in carrying out the specified sterilization work is borne by the Contractor at no extra cost to the Owner or the State and is included in the Contract Unit Price per linear foot bid for the Item for the various sizes. Plug adjacent pipe openings as required in accordance with the Section 202.03.2.

- 12. AS-BUILT / 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 Utility Owner. Services, fittings, fire hydrants and all other reconnections to the replaced pipes shall be identified and marked in the construction drawings by the Contractor. The Contractor shall be responsible for marking the construction drawings in reference to at least two fixed and easily found points.

B. Jack and Bore

The pipe, whether casing or carrier, installed by means of Tunneling shall be installed to the line and grade specified on the Contract Drawings. Initial control information will be established prior to the initiation of work. As Tunneling proceeds, line and grade will be furnished on a scaled drawing at intervals not exceeding twenty (20) feet by the Contractor. The Contractor shall use this information to project the alignment ahead until subsequent references can be set.

If a pilot hole is to be tunneled, the pilot hole shall not deviate greater than 5% of depth over the length of the tunnel unless previously agreed to by the Engineer. In the event that the pilot hole does deviate greater than required, the Engineer may require the Contractor to pull back and re-tunnel from the location along the path prior to deviation.

Bore so as not to interfere with, interrupt, or endanger surface and activity thereon. Minimize subsidence of surface, structures, and utilities above and in vicinity of bore. Support ground continuously to prevent loss of ground and keep perimeters stable. Be responsible for settlement resulting from operations. Repair and restore damaged property to its original condition before being disturbed at no cost to the OWNER.

The approach and receiving trenches shall be excavated, and the pipe placed at the elevation and grades specified, in accordance with the Drawings and Contract Documents. Boring shall be performed in the downstream direction.

Boring shall be installed to grade and line indicated on the contract documents. Jack and bore operation shall be monitored via censoring devices to ensure correct grade and line installation. There shall be a 1-inch tolerance for grade elevations of the casing and carrier pipes.

The casing pipe shall be pushed in to the ground with a boring auger rotating within the pipe to remove the spoil. The cutting head shall not be advanced ahead of the casing pipe except for that distance necessary to permit the cutting teeth to cut clearance the pipe.

The overcut of cutting head shall not exceed more than ½ inch. If unstable soil is encountered during the boring procedure, the cutting head shall be retracted into the casing to maintain a balance between the pushing pressure and the ratio of pipe advancement to quality of soil. The Contractor shall use a steering system to ensure grade is met, on a single pass. Pilot tube guided boring is not acceptable.

If voids should develop greater than the outside diameter of the pipe by approximately one (1) inch, the Contractor shall fill the voids with approved pressurized grout material.

When augers and cutting heads or similar devices are used for advancing the casing pipe, the front of the pipe shall be provided with mechanical arrangements or devices that will prevent the auger and cutting head from leading the pipe (so that there will be no unsupported excavation ahead of the pipe). The auger and cutting head arrangement shall be removable from the pipe in the event an obstruction is encountered.

The operation shall be continuous until the casing is installed.

Direction of jack and bore shall be monitored via sensing devices to ensure correct grade and line installation. A thrust wall shall be constructed normal to the proposed line thrust. The thrust load shall be imparted to the pipe through a suitable thrust ring that is sufficiently rigid to ensure distribution of the thrust load on the pipe. The thrust wall and jacking system shall be designed to carry the thrust of the jacks to the soil without excessive soil deflection and in such a manner as to avoid any disturbance of adjacent structures or utilities.

Dewatering shall be performed by the Contractor in compliance with all applicable local, State and Federal rules, regulations and ordinances. Surface drainage shall be diverted away from the execution through the use of dikes, ditches, pipes, sumps, or other means. When water is encountered, develop and maintain dewatering system of sufficient capacity to remove water continuously, keeping excavations free of water until backfill operation is in progress.

Keep removal of soil to a minimum. Dewater in accordance to Contract Documents. Observe settlement or displacement of surface facilities due to dewatering. Should settlement or displacement be detected, notify Engineer immediately and act to maintain safe conditions and prevent damage.

Carrier pipe shall be installed in the casing pipe with restrained joints, and as illustrated on the Contract Drawings. The carrier shall be supported within the casing so that no external loads are transmitted to the carrier pipe. The ends of the casing pipe shall be sealed to provide a barrier against debris and seepage.

After carrier pipe and spacers are installed, the annular space shall be filled with grout.

Method of Measurement and Basis of Payment:

Price and payment for water service items includes furnishing, transporting and installing the Materials; adjusting, relocating or repairing the services, testing of the water main system; for repairing leaks and defects, including defects to settlement, connecting to existing water main systems and services; maintaining service as required; excavating; jack and bore installation; disposing of excess excavated Material; backfilling; furnishing Material for backfilling; furnishing and installing concrete thrust blocks, joint restraints, pipe bedding, sheeting and shoring, temporary support of existing Utilities, dewatering; abandoning existing pipes, cutting and capping new or existing lines and for all labor, Equipment, tools and necessary incidentals to achieve and accept an operational water main system.

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 breakout sheet total must match the Lump Sum Bid price for Item 710504. The Department will review the figures submitted on the breakout sheet(s) to ensure they match the respective lump sum bid price. Incorrect breakout sheets will be returned for immediate correction.

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.

All lump sum pay items will be prorated for each pay estimate. A percentage of the lump sum item will be paid, on a monthly basis, based upon the amount of work completed and accepted by the Engineer.

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
710504	WATER SERVICES	LS

711501 - SANITARY SEWER SYSTEM

Description:

Furnish, transport, provide bypass pumping, install, backfill using type C borrow, and test a sanitary sewer system in accordance with the Contract Documents, these Special Provisions, DeIDOT Standard Specifications, and requirements of the Standard Specifications of the Utility Owner (City of Newark). This work includes but is not limited to construction via open trench of gravity sewer, installation of forcemain and thrust restraints, backfill using type C borrow, installation and adjustment of manholes, bypass pumping, pumping and hauling, gravity laterals, lateral cleanouts, and sewer plugs.

In case of any conflict between the notes and details on the Plans; Special Provisions; Standards and Specifications of the Utility Owner; the Standards and Specifications of the Utility Owner shall prevail.

The Contractor shall obtain the Standards and Specifications of the Utility Owner and study for materials cost before submitting the bids. The Utility Owner of the sanitary sewer is the City of Newark.

General Requirements:

All work shall be subject to inspection and subsequent approval/disapproval of the engineer and the representative of the Utility Owner; and the contractor shall be required to correct the discrepancies at his/her expense.

Included in this work are the connections of all existing commercial, industrial, and residential sanitary sewer services to the new sanitary sewer system. All modifications to such services, as required by the present Standards and Specifications of the Utility Owner and all relocations of such services necessary to avoid conflicts with utilities and highway drainage facilities are included in the work. Since the exact locations of the conflicts cannot be determined prior to trench excavation operations, the Contractor must coordinate and schedule any required relocation efforts of each sanitary sewer connection on an individual basis with the Utility Owner and the property owner. The Contractor shall be responsible for locating all services and determining whether each service is active or abandoned. Locations shown on drawings were provided by the utility owner and may or may not reflect actual field conditions. All costs associated with determining locations and active/abandon status of the service laterals will be incidental to the contract.

Coordinate all sanitary sewer construction activities with the Owner including, but not limited to, requests for system shut downs and inspections. Provide the Owner with reasonable time to respond to requests for information and coordination. Submit (3 weeks prior to beginning any Work) for approval of a plan describing the logical sequence for sanitary sewer shut-downs and tie-ins.

It is of prime importance that the Contractor, in the performance of his/her work, does not disrupt the operation of the existing sanitary sewer facilities in any manner or at any time, without the expressed prior approval of the Utility Owner. The Contractor shall construct, maintain, and remove following construction temporary bypasses as may be required during construction to maintain sanitary sewer facilities in service. In addition, Contractor shall pump and haul sewage as required to maintain sanitary sewer service. No separate payment will be made for such temporary bypasses or pumping and hauling.

The Contractor shall provide at least two (2) telephone numbers where his designated personnel can be reached 24 hours a day in case of an emergency. The Contractor shall provide temporary lighting for maintenance and repairs at night. The Contractor shall provide adequate standby equipment installed and ready for immediate operation and use in the event of an emergency or breakdown.

One standby bypass pump system for each pump system utilized shall be installed at the bypass location ready for use in the event of primary pump system failure. Each stand-by pump system shall

have an automatic start/stop control. The bypass pumping system shall be capable of bypassing the flow around the work area for satisfactory performance of work.

All lateral connections will be treated in the same manner as mainline sewers. Each will have a temporary sump, pump and stand-by pump to transfer flows to a mainline manhole. It is essential to the operation of the existing sanitary sewer system that there be no interruption in the flow of sanitary sewer throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing sewer downstream of his work. Sewage shall be pumped from existing upstream manholes to downstream manholes.

The design, installation and operation of the bypass pumping system shall be the Contractor's responsibility. The bypass pumping system shall meet the requirements of all codes and regulatory agencies having jurisdiction. The Contractor shall provide all necessary means to safely convey the sewage around the work area. The Contractor will not be permitted to stop or impede the main flows under any circumstances. The Contractor shall maintain sanitary sewer flow around the work area in a manner that will not cause surcharging or damage of the existing sewer system and that will protect public and private property from damage and flooding.

Any and all emergency repairs required during the period of this Contract shall be the responsibility of the Contractor. In the event the Utility Owner is unable to contact the Contractor for the immediate emergency repair items of work, or in the event the Contractor does not take action when contacted within 24 hours, the Utility Owner reserves the right to attend to any and all emergency repair work items and to resubmit the costs directly to the Contractor for complete payment.

The installation requirements for the sanitary sewer system include both open-cut for both gravity sewer and force main sewer.

The contractor shall furnish all labor, supervision, material, tools, equipment, supplies, and services; and shall perform all Work necessary for the installation of a casing pipe by bore and jack methods. The casing pipe shall be constructed in accordance with the Contract Documents and the applicable laws, rules, ordinances, standards of the City of Newark, the State of Delaware, Federal Government, OSHA 29CFR 1926, building codes, applicable criteria of ANSI A10.16-1995(r2001) (Safety Requirements for Tunnels, Shafts, and Caissons), and regulatory agencies, and specifications of the Owner.

Materials:

The requirements for the materials as applicable to the Contract are as noted below, unless otherwise stated on the Plans and/or required by the Utility Owner of the sewer system. The Contractor shall verify the compatibility of these materials specifications with the Utility Owner before placing order for the Contract. The Owner will have right to inspect Materials and reject any Materials that do not meet the applicable standards and specifications.

Provide all Materials to complete the Work including pipe, fittings, manholes, cleanouts, fill, plugs, and all other appurtenances necessary to make permanent connections to existing utility facilities of whatever material type encountered.

Gravity Piping

The Polyvinyl Chloride Pipe (PVC pipe) suitable for non pressure drainage of sewage and fittings shall be of SDR 26 of the nominal size required by the Plans or as required/approved by the Utility Owner.

All PVC pipe and fittings shall be manufactured in accordance with the latest version of the following ASTM Specifications:

1. ASTM D3034, "Standard Specification for Type PSM PVC Sewer Pipe and Fittings."
2. ASTM F1336, "Standard Specification for PVC Gasketed Sewer Fittings."
3. ASTM D3212, "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals."

All PVC pipe joints shall be gasketed, bell-and-spigot, push-on type. Gaskets shall be part of a complete pipe section and furnished as such. Gaskets may be factory installed or field installed as recommended by the pipe manufacturer. Lubricant shall be as recommended by the pipe manufacturer. Provide elastomeric gasket joints in accordance with ASTM F477.

All PVC non-pressure sewer pipe shall have a maximum standard dimension ratio (SDR) of 26. All PVC non-pressure sewer pipe shall have a pipe stiffness that equals or exceeds 115 lbs/in² (PSI).

Each pipe shall be marked at intervals of five (5) feet or less to designate compliance with applicable ASTM or AWWA specification. The pipe shall be as uniform as commercially practicable in color, capacity, density and other physical properties and provided by a single Contractor.

Lateral connection fittings shall be made using a manufactured "wye" connection, constructed of the same class and material as the gravity main to which they are connected.

Unless shown otherwise on the Plans or required by the owner, all commercial, industrial, and residential connections shall be constructed of the same class of material as the sewer mains to which they are connected. Minimum grade and size of the lateral pipes shall be as required by the Owner's Standards and Specifications.

Force Main Piping

All Ductile Iron Pipe (DIP) and High Density Polyethylene (HDPE) pipe, fittings and appurtenances shall be provided as depicted on the Contract Drawings.

Sanitary Sewer Force Main shall be DIP Class 52, Protecto 401 ceramic epoxy lined with outside surface bituminous coated unless otherwise stated in contract documents, where the non-metallic force main shall be HDPE DR-11. HDPE Joints shall be butt-fused.

All DIP and HDPE pipe and fittings intended for pressure sewer shall be manufactured in accordance with the latest version of the following AWWA Specifications:

1. HDPE Pipe: AWWA C901 or C906, ASTM D3261, or ASTM F2206/ASTM F3183 as required.
2. PVC Fittings: AWWA C907, for gasketed joints and using ASTM F 477 elastomeric seals.
3. DIP: AWWA C150 and C151 ductile or gray iron.
4. Compact Ductile Iron Fittings: AWWA C153/A21.53.

Pipe Appurtenances

All pipe and lateral repair couplings suitable for non-pressure sewer repairs shall be manufactured in accordance with the following requirements:

All fittings shall be 350 psi rated, ANSI/AWWA - C153/A21.53 ductile or gray iron, Protecto 401 ceramic epoxy lined. Pipe to Pipe Joint restraints shall be Megalugs, TR FLEX, or approved equal and be able to be deflected as required per approved plans.

Gaskets shall be accordance with the following requirements:

1. ASTM C 1173 - Standard Specification for Flexible Transition Couplings for Underground Piping Systems
2. Hardness, Shore "A," Inst. ± 565
3. Tensile Strength, Min. psi1000
4. Elongation at Rupture, Min. %.....250
5. Tear Strength, Min.....150 lb/in.
6. Brittleness Temperature.....-40°F

Clamps shall be in accordance with the following requirements:

1. Manufactured to the requirements of CSA B602
2. Clamp Housing- 301 Stainless Steel
3. Clamp Band - 301 Stainless Steel
4. Clamp Screw - 305 Stainless Steel
5. Installation torque - 60 inch-pounds

Shear Rings shall be in accordance with the following requirements:

1. 0.012" Thick, 300 Series Stainless Steel
2. Width manufactured according to coupling width (1.50 inches, 2.13 inches, or 4.0 inches)
3. Length manufactured according to coupling diameter
4. Clamps spot welded in place

Coupling shall be in accordance with the following requirements:

1. ASTM C 1173 - standard specification for flexible transition couplings for underground piping systems
2. Maximum test pressure: 4.3 PSI
3. Maximum operating temperature: 140° F non-consistent

Sewer Plugs shall be in accordance with the following requirements:

1. Maximum test pressure: 4.3 PSI
2. Maximum operating temperature: 140° F non-consistent

Backfill and Trenching

All trenching and backfill materials, including those not listed herein shall be included under this item.

Trench material shall match those shown on Contract Drawings and City of Newark Standard Details.

Use Borrow, Type C for backfilling conforming to the Contract Drawings and City of Newark's Standard Details.

For sewer bedding, aggregate material shall be in accordance with AASHTO M43 and shall be used where specified on the Drawings or as required by the Engineer. Aggregate material shall be furnished from a specific source or sources approved by the Engineer.

Warning tape for sanitary sewer shall be printed polyethylene plastic tape with a metallic core, manufactured specifically for warning and identification of buried utility lines. The tape shall be of a roll type, 6" (50 mm) minimum width, and color-coded for sewer (green), with warning and identification imprinted in bold black letters continuously and repeatedly over entire length of tape. The code and letter

color shall be permanent and unaffected by moisture and other substances contained in trench backfill materials. Imprinted on the tape shall be "Caution, Buried Sewer Line Below", or a similar message as approved by the Engineer.

Force Main Pipe Appurtances

HDPE to Ductile Iron Transition assembly shall conform to the Detail found within the Project Drawings.

Pressure-Type Pipe Couplings shall be in accordance with the following requirements:

Metal, bolted, sleeve-type, reducing or transition coupling, for joining underground pressure piping. Include 150-psig minimum pressure rating and ends of same sizes as piping to be joined.

1. AWWA C219,
2. Center-Sleeve Material: Manufacturer's standard.
3. Gasket Material: Natural or synthetic rubber.
4. Metal Component Finish: Corrosion-resistant coating or material
5. Hardware: Type 304 Stainless Steel

Joint Restraints shall be in accordance with the following requirements:

1. AWWA C111
2. Minimum ASTM A536, 60-42-12 ductile iron.
3. Restraint devices shall be coated with a corrosion resistant epoxy
4. Pressure rating that meets or exceeds the pressure rating of the pipe and the design shall incorporate a 2 to 1 safety factor.

Mechanical Joint Restraints shall be incorporated into the design of the follower gland. AWWA C110

Flanged Joint Restraints shall be stainless steel hardware and ANSI B16/5 Class 150/125 Drilling Pattern.

Pipe joints shall be restrained if they connect pipe with fittings, valves or tank structures or if they lie within 25 feet of such a connection and as shown on the Contract Drawings.

Full port swing check valves shall have cast iron body with flanged ends drilled to ANSI 125 pattern. Valves shall be fitted with an external lever, weights and/or spring. The bronze or stainless steel body ring shall be pinned into the valve port. The valve clapper shall be cast iron, replaceable resilient face, and shall swing completely clear of the waterway when the valve is fully open. The hinge pin shall be of 18-8 stainless steel construction and shall be utilized with bronze bushings and packing or O-ring seals. Valves shall be equipped with removable cover plate to permit entry for cleaning of the valve without removing the valve from the line. Valve rating shall be 175 psi water working pressure, 350 psi hydrostatic test pressure. Check valves shall be Golden-Anderson, APCO Valve & Primer, Nibco or approved equal.

Polyethylene Sheeting shall be ASTM D 4397, with at least 8-mil thickness

Detectable Pipeline Wire: Pipeline detectable wire shall be installed continuously along pipe. Wire shall be HDPE insulated (green), solid copper or copper clad steel, #12 AWG, 600 volt, of not less than 98% conductivity, and rated for direct burial.

Splicing shall be done with water and corrosion proof wire connectors rated for direct burial. Wire to be brought up to the surface at the beginning and termination of the pipe, all tracer stations and at any in-line valves (interior of the valve box).

Sanitary Sewer Manholes

Pre-cast manholes shall be provided as specified herein and as depicted on the Contract Drawings. References of specific product manufacturers may be used to depict a material style and quality expected for this project.

The quality of all materials, the process of manufacture, and the finished precast manhole or structure is subject to inspection by the Engineer. The Owner or Engineer may make such inspection at the place of manufacture, on the work after delivery or at both places. The Owner or Engineer may reject any precast manholes or structures at any time on account of failure to meet any of the specifications' requirements even though sample manhole sections may have been accepted as satisfactory at the place of manufacture.

The Owner reserves the right to core manholes either at the job site or point of delivery to validate strength of concrete and placement of steel. If cores fail to demonstrate the required strength and/or indicate incorrect placement of reinforcing steel, the Owner reserves the right to reject all sections not previously tested until conformance to these requirements is substantiated. Additional core testing will not result in an increase to the Contract Amount.

Locations, sizes, penetrations, depths and all other attributes of each manhole shall be confirmed by the Contractor prior to ordering. Provide manholes of 4,000 psi concrete, cementitious materials, aggregates and steel reinforcement conforming to ASTM C 478 for sewer manholes.

Manhole benches of new manholes shall be made at the manufacturing site using concrete conforming to the requirements for precast sections. At the discretion of the Engineer, manhole benches may be constructed in the field using concrete conforming to the requirements for precast sections or sewer brick and mortar. The manhole bench shall be smooth and sloped toward the channel at one inch per foot. The bench shall be coated with a cementitious crystalline waterproofing sealant.

Manhole channels of new manholes shall be precast, with a smooth, semicircular bottom that extends upward to the height of the pipe crown. At the discretion of the Engineer, manhole channels may be constructed in the field using sewer brick and mortar.

Manhole riser and/or base sections shall include properly located penetrations for making connections to sewer pipes. Unless otherwise depicted or permitted by the Engineer, provide 6 inches minimum distance between a joint in a manhole section and the nearest edge of an opening for a connecting sewer. The diameter of such openings shall not be more than 4 inches larger than the outside diameter of the pipe to be connected.

Force Main Manholes

Force Main Clean out and Air Release Manholes shall conform to the Details found within the Project Drawings.

Air release valves shall be installed at high points on the force main, and/or in the station, as directed by City of Newark. Air release valves shall be of full body design, unless otherwise approved by City of Newark. The body and cover shall be of cast iron conforming to ASTM A126 class B. All internal parts of the air release valve shall be of stainless steel. The air release valve shall be float operated and shall employ a compound lever mechanism to enable the valve to automatically release accumulated air and gases from the pipe while the system is pressurized and operating. The linkage/lever mechanism shall be able to be removed from the valve without disassembly of the mechanism. The air release valve shall close drip tight, incorporating an adjustable orifice button. Valve shall be specified with manufacturer's backflushing kit for backwashing with clear water. City of Newark may also require air/vacuum release valves as needed by the force main design. Air (or air/vacuum) release valves shall be as manufactured by GA Industries, APCO, ARI or City of Newark approved equal.

Manhole Appurtenances

Manhole O-ring Gaskets and Sealing Compound shall be in accordance with the following requirements:

1. Joints between manhole sections shall be sealed with a flexible, watertight gasket that meets or exceeds ASTM C443.
2. Joints shall also include a joint sealing compound that meets or exceeds ASTM C990 and AASHTO M-198.
3. Provide trowelable grade butyl-rubber base backplaster material to seal exterior manhole joints and adjusting rings that meets or exceeds ASTM C990.

Pipe to Manhole Connectors shall be in accordance with the following requirements:

1. The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure and shall be integrally cast into the manhole unless otherwise specified.
2. The connector shall be made from materials that conform to Section 4, "Materials and Manufacture" of ASTM C-923 and F-2510 "Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Laterals", and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-923.
3. The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.
4. Any metal elements of the connector shall be non-magnetic Series 300 stainless steel.
5. "Boot-type" connectors shall not be used unless specified or reviewed by the Engineer.

Grade Adjustment Rings shall be in accordance with the following requirements:

1. Grade adjustment rings used in the public road right of way must be approved by DELDOT.
2. Precast concrete adjusting rings shall meet or exceed ASTM C478.
3. Rubber composite adjustment rings shall meet or exceed the following:
 - a) Density - 64 lbs/ft³, ASTM D3574-05 Test A
 - b) Durometer Hardness - 77 A \pm 5, ASTM D2240-05
 - c) Tensile Strength - Not less than 145 psi, ASTM D412-06
 - d) Heat Ages Properties - 70 hours @ 158 °F, 3 hours @ 300 °F, ASTM D573-04
4. Expanded polypropylene adjustment rings shall meet or exceed ASTM D3575.
5. High density polyethylene (HDPE) adjustment rings shall meet or exceed ASTM D4976 and ASTM D1248.

Manhole Frames and Covers

Provide City of Newark standard manhole frames and covers conforming to ASTM A 48, Class 35B.

Manhole Steps and Ladders

Provide manhole steps or ladders as depicted on the Contract Drawings as conforming to ASTM C478. Unless otherwise specified, provide polypropylene steps with a reinforced 3/8- inch minimum diameter reinforcing steel, grade 60. Do not use cast iron steps.

Bypass Pumping

A dual pump system shall be used with each pump provided capable of handling the full flow required. The bypass pumping system shall have sufficient capacity to pump the peak flow provided by

the City. This flow number is based on best available information at the time. Contractor should perform independent evaluation prior to beginning work. The Contractor shall provide all pipeline plugs, pumps of adequate size to pump peak flow, and temporary discharge piping to ensure that the total flow of the sanitary sewer can be safely diverted around the work.

Bypass pumping systems will be required to operate 24 hours per day. During overnight operation, an auto-dialer and automatic alarm activation shall be provided. All pumps shall be fully automatic, self-priming or submersible units that do not require foot-valves or vacuum pumps in the priming system. The pumps may be electric motor driven or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of sanitary sewer flow

The Contractor shall provide the necessary stop/start controls for each pump. The controls shall include automatic start up on a high level and stop on a low level. The Contractor shall include one stand-by pump system of equal capacity for each temporary bypass pump system to be maintained on site.

Each stand-by pump shall have a separate backup discharge pipe, for a total of two (2) discharge pipes. These discharge pipes shall be protected from flooding. In order to prevent the accidental spillage of flows all discharge systems shall be constructed of steel pipe utilizing quick-disconnect joints, or fused, high-density polyethylene pipe. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the City or their representative. The piping will provide an easily moved system to facilitate the work progress of the Contractor's schedule.

The Contractor shall provide equipment with residential mufflers and sound baffles for overnight operation near residences. Sound levels five (5) feet from operating pumps shall be no greater than 70 dBA.

Construction Methods:

Open Trench

The excavation and backfill for the pipe shall be performed in accordance with the applicable requirements including backfill requirements of Section 612 of the Delaware Standard Specifications, unless otherwise modified on the Plans, or in conflict with the requirements of the Utility Owner. If there is a conflict between the Delaware Standard Specifications (including these Special Provisions) and the Specifications of the Utility Owner, the latter will prevail. The Contractor is advised to obtain and be fully acquainted with the applicable specifications of the Utility Owner. The pipe shall be installed at the locations and to the lines, grades, and dimensions shown on the Plans or as directed by the Engineer.

During backfill of the sewer main the Contractor shall install the specified warning tape at a depth of 8" (200 mm) to 12" (300 mm) below finished grade or as directed and approved by the Engineer/Owner.

Lengths of pipes shown in the Contract Documents are estimated only. The Contractor is responsible to layout the tie-in areas in the field and fabricate the bends and pipe lengths required to properly tie-in to other pipes, fittings and/or manholes as required and approved by the Engineer. Thoroughly clean all pipes and connecting Materials before placement. Keep all pipes and connecting Materials clean until the completed Work is accepted.

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

The Contractor shall build all future service connections to the existing houses, businesses, and others, complete to the property line, right-of-way lines or other designated points. The ends of all such service connections shall be closed with plugs as directed and approved by the Engineer/Owner.

Sheeting and bracing required for trenches shall be removed to the elevation of the conduit, but no sheeting will be allowed to be pulled, removed, or disturbed below the conduit. Sheeting and bracing shall meet OSHA requirements.

Before lowering into the trench, the pipe shall be inspected for defects. All cracked, chipped, or broken pipe shall be discarded. The ends and interior of the pipe shall be clean. Belled ends shall be laid upgrade. Handling of the pipe shall be accomplished in a manner that will not damage the pipe. The joint shall be made in the manner recommended by the manufacturer. Care shall be taken not to buckle or disturb previously laid pipe.

Pipe jointing shall be as specified herein, and per manufacturer's recommendation for the pipe material used for this project. Bell and spigot and/or push-on joints and gaskets shall be thoroughly cleaned and lubricated in accordance with manufacturer's recommendations. The Contractor shall ensure that the pipe is sufficiently joined as to create a water tight seal. Whenever a pipe requires cutting to fit into the line or to bring it to the required location, the work shall be done in a satisfactory manner so as to leave a smooth end without extra compensation.

Each joint shall be inspected to ensure that it is properly made before backfilling is done. Care shall be taken to prevent any dirt or foreign matter from entering the open end of the pipe. Where it is necessary to cut pipe, such cuts shall be neatly made in an approved manner. The laid pipe shall be true to line and grade and, when completed, the sewer shall have a smooth and uniform invert. No section of gravity sewer, including service connections shall have an adverse grade which would pond water in the invert or any other portion of the sewer.

The Contractor shall lay pipeline starting at the lower elevation of a run and proceed upgrade unless otherwise specified or directed by the Engineer. Lay all pipe with bells (if present) pointing upstream. Lay all pipelines in trench excavations on bedding as specified, concrete cradle or other foundations as shown on the Contract Drawings or directed by the Engineer.

Carefully place each pipe and check for alignment and grade. Make adjustments to bring pipe to line and grade by scraping away or filling in bedding material under the barrel of the pipe. Support by wedging or blocking the pipe barrel is not permitted. Bring the faces of the spigot ends and the bells of pipes into fair contact and firmly and completely push the pipe together. Shape bell holes in the bedding material for each joint as required allowing the joint to be properly made and allow the barrel of the pipe to have full bearing throughout its length.

As the work progresses, clean the interior of pipelines of all dirt and superfluous materials. Properly secure the pipe against movement and make the pipe joints in the excavation as required. Carefully grade and compact pipe bedding by hand around the pipe, ensuring pipe haunches are properly supported.

Provide temporary bulkheads at the ends of sections where adjoining pipelines have not been completed and are not ready to connect.

Pipe shall be laid accurately to the staked line and grade. All service connections shall be installed as indicated on the Drawings right-of-way. Where existing service sewers are to be connected, suitable fittings and adapters shall be provided by the Contractor.

Pipe shall be cleaned of all foreign matter, and water shall be kept out of trenches until joints have been completed. When work is not in progress, open ends of pipe and fittings shall be securely closed to keep foreign matter and animals from entering.

Connections to existing pipe shall be made with Fernco Strongback Coupling or approved equal. Connectors must be approved by the Engineer prior to installation.

The Contractor shall determine the location of existing sewer services prior to installation of the mainline pipe in such a way that the service wyes can be installed in the proper location as the mainline pipe is being installed. The Contractor shall be responsible to verify the locations of the lateral in the field and determine if the lines are active or abandoned. Inactive lines or abandoned lines will not be replaced as approved by the Utility Owner. No service saddles will be permitted, unless approved by the Engineer.

Connections to existing sewer mains, service connections, and manholes shall be made in such a manner so as to not damage the existing facility. Such connections shall be made so that no projections or rough surfaces occur within the pipe.

Prior to constructing the tie-ins, coordinate with the Owner and, if required by the Owner, be prepared with tanker trucks and pumps to handle any excess flow during the transition. The Owner must be satisfied with the Equipment and tanker trucks provided on site before allowing the actual tie-in. Pump all excess flow into the tankers and properly dispose of the excess flow at an approved location.

Locations of the sewer laterals are approximate and may be changed by the Engineer. Relocating of the sewer lateral will not add extra cost to the Utility Owner or State, unless either of the following conditions result:

1. The relocation results in an increase in the length of the lateral; or,
2. A change in construction methods is required from the change in lateral location

If the Contractor believes that the work at the new location(s) will result in a substantive change, the Contractor shall notify the Engineer prior to beginning the changed work. The Engineer will evaluate the request and if the relocation is warranted, the change in work shall be authorized. Lateral connections shall be laid such that flow from the lateral shall be in the same direction as the gravity main.

The Contractor shall reconnect all active service connections as approved by the Utility Owner. Service connections shall be reconnected to the pipe by using connectors approved by the pipe manufacturer and in conformance with the specified installation procedure.

Connections to the existing service pipe shall be made using flexible couplings. All flexible couplings shall conform to ASTM C425. Joint deflection limits and lateral connections shall meet the maximums indicated in ASTM C12 and C425.

The slope of the existing lateral toward the newly installed sewer main shall be maintained at the existing percent. For reconstructed laterals, a minimum slope of two percent (2%) or as specified by the Utility Owner is required.

Lateral connections to existing sewer mains shall not obstruct flow.

Maintain a minimum of 18 inches of vertical clearance where the water main or storm sewer crosses over the sanitary sewer or lateral; otherwise, a minimum of ten (10) foot long concrete encasement (centered at the crossing point) shall be provided around the sanitary sewer or lateral as per the standard detail. 6 inches of 3,500 psi concrete shall be provided all around the pipe.

Force Main Installation

Deliver materials to the Site to ensure uninterrupted progress of the work. Inspect delivered pipe for cracked, gouged, chipped, dented or other damaged material. If the pipe exhibits any of these characteristics immediately remove from site.

Handle all pipe, fittings, appurtenances and accessories carefully with approved handling devices. Do not drop or roll material off trucks. Do not otherwise drop, roll or slide piping. Unload pipe, fittings and specials as close to the place where they are to be installed as is practical to avoid unnecessary

handling. Keep pipe interiors completely free from dirt and foreign matter. Store pipes and fittings on heavy wood blocking or platforms so they are not in contact with the ground.

When distributing the pipe along the pipeline alignment, the pipe should be blocked to prevent any possibility of rolling. Pipe with bells and spigots should be supported along the barrel of the pipe to prevent deformation of the joining ends, to prevent dirt accumulating on the sealing surfaces and inside the pipe.

Perform trench excavation and backfill in accordance with the City of Newark Standard Detail. No section of sewer pipe shall be laid before the subgrade or bedding has been reviewed by the Engineer. If an existing pipeline is to be removed and replaced by a new pipeline, the Contractor shall ensure temporary bypass pumping and all appurtenances required to maintain service is in place and ready for operation.

All concrete required to support and reinforce wye branches, tee wyes, bends, and fittings shall be placed as directed by the details on the Contract Drawings. Concrete Buttresses shall be placed at all wye branches, tee wyes, tees, bends, and fittings

Pipe jointing shall be as specified herein, and per manufacturer's recommendation for the pipe material used for this project. Bell and spigot and/or push-on joints and gaskets shall be thoroughly cleaned and lubricated in accordance with manufacturer's recommendations. The Contractor shall ensure that the pipe is sufficiently joined as to create a water tight seal.

Whenever a pipe requires cutting to fit into the line or to bring it to the required location, the work shall be done in a satisfactory manner so as to leave a smooth end without extra compensation.

The Contractor shall lay pipeline at the low end of a run and proceed upgrade unless otherwise specified or directed by the Engineer. Lay all pipe with bells (if present) pointing upstream. Lay all pipelines in trench excavations on bedding as specified, concrete cradle or other foundations as shown on the Contract Drawings or directed by the Engineer.

Carefully place each pipe and check for alignment and grade. Make adjustments to bring pipe to line and grade by scraping away or filling in bedding material under the body of the pipe. Wedging or blocking up the pipe barrel is not permitted.

Bring the faces of the spigot ends and the bells of pipes into fair contact and firmly and completely shove the pipe home. Shape bell holes in the bedding material for each joint as required allowing the joint to be properly made and allow the barrel of the pipe to have full bearing throughout its length. Thoroughly tamp bell holes following the making of each joint.

As the work progresses, clean the interior of pipelines of all dirt and superfluous materials. Properly secure the pipe against movement and make the pipe joints in the excavation as required. Carefully grade and compact pipe bedding by hand around the pipe, ensuring pipe haunches are properly supported.

Provide temporary bulkheads at the ends of sections where adjoining pipelines have not been completed and are not ready to connect.

Couplings and Joints Restraints shall be installed per manufacturer's instructions.

If performing an excavated point repair of a pressure sewer pipe, the Contractor shall execute his work in accordance with above, and the following:

The defective pipe shall be uncovered to the extent that competent pipe is found on either end of the defective pipe and inspected by the Contractor and the Engineer. An approximate location, length of repair and existing pipe material are depicted on the Contract Drawings.

The Contractor shall saw-cut the existing pipe where it's found to be competent, such that the ends of the pipe are straight, smooth and free of chips, cracks or any other defects.

The Contractor shall remove the defective pipe section from the trench, dispose of properly and recondition the bedding material as required in accordance with paragraph E above.

The Contractor shall place the repair pipe, which shall be of the same pipe diameter and material as the defective pipe unless otherwise specified or directed by the Engineer, and connect to the existing pipe using restrained pressure type pipe couplings. Secure the pipe couplings in accordance with the manufacturer's recommendations.

After an inspection by the Engineer, the Contractor shall backfill and restore the disturbed area as directed.

Sanitary Sewer Manholes

The Contractor shall take every precaution to prevent damage to the manhole sections and appurtenances during transportation and unloading. Unload manhole sections using skids, pipe hooks, rope slings, or suitable power equipment, if necessary, and keep the sections under control at all times. Do not allow the manhole sections to be dropped, dumped or dragged under any conditions.

Prior to being installed, each precast manhole or structure shall be carefully inspected. Reject those not meeting the specifications and replace at the Contractor's expense.

If any manhole section is damaged in the process of transportation or handling, the Contractor shall reject and immediately remove such sections from the site and replace the damaged manhole sections at his own expense.

Perform trench excavation and backfill in accordance with the Utility owner's specifications.

No manhole base section shall be placed before the subgrade or bedding has been reviewed by the Engineer.

If an existing manhole is to be removed and replaced by a new manhole, the Contractor shall ensure temporary bypass pumping and all appurtenances required to continue service is in place and ready for operation.

Unless otherwise specified, the Contractor shall cut and remove a portion of the existing pipe(s) in order to place the new manhole. The Contractor shall insert a pipe stub in the new manhole, place the manhole and align with the existing pipe. A pipe repair coupling as specified herein shall be used to join the existing pipe with the new pipe stub.

The Contractor shall place the manhole base section at the location, elevation and orientation depicted on the Drawings. The base section shall be level and plumb.

The Contractor shall connect all pipes utilizing the pre-cast openings and pipe to manhole gaskets. After proper placement of the manhole base section, the Contractor shall place subsequent sections.

Doghouse-type manholes shall be installed as specified on the Contract Drawings.

Install sufficient sealing compound so as to show a "squeeze-out" on the outside of the joint.

Apply trowelable grade butyl rubber backplaster material one-quarter (1/4) inch minimum thickness, when dry, on the outside of the manhole at each joint, extending six (6) inches above and below the joint. Apply butyl rubber backplaster on the outside of the chimney from three (3) inches

below the bottom adjustment ring on the cone section to, and covering, the adjustment rings just below the casting. Next, apply shrink wrap or visquine to the outside of each joint to further seal manhole.

Set cones or flattops as determined by the depth of the manhole, so that no more than 12 inches of reinforced concrete adjusting rings are required to adjust the top of the manhole casting to grade.

Provide a soil-tight seal between the precast manhole and adjusting ring, and each adjoining adjusting ring, and between the adjusting ring and casting by the use of two (2) rows of 1/2 inch extrudable preformed gasket material or trowelable grade butyl rubber or an approved equal. After butyl rubber is applied to exterior of adjustment rings, install exterior chimney seal if specified.

Set manhole frame on 1/2 inch extrudable preformed gasket material or trowelable grade butyl rubber or an approved equal. In paved areas, match top of casting with finished grade; in unpaved/grassy areas, install casting so that the top extends at least six inches above finished grade, and grade surface to provide positive surface drainage away from manhole.

Locate manhole steps to one side of the manhole, not directly above the inlet or outlet pipes, granting access to the bench. Install steps with non-shrink mortar or epoxy grout.

The Contractor shall restore all manholes and associated surface areas to their original condition or as required by the Utility Owner and specified in the description of work. The newly installed pipe shall be restrained and sealed at the manhole in accordance with the manufacturers recommended procedures and with a material approved by the Utility Owner.

Restoration of the bottom of the Manhole shall be done as follows:

1. For restorations less than or equal to three inches grout shall be used. The grout design mix shall meet or exceed 500 psi (3,447 kPa) compressive strength at 28 days. The Contractor may, with the approval of the Utility Owner, incorporate grout additives to improve flow properties, provided that the minimum compressive strength requirements are met.
2. For restorations greater than three inches concrete shall be used. Concrete shall be as specified in the Contract Documents.

Bypass Pumping

The Contractor shall remove manhole sections or make connections to the existing sewer and construct temporary bypass pumping structures as may be required to provide adequate suction conduit.

Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance of work, it is to be removed in a manner that permits the flow of sewage to slowly return to normal without surge to prevent surcharging or causing other major disturbances downstream.

When working inside manhole or sewer line, the Contractor shall exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible or oxygen-deficient atmospheres, and confined spaces.

The Contractor shall obtain all rights and permits prior to the installation of the bypass pipelines if such lines are outside the Limit of Disturbance. When the bypass pipeline crosses local streets and private driveways, the Contractor must place the bypass pipelines in trenches and cover with plating or temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the City of Newark or their representative, the Contractor shall remove all the piping, restore all property to previously existing condition and restore all pavement. The Contractor is responsible for obtaining any approvals for placement of the temporary pipeline within public ways from the agency with jurisdiction.

Construction Requirements:

The Contractor is solely responsible for bypass pumping quality assurance during the length of the project. The contractor is responsible for any costs associated with corrective measures required to replace or repair items not meeting the quality standards specified by the Utility Owner or Engineer.

Submittals

The Contractor shall submit the following items for review and approval by the Utility Owner or Engineer in accordance with the Contract Documents. Approval of the submittals by the Utility Owner or Engineer shall be obtained prior to ordering pipe materials and/or the start of the pipe replacement process.

1. Detailed construction procedures, and layout plans to include sequence of construction.
2. Sewer bypass plans, methods, and list of equipment to be utilized.
3. Description of the method to remove and dispose of the host pipe, if required.
4. The safety plan in conformance with the Contract Documents and OSHA regulations.
5. Traffic control plans.
6. Project schedule.
7. Pipe appearances, including gaskets, clamps, shear rings, couplings, and plugs. Include evidence of compliance with ASTM standards
8. Piping, including certified test results from the manufacturer demonstrating compliance with the requirements.
9. Detailed drawings and data on pipe, fittings, joints, gaskets and appurtenance. Include certified test results from the manufacturer demonstrating compliance with the requirements.
10. Certified test results from the manufacturer demonstrating compliance with the requirements of this section.
11. Pipe layouts and schedules.
12. Precast manholes and structures including evidence of compliance with ASTM standards, and a table or chart showing the specific sections and orientation of penetrations for each manhole supplied.
13. Manhole appurtenances, including but not limited to O-ring gasket and joint sealant, resilient connector, manhole frame and cover, and manhole step.
14. Provide manufacturer's written confirmation that all reinforced pre-cast concrete manhole sections contain an inorganic copolymer waterproofing admixture in compliance with manufacturer's application instructions.
15. Sewer Lateral Cleanouts
16. Shop drawings for casing pipe showing size and hold down assemblies or casing spacers for carrier pipe.
17. Working drawings, shop drawings (drawn to scale), catalog cut sheets, technical data, and written procedures describing in detail proposed bore and jack method and entire operation to be used, for information only, including but not limited to:
18. Provide a construction schedule for approval that includes the sequence of installation of the casings and pipelines. Provide a laying schedule (on the Drawings) that shows necessary deviations from the Drawings due to specific utility conflicts discovered during required exploratory excavations. Include a description of the proposed construction methods, including methods to establish and maintain vertical and horizontal alignment.
19. Working and receiving shafts.
20. Dewatering Plan.
21. Method of removing soils and installation of casing and carrier pipe.
22. Size, capacity, and arrangement of equipment.
23. Pipe closure system.
24. Certified Welders Certificate.
25. Backstop.
26. Shaft base material.

27. Type of cutter head.
28. Method of monitoring and controlling the line and grade.
29. Detection of surface movement.
30. Procedure for installing pipe supports, anchor, or placement of grout between carrier pipe and casing pipe.
31. Bulkhead details and proposed positive method of anchoring carrier pipe to prevent floatation.
32. Catalog data for casing spacers when used for temporary support during construction.
33. Procedure for monitoring line and grade.
34. Certification shall be in the form of a letter or company-standard form containing all required data and signed by an officer of the manufacturing, fabricating, or supply company.

Other Utilities:

The Utility Owner or as shown on the drawings shall provide the Contractor with available information relating to the location of utilities adjacent to the pipe to be replaced. The Contractor shall, prior to starting work, verify the location of all adjacent utilities. The minimum clearance from other utilities shall be approximately 18-inches. The Utility Owner may at its discretion reduce the minimum clearance.

The Contractor shall expose all interfering and crossing utilities by spot excavating at the planar intersection of the pipe and removing the soil from around the utility. The cost of exposing these utilities shall be borne by the Contractor.

Emergency Repairs to Damaged Utilities:

Known or Field Located Utilities - In the event that the Contractor or his Subcontractor during the execution of the work breaks any known or field located pressure or gravity main causing the disruption of service and/or an eminent hazard, it shall be the responsibility of the Contractor/Subcontractor to immediately notify the Utility Owner at the designated emergency telephone number and immediately undertake measure to repair the damaged utility. To that effect, the Contractor/Subcontractor shall ascertain prior to initiating the work that the necessary repair parts, tools, equipment, and labor are on ready and available onsite to complete the repair work without delays. The Utility Owner personnel and Engineer shall witness the repair work.

If the Contractor/Subcontractor estimates or determines that he is not going to be able to restore service within a less than two-hour period, the Contractor shall immediately contact the Utility Owner's manager to initiate repair.

The Utility Owner will undertake the repair work and will back charge the Contractor. The Utility Owner will submit an itemized bill within 30 calendar days from the occurrence of the event.

Unknown or Inaccurately Located Utilities - If the utility was not field located or it was inaccurately located in accordance with the prescribed procedures under the One-Call guidelines and the Contractor/Subcontractor cause a line break during the execution of the work, the same notification procedure as above must be followed. The Utility Owner will undertake the repair work at no cost to the Contractor.

Acceptance Testing

After the existing pipe is completely replaced the Contractor and Utility Owner shall perform inspections of the pipe. The newly installed pipe shall be visibly free of defects, which may affect the integrity or strength of the pipe. If in the opinion of the Utility Owner such defects exist, the pipe shall be repaired or replaced at the Contractor's expense.

Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness shall not be used and must be removed from the site.

Cooperate and furnish all assistance necessary to perform the tests as specified herein and as further required and directed by the Engineer and the representative of the Owner. Furnish all Equipment and personnel to conduct the tests specified herein and/or any proposed by the Owner of the utility.

The Contractor shall not make connections to existing sanitary sewers until after the final inspection and all tests have been accepted.

Leakage Tests for Sewer Pipes

Low-Pressure Air Test

1. All sewer pipes will be tested by the "Low-Pressure Air Test."
2. This test will be made by plugging all branch fittings and ends of lateral stubs to withstand internal pressure. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced when required.
3. Air shall slowly be supplied to the plugged pipe line until the internal air pressure reaches 4.0 pounds per square inch (PSI) greater than the average back pressure of any groundwater that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.
4. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 PSI. The line shall be considered acceptable if the amount of time is not less than the following formula:

$T = 0.0850DK/Q$, where

K = 0.000419DL, but not less than 1.0

Q = rate of loss of 0.003 CFM per square foot of internal surface

D = Pipe diameter, inches

L = Length of pipe being tested, feet

Minimum Holding Time Required For Pressure To Drop From 3.5 To 2.5 Psig For Size And Length Of Pipe Indicated For Q = 0.003

Pipe Diameter (inches)	Minimum Time (min:sec)	Length for Minimum Time (feet)	Time for Longer Length (seconds)	Specific Time for Length							
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet
4 or less	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42

Leakage Test for Manholes and Structures

Manholes, vaults and similar structures constructed may be tested by the Vacuum Test. This test shall be performed in accordance with ASTM C 1244. Testing prior to backfilling is highly recommended to facilitate corrective measures in case of test failure.

1. The Contractor shall plug all pipe openings, taking care to securely brace the plugs and inflate the compression band to 40 psi to bring about a seal between the vacuum tester base and the manhole frame.
2. A vacuum to 10 inches of mercury (10" Hg) shall be drawn and the valve closed.
3. Manholes and similar structures shall be considered acceptable if the vacuum remains at 10" Hg or drops to 9" Hg in a time greater than 1 minute.

Manhole Rehabilitation Acceptance

A visual inspection of all manhole repairs and rehabilitation shall be performed by the Engineer. The Contractor shall provide labor and materials required for inspection. There shall be no signs of infiltration, spalling, loss of adhesion, cracks or any other defects in the Contractor's work. Acceptance is also dependent satisfactory results of field compressive strength testing, if performed.

All manholes that have been rehabilitated shall be re-inspected prior to Final Acceptance, but no less than 12 weeks after Conditional Acceptance. The Engineer shall schedule this reinspection with the Contractor, providing a minimum of 2 weeks' notice. Re-inspection shall include a visual confirmation that no infiltration, spalling, loss of adhesion, cracks or any other defects have formed in the work performed since Conditional Acceptance. Any defects found shall be corrected by the Contractor in accordance with the manufacturer's recommendation at no additional cost to DeIDOT.

Re-inspection shall include at least 20% of the manholes rehabilitated. The Engineer will select the manholes to be re-inspected, the Contractor shall provide all labor and materials required for re-inspection, including traffic control.

If more than 10% of the manholes re-inspected fail a visual inspection, an additional 20% of the manholes rehabilitated shall be re-inspected. If more than 10% of the second group of manholes re-inspected fail, all manholes rehabilitated shall be re-inspected.

The Contractor shall pay the Engineer's expense in addition to all other expenses, for re-inspection of manholes rehabilitated beyond the first 20%. The Engineer's expense shall be the same dollar amount as the liquidated damages identified in the Contract Documents.

Other Acceptance Testing

The Engineer reserves the right to perform other testing as they deem necessary, depending on several factors, including but not limited to failed acceptance tests, site and weather conditions, post-construction CCTV inspection and observances during construction. These tests may include the following:

Pipe Alignment Test (Lamp Test): Pipe alignment testing consists of visually examining the inside of the pipe between two consecutive manholes with the aid of a light and mirror. A mirror is held at the invert of the pipe and adjusted so the light and barrel of pipe can be seen. The barrel of the pipe shall have no vertical or horizontal deflection.

Ovality/Deflection Test (Mandrel Test): Ovality/Deflection testing consists of pulling a mandrel, appropriately sized for the pipe diameter(s) constructed, through the constructed pipe sections. The size of the mandrel shall be based on the ovality/deflection requirements specified within the Contract. The mandrel shall pass through all pipe segments without meeting resistance.

Failed Acceptance Test

If any test results indicate the presence of a defect, whether caused by defective materials, improper workmanship or damage to the materials, the Contractor shall, locate and repair the defect at his own expense. The means and methods of repair shall be discussed with the Engineer prior to execution.

If defective portions cannot be located, remove and reconstruct as much of the original work as necessary to obtain piping that meets the leakage requirements specified herein and retest, all at no addition to the Contract Price. The failed test shall be re-performed until the results are within acceptable limits.

CCTV Inspections

The Contractor shall perform post installation internal television inspections of the installed sanitary main. Each reach of sewer shall have audio description with appropriate stationing of services indicated. The data and stationing are to be on the video. All such inspections shall be performed by personnel trained in locating breaks, obstacles and service connections by closed circuit color television.

Post construction video tapes are to be submitted to the Engineer and Utility Owner for review prior to final payment. Should any portion of the inspection tapes be of inadequate quality or coverage, as determined by the Utility Owner, the Contractor will have that portion video-taped at no additional expense to the State or Utility Owner. All original video tapes remain property of the Utility Owner. The Contractor may, at the discretion of the Utility Owner retain second copy.

Do not make connections to existing sanitary sewers until after the final inspection and tests have been approved. Furnish all Material and labor required for tests, including caps and plugs and the cost thereof included in the prices bid for installing sanitary pipe. Furnish water required for leakage test at no additional cost to the Department.

Method of Measurement and Basis of Payment:

Price and payment for sanitary sewer system includes furnishing, transporting, and installing the Materials; testing of the sanitary sewer system; including manholes, cleanouts, and air releases; connecting to existing sanitary sewer systems and services; maintaining service as required; installation of force main and thrust restraints, excavating; disposing of excess excavated Material; backfilling, including Type C borrow required specifically for filling the sewer trench; furnishing Material for backfilling; furnishing and placing warning tape and wire; aggregate pipe bedding, sheeting and shoring, temporary support of existing Utilities, dewatering, furnishing and using tanker trucks for excess flow, constructing and operating a bypass pumping system, temporary bypass pumping and hauling, disposing of excess flow at an approved location; cutting and capping new or existing lines and for all labor, equipment, tools and necessary incidentals to achieve and accept an operational sanitary sewer system.

Abandonment of all manholes and sewer shall be paid for under Section 211. HDD of HDPE Sewer and Casing Pipe shall be paid under 711505.

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 breakout sheet total must match the Lump Sum Bid price for Item 711501. The Department will review the figures submitted on the breakout sheet(s) to ensure they match the respective lump sum bid price. Incorrect breakout sheets will be returned for immediate correction. 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.

All lump sum pay items will be prorated for each pay estimate. A percentage of the lump sum item will be paid, on a monthly basis, based upon the amount of work completed and accepted by the Engineer.

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
711501	SANITARY SEWER SYSTEM	LS

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711505 - HORIZONTAL DIRECTIONAL DRILLING FOR SANITARY SEWER

Description:

This work consists of performing Horizontal Directional Drilling (HDD) of High Density Polyethylene (HDPE) Pressure Sewer pipe.

Quality Assurance:

- A. Experience: Actively engaged in horizontal directional drilling for minimum of 3 years.
- B. Field supervisory personnel: Experienced in the performance of work and tasks as stated herein for minimum of 3 years.

Submittals:

- A. Submit for information only.
 - 1. Presentation of similar experience in the last 3 years.
 - 2. Include, but not limited to, owner name, address, telephone number, contact person, date and duration of work, location, pipe information, and contents handled by pipeline.
 - 3. Supervisory field personnel and historical information of HDD experience.
 - a. At least one field supervisor listed must be at site when HDD operations are in progress.
- B. Submit following:
 - 1. Working Drawings and written procedure describing in detail proposed method and entire operation for information only including, but not limited to:
 - a. Size, capacity and arrangement of equipment.
 - b. Location and size of drilling and receiving pits.
 - c. Dewatering and methods of removing spoils material.
 - d. Method of installing detection wire and pipe.
 - e. Type, location and method of installing locator station.
 - f. Method of fusion pipe segment and type of equipment.
 - g. Type of cutting head.
 - h. Method of monitoring and controlling line and grade.
 - i. Detection of surface movement.
 - j. Bentonite drilling mud for information only:
 - 1) Products information, material specifications, and handling procedures.
 - 2) Material safety data sheet and special precautions required.
 - 3) Method of mixing and application.

Project Conditions:

- A. Complete HDD so as not to interfere with, interrupt, or endanger surface and activity thereon.
- B. Do not use HDD in rock stratum or subsoil consisting of boulders and underground obstructions that impede the process.
- C. Follow applicable ordinances, codes, statutes, rules, and regulations of State of Delaware, DelDOT, applicable County building codes, affected Railroad Company, and applicable regulations of Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001), "Safety Requirements for Tunnels, Shafts, and Caissons."

Materials:

- A. Pipe.
1. HDPE IPS DR-11.
 2. HDPE Joints:
 - a. Butt fusion joining technique for joining pipe segments installed by HDD.
 - b. When joining HDPE pipe at ends of directional drilling runs fusion bond to adjacent pipe section.
 - 1) Use butt fusion, socket fusion, or electrofusion coupling joining technique.
 - c. Mechanical Couplings are not permitted for joining of directional drilled pipe sections.
- B. Drilling Fluid:
1. Bentonite drilling mud compatible with environment.
 2. Waste oil or environmentally non-compatible polymers cannot be part of composition.
- C. Detection Wire: TW, THW, THWN, or HMWPE insulated copper, 10 gage or thicker wire.
- D. Locator Station.
1. Underground, Flush Mounted:
 - a. Tube minimum 15 inches long with minimum inside diameter of 2-1/2-inches made of non-corrosive material, schedule 40 PVC, HDPE, or equal.
 - b. Factory attached cast iron or high-impact plastic collar with ribs to prevent rotation when removing locking lid after locator station is set in concrete.
 - c. Light blue cast iron or high-impact plastic locking lid that will withstand AASHTO H-20 traffic loads and ultra-violet rays.
 - d. Mark locking lid to identify pipeline with permanent identification such as P.S. Locator.
 - e. Terminal block made of high dielectric material which is made of phenolic resin, plastic, micarta, Lexan or Bakelite for each locator station.
 - 1) Terminal block furnished with two 3/16-inch threaded studs, nuts, and washers made of nickel plated brass.
 - f. Approved manufacturers:
 - 1) C.P. Test Services, Inc., Model Mini.
 - 2) Handly, Industries, Model T2IS2.
 - 3) Or equal.
 2. Manhole Mounted:
 - a. Waterproof enclosure made from cast aluminum, galvanized steel, high-impact plastic, Lexan, Gyrlyn, or equal.
 - b. Light blue schedule 40 PVC pipe or schedule 40 galvanized steel with outside diameter of at least 3/4-inch to mount enclosure.
 - c. Use similar materials for pipe and enclosure to fasten enclosure onto pipe following manufacturer's instructions.
 - d. Approved manufacturers:
 - 1) Cott Manufacturing Company, Model Finklet or Finkplate, 2 leads.
 - 2) Gerome Manufacturing Company, Inc., Model Testox Series 300, 2 leads.
 - 3) Or equal.

Execution:

PREPARATION

- A. Excavate pits following Working drawings.
- B. Provide equipment to guard against electrocution and alarm system on drilling equipment capable of detecting electrical current as it approaches electric lines.
- C. Test pit underground utilities crossing before HDD operation following DelDOT procedures and specifications.

OPERATION

- A. General.
 - 1. Determine drilling length and equipment pull strength for type of soil encountered.
 - 2. Provide method to control line and grade.
 - a. Provide and maintain instrumentation that accurately locates pilot hole.
 - b. Drill pilot hole along path following Drawings to these tolerances:
 - 1) Vertical alignment plus or minus 0.5 foot. Vertical path of pilot hole must not establish new high points not shown on Drawings.
 - 2) Horizontal alignment plus or minus 1.0 foot.
 - c. Include electronic monitoring of horizontal and vertical drilling head location. Obtain accuracy range within 1 inch of actual position of pipeline. Record position readings at maximum of 10-foot intervals.
 - d. At completion of pilot hole drilling, furnish tabulations of horizontal and vertical alignment to Engineer.
 - 3. When water is encountered.
 - a. Provide and maintain dewatering system of sufficient capacity to remove water.
 - b. Keep excavation free of water until backfill operation is in progress.
 - c. Perform dewatering in manner that removal of soils particles are held to minimum.
 - d. Dewater into sediment trap following project Erosion and Sediment protection procedures.
 - 4. Maintain close observation to detect settlement or displacement of surface and adjacent facilities.
 - a. Notify Engineer immediately if settlement or displacement is detected.
 - b. Maintain safe conditions and prevent damage.
- B. Drilling Operation.
 - 1. Drilling Fluids.
 - a. Maintain drilling fluid in bore hole to increase stability of surrounding soil and reduce drag on pulled pipe.
 - b. Dispose of drilling fluid and other spoils at location following laws, ordinances, rules, and regulations of local jurisdiction.
 - c. Transport excess fluids and other spoils to disposal site, at no additional cost to the Department.
 - d. Minimize drilling fluid at locations other than entry and exit points. Immediately clean up any drilling fluids that inadvertently surface.
 - e. Provide clean water for drilling, at no cost to the Department, at Engineer's requirement.

2. Pilot Hole Drilling.

- a. Angle entry hole so that curvature of pilot hole does not exceed allowable bending radius of HDPE pipe.
- b. Be able to make a turn of up to 90 degrees and maintain curvature not to exceed allowable bending radius of HDPE pipe.
- c. Alignment Adjustment and Restarts.
 - 1) Follow pipeline alignment on Drawings within tolerances specified herein. Before adjustments, notify Engineer for approval.
 - 2) Notify Engineer when forward motion of operation is stopped by an obstruction.
 - a) Abandon in place with drilling fluid, unless Engineer directs otherwise.
 - b) Upon Engineer's approval, attempt second installation at approved location or excavate at point of difficulty and install HDPE pipe by trench method following Section 711048.
 - 3) Withdrawals, abandonments, and restarts are at no additional cost to the Department when HDD is provided as an option of installation of pipe.
 - 4) Exercise caution including, but not limited to, locating utilities, drilling downholes (test pits) to observe drill stems or reamer assembly to clear other existing utilities at locations following Drawings.
 - 5) Keep the number of boring pits to a minimum, no closer than following distances, unless otherwise approved by Engineer.
 - a) Equipment must be capable of boring following lengths in a single bore.

<u>Iron Pipe Size (IPS)</u>	<u>Boring Distance (In feet)</u>
1-1/4	400
1-1/2	400
2	350
2-1/2	350
3	300
4	250
8	250

Installation:

A. Installing HDPE Pipe.

1. Provide a swivel to reaming assembly and pull section of pipe to minimize torsional stress on pull section after drilling pilot hole.
2. Hold reaming diameter to 1.5 times outside diameter of HDPE pipe being installed.
3. Protect pull section as it proceeds during pull back so it moves freely and is not damaged.
4. Pull detection wire along with HDPE pipe. Extend wire into locator station at each end of HDPE pipe.
5. When connecting to adjacent pulled or non-pulled section of HDPE pipe, allow pull section of pipe to extend past termination point. Make tie-ins the next day after pullback of HDPE pipe.
6. Test pit pipe installation to verify horizontal and vertical alignment at Engineer's direction.
 - a. One test pit for every 500 feet along length of pipeline.
 - b. Engineer may order additional test pit for each test pit that reveals pipeline

installation is not in compliance with Contract Documents at no additional cost to the Department.

7. Replace portions of pipeline not in compliance with Contract Documents at Engineer's direction and at no additional cost to the Department.

B. Installing Locator Station.

1. Locator Stations.

- a. At each end of HDPE pipe. Follow Standard Details or Drawings,
- b. Flush mount underground locator: See Standard Details.
- c. When HDPE pipe is connected to another type of pipe material, continue detector wire over connecting pipe, so locator station is installed out of paved area.
- d. In areas scheduled to be improved identify and protect station locations immediately after installation.
 - 1) Space 3 stakes equally around the station.
 - 2) Extend at least 4 feet above existing grade.
 - 3) Flag with orange fluorescent wrap within 6 inches from top of stakes.

2. Detection Wire.

- a. Install detection wire without splices as shown on Standard Details.
- b. Terminate detection wire inside locator box using proper sized crimp type connectors on wire ends.
- c. Connect each wire to terminal maintaining at least 18 inches slack in each wire for underground flush mounted locator stations.
- d. Neatly coil slack wire in test station below terminal board.
- e. Locate wires on top and along HDPE pipe.
- f. Allow adequate slack and support to protect wires from damage during backfilling operations.
- g. Test each detection wire for continuity after backfill is completed.
 - 1) If test for continuity is negative, repair or replace at Engineer's direction.
 - 2) After continuity is verified, connect each detection wire to terminal block in locator station.

Field Quality Assurance:

- A. Perform field testing of HDPE Pipe.

Method of Measurement and Basis of Payment:

Payment for HDPE pipe installation by HDD and associated casing pipe shall be paid by linear footage installed. All excavation, test pits, casing pipe, fluids, wires, are incidental to the costs of horizontal directional drilling.

801500 – MAINTENANCE OF TRAFFIC, ALL INCLUSIVE

Description:

This item consists of performing project work in Maryland. Work shall be constructed in accordance with the Maryland Department of Transportation State Highway Administration (MD SHA) ‘Standard Specifications for Construction and Materials’, Dated July 2018, and the Maryland Department of Transportation State Highway Administration ‘Book of Standards – For Highway and Incidental Structures’, including all revisions up to the date of advertisement.

Materials:

Provide Materials meeting the requirements of Category 900 of the MD SHA ‘Standard Specifications for Construction and Materials’, Dated July 2018, including all revisions up to the date of advertisement.

Method of Measurement and Basis of Payment:

Price and payment for work in Maryland includes all labor (the higher of state and federal prevailing wages for each classification), equipment, tools and necessary incidentals to achieve and accept the work in Maryland.

No separate payment shall be made for work performed outside of Maryland.

A breakout sheet attached to the Proposal lists the different elements of work or materials by MD SHA pay item 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 Bid price submitted for Item 801500 shall be the final bid price. The Lump Sum bid price should be derived from the total sum of the cost of all items listed. The Department will review the figures submitted on the breakout sheet(s) to ensure they match the respective lump sum bid amount. Mathematically incorrect breakout sheets will be returned for immediate correction.

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.

All lump sum pay items will be prorated for each pay estimate. A percentage of the lump sum item will be paid, on a monthly basis, based upon the amount of work completed and accepted by the Engineer.

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
801500	MAINTENANCE OF TRAFFIC, ALL INCLUSIVE	LS

BREAKOUT SHEET - 2		CONTRACT NO. T201504401.01			
Item Number 711501 -SANITARY SEWER SYSTEM					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1990	L.F.	4" Class 52 DIP	\$	\$
2	5	L.F.	8" Class 52 DIP	\$	\$
3	85	L.F.	1.5" IPS HDPE DR-11	\$	\$
4	241	L.F.	4" IPS HDPE DR-11	\$	\$
5	241	L.F.	8" IPS HDPE DR-11	\$	\$
6	636	EA	8" SDR-26 PVC	\$	\$
7	9	EA	48" Round Manhole (FM Clean-Out)	\$	\$
8	1	EA	48" Round Manhole (Air Release)	\$	\$
9	1	EA	84"x36" Junction Chamber	\$	\$
10	3	EA	48" Round Manhole	\$	\$
11	3	EA	4" M.J. Sleeve	\$	\$
12	1	EA	4" Bend, 90 Degrees	\$	\$
13	4	EA	4" M.J. Pipe Cap	\$	\$
14	11	EA	4" Bend, 11.25 Degrees	\$	\$
15	12	EA	4" Bend, 45 Degrees	\$	\$

BREAKOUT SHEET - 2						CONTRACT NO. T201504401.01	
Item Number 711501 –SANITARY SEWER SYSTEM							
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT		
<u>16</u>	4	EA	4" Bend, 22.5 Degrees	\$	\$		
<u>17</u>	2	EA	1.5" Bend, 45 Degrees	\$	\$		
<u>18</u>	1	EA	1.5" M.J. Pipe Cap	\$	\$		
<u>19</u>	1	EA	1.5" M.J. Sleeve	\$	\$		
<u>20</u>	1	EA	2" M.J. Pipe Cap	\$	\$		
<u>21</u>	1	EA	2" M.J. Sleeve	\$	\$		
<u>22</u>	1	EA	4"X1.5" Reducer	\$	\$		
<u>23</u>	1	EA	4"X2" Reducer	\$	\$		
<u>24</u>	1	EA	4"X8" DIP Class 52 Reducer	\$	\$		
<u>25</u>	2	EA	4"X4" Tee	\$	\$		
<u>26</u>	2	EA	4" HDPE to DIP Transition Coupling	\$	\$		
<u>27</u>	1	EA	8" M.J. Pipe Cap	\$	\$		
<u>28</u>	8	EA	Raise Existing Manhole	\$	\$		
<u>29</u>	1	EA	Connect Proposed Sewer To Existing Manhole	\$	\$		

BREAKOUT SHEET - 2		CONTRACT NO. T201504401.01			
Item Number 711501 –SANITARY SEWER SYSTEM					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
TOTAL ITEM NUMBER <u>711501</u>– SANITARY SEWER SYSTEM \$ (LUMP SUM BID PRICE FOR ITEM <u>711501</u> – SANITARY SEWER SYSTEM)					

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FOR BIDDING

BREAKOUT SHEET - 3		CONTRACT NO. T201504401.01			
Item Number 711505 – HDD FOR SANITARY SEWER					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	241	L.F.	Directional Drill HDPE DR-11 Casing Pipe and Force Main	\$	\$
TOTAL ITEM NUMBER 711505 – HDD FOR SANITARY SEWER \$ _____					

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BREAKOUT SHEET - 4		CONTRACT NO. T201504401.01			
Item Number 801500 – MAINTENANCE OF TRAFFIC, ALL INCLUSIVE					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	1	LS	120500 - MAINTENANCE OF TRAFFIC	\$	\$
2	3	CY	203030 – TEST PIT EXCAVATION	\$	\$
3	2970	LF	549401 – 5 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	\$	\$
4	1510	LF	549403 – 5 INCH YELLOW THERMOPLASTIC PAVEMENT MARKINGS	\$	\$
5	180	LF	549405 – 10 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	\$	\$
6	15	SF	549425 – THERMOPLASTIC PAVEMENT MARKING LEGENDS AND SYMBOLS	\$	\$
7	485	LF	549609 – 12 INCH WHITE PREFORMED THERMOPLASTIC PAVEMENT MARKING LINES	\$	\$
8	115	LF	549617 – 24 INCH WHITE PREFORMED THERMOPLASTIC PAVEMENT MARKING LINES	\$	\$
9	2	CY	801004 - CONCRETE FOR SIGNAL FOUNDATION	\$	\$
10	1	EA	802145 - ADJUST EXISTING HANDHOLE	\$	\$
11	300	LF	802501 - NO. 6 AWG STRANDED BARE COPPER GROUND WIRE	\$	\$
12	220	LF	805118 – 4 INCH SCHEUDLE 80 RIGID PVC CONDUIT - BORED	\$	\$

BREAKOUT SHEET - 4		CONTRACT NO. T201504401.01			
Item Number 801500 – MAINTENANCE OF TRAFFIC, ALL INCLUSIVE					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
13	125	LF	805135 – 3 INCH SCHEDULE 80 RIGID PVC CONDUIT TRENCHED	\$	\$
14	3	EA	811001 - FURNISH AND INSTALL ELECTRICAL HANDHOLE	\$	\$
15	5	EA	818004 – 10 FOOT BREAKAWAY PEDESTAL POLE	\$	\$
16	2	EA	837001 - GROUND ROD – ¾ INCH DIAMETER X 10 FOOT LENGTH	\$	\$
17	4	EA	860285 – 16 INCH LED COUNTDOWN PEDESTRIAN SIGNAL HEAD	\$	\$
18	1	EA	860292 - CUT, CLEAN, GALVANIZE AND CAP TRAFFIC SIGNAL STRUCTURE	\$	\$
19	800	LF	861105 – ELECTRICAL CABLE 2-CONDUCTOR (NO.14 AWG)	\$	\$
20	710	LF	861107 – ELECTRICAL CABLE 5-CONDUCTOR (NO.14 AWG)	\$	\$
21	5	EA	865210 – AUDIBLE/TACTILE PEDESTRIAN PUSHBUTTON STATION AND SIGNS	\$	\$
22	1	EA	865300 – 2-WIRE APS CENTRAL CONTROL UNIT	\$	\$
23	5980	LF	549301 – 5 INCH WHITE EPOXY PAVEMENT MARKINGS	\$	\$
24	55	SF	549010 – PAVEMENT MARKING PAINT LEGENDS AND SYMBOLS	\$	\$

BREAKOUT SHEET - 4		CONTRACT NO. T201504401.01			
Item Number 801500 – MAINTENANCE OF TRAFFIC, ALL INCLUSIVE					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
25	1285	LF	549303 – 5 INCH YELLOW EPOXY PAVEMENT MARKINGS	\$	\$
26	105	LF	114046 – 24 INCH WHITE PAVEMENT MARKING PAINT	\$	\$
27	13390	LF	114280 – REMOVAL OF EXISTING PAVEMENT LINE MARKINGS, ANY WIDTH	\$	\$
28	55	SF	114286 – REMOVAL OF EXISTING PAVEMENT LETTERS, SYMBOLS, ARROWS, AND NUMBERS	\$	\$
29	1	LS	110100 – CLEARING & GRUBBING	\$	\$
30	1	LS	130840 – CONSTRUCTION STAKEOUT	\$	\$
31	22	LF	210010 – REMOVAL OF EXISTING CURB (ANY TYPE)	\$	\$
32	50	LF	210019 – SAW CUTS	\$	\$
33	268	CY	210025 – REMOVAL OF EXISTING PAVEMENT	\$	\$
34	7	CY	210026 – REMOVAL OF EXISTING SIDEWALK	\$	\$
35	695	SY	520113 – 6 INCH GRADED AGGREGATE BASE COURSE	\$	\$
36	79	TON	504530 – SUPERPAVE ASPHALT MIX 12.5mm FOR SURFACE, PG 64S-22, LEVEL 2	\$	\$
37	278	TON	504560 - SUPERPAVE ASPHALT MIX 19mm FOR BASE, PG 64S-22, LEVEL 2	\$	\$

BREAKOUT SHEET - 4						CONTRACT NO. T201504401.01	
Item Number 801500 – MAINTENANCE OF TRAFFIC, ALL INCLUSIVE							
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT		
38	74	LF	634131 – STANDARD TYPE C CURB 8 INCH x11 INCH MINIMUM	\$	\$		
39	107	LF	634204 – TYPE A CURB ANY HEIGHT OR DEPTH	\$	\$		
40	14	LF	634301 – STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	\$	\$		
41	20	LF	634316 – STANDARD TYPE B COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	\$	\$		
42	363	LF	634331 – STANDARD TYPE C COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	\$	\$		
43	20	LF	634344 – STANDARD TYPE D COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH MINIMUM DEPTH	\$	\$		
44	510	LF	634500 – MIX 6 CONC SLOT BACKFILL	\$	\$		
45	690	SF	655105 – 5 INCH CONCRETE SIDEWALK	\$	\$		
46	80	SF	655120 – DETECTABLE WARNING SURFACE FOR CURB RAMPS	\$	\$		
47	250	SY	704365 – PLACING FURNISHED TOPSOIL 6 INCH DEPTH	\$	\$		
48	250	SY	705500 – TURFGRASS ESTABLISHMENT	\$	\$		

BREAKOUT SHEET - 4		CONTRACT NO. T201504401.01			
Item Number 801500 – MAINTENANCE OF TRAFFIC, ALL INCLUSIVE					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
49	270	UD	120610 – ARROW PANEL		
50	4055	EA	120635 – SIGNS FOR MAINTENANCE OF TRAFFIC, RENTAL PER DAY	\$	\$
51	20	EA	120743 - TYPE III BARRICADE FOR MAINTENANCE OF TRAFFIC	\$	\$
52	100	HR	120747 – FLAGGER	\$	\$
53	17030	EA	120835 - DRUMS, RENTAL PER DAY	\$	\$
54	35	UD	120860 – PORTABLE VARIABLE MESSAGE SIGN	\$	\$
55	80	HR	873155 – MARYLAND STATE POLICE WITH VEHICLE	\$	\$
TOTAL ITEM NUMBER 801500 – MAINTENANCE OF TRAFFIC \$ _____ (LUMP SUM BID PRICE FOR ITEM 801500 – MAINTENANCE OF TRAFFIC)					

BREAKOUT SHEET - 5		CONTRACT NO. T201504401.01			
Item Number 602013 – DRAINAGE INLET, SPECIAL					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
1	2	EA	DRAINAGE INLET, 84" X 84"	\$	\$
2	1	EA	DRAINAGE INLET, 18" PVC	\$	\$
TOTAL ITEM NUMBER 602013 – DRAINAGE INLET, SPECIAL \$ _____ (LUMP SUM BID PRICE FOR ITEM 602013 – DRAINAGE INLET, SPECIAL)					

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DELAWARE DEPARTMENT OF TRANSPORTATION
SCHEDULE OF ITEMS

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All figures must be typewritten.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
SECTION 0001 ROAD						
0010	201000 CLEARING AND GRUBBING	LUMP		LUMP		
0020	202000 EXCAVATION AND EMBANKMENT	63933.000 CY				
0030	207000 STRUCTURAL EXCAVATION	6920.000 CY				
0040	208000 FLOWABLE FILL	16.000 CY				
0050	209001 BORROW, TYPE A	15366.000 CY				
0060	209002 BORROW, TYPE B	9215.000 CY				
0070	209004 BORROW, TYPE C	3161.000 CY				
0080	209006 BORROW, TYPE F	11430.000 CY				
0090	211000 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP		LUMP		

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0100	211001 REMOVAL OF PORTLAND CEMENT CONCRETE PAVEMENT, CURB AND SIDEWALK	38294.000 SY				
0110	301001 GRADED AGGREGATE BASE COURSE, TYPE B	22773.000 CY				
0120	301002 GRADED AGGREGATE BASE COURSE, TYPE B, PATCHING	4128.000 CY				
0130	302002 DELAWARE NO. 3 STONE	468.000 TON				
0140	302005 DELAWARE NO. 57 STONE	81.000 TON				
0150	401005 SUPERPAVE TYPE C, PG 64-22 (CARBONATE STONE)	3072.000 TON				
0160	401014 SUPERPAVE TYPE B, PG 64-22	583.000 TON				
0170	401021 SUPERPAVE TYPE BCBC, PG 64-22	791.000 TON				
0180	401029 SUPERPAVE TYPE C, PG 64-22, PATCHING	217.000 TON				
0190	401030 SUPERPAVE TYPE B, PG 64-22, PATCHING	5131.000 TON				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0200	401031 SUPERPAVE TYPE BCBC, PG 64-22, PATCHING	1664.000 TON				
0210	401037 SUPERPAVE TYPE B, PG 64-22, WEDGE	495.000 TON				
0220	501006 PORTLAND CEMENT CONCRETE PAVEMENT, 12"	80384.000 SY				
0230	501503 PRECAST CONCRETE PAVEMENT PANELS	7176.000 SY				
0240	504001 CRACK AND JOINT SEALING LESS THAN 3/4 INCH WIDE	5000.000 LF				
0250	601000 CLEANING DRAINAGE PIPE, 15"-24" DIAMETER	142.000 LF				
0260	601001 CLEANING DRAINAGE PIPE, GREATER THAN 24" DIAMETER	310.000 LF				
0270	601011 REINFORCED CONCRETE PIPE, 15", CLASS III	2649.000 LF				
0280	601012 REINFORCED CONCRETE PIPE, 18", CLASS III	2862.000 LF				
0290	601013 REINFORCED CONCRETE PIPE, 21", CLASS III	202.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0300	601014 REINFORCED CONCRETE PIPE, 24", CLASS III	283.000 LF				
0310	601019 REINFORCED CONCRETE PIPE, 42", CLASS III	58.000 LF				
0320	601021 REINFORCED CONCRETE PIPE, 54", CLASS III	13.000 LF				
0330	601032 REINFORCED CONCRETE PIPE, 15", CLASS IV	538.000 LF				
0340	601033 REINFORCED CONCRETE PIPE, 18", CLASS IV	974.000 LF				
0350	601034 REINFORCED CONCRETE PIPE, 21", CLASS IV	114.000 LF				
0360	601035 REINFORCED CONCRETE PIPE, 24", CLASS IV	115.000 LF				
0370	601053 REINFORCED CONCRETE PIPE, 15", CLASS V	376.000 LF				
0380	601054 REINFORCED CONCRETE PIPE, 18", CLASS V	275.000 LF				
0390	601055 REINFORCED CONCRETE PIPE, 21", CLASS V	72.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0400	601056 REINFORCED CONCRETE PIPE, 24", CLASS V	28.000 LF				
0410	601101 REINFORCED CONCRETE ELLIPTICAL PIPE, 19" X 30", CLASS III	382.000 LF				
0420	601115 REINFORCED CONCRETE ELLIPTICAL PIPE, 14" X 23", CLASS IV	122.000 LF				
0430	601141 REINFORCED CONCRETE FLARED END SECTION, 15"	11.000 EACH				
0440	601142 REINFORCED CONCRETE FLARED END SECTION, 18"	14.000 EACH				
0450	601143 REINFORCED CONCRETE FLARED END SECTION, 21"	5.000 EACH				
0460	601144 REINFORCED CONCRETE FLARED END SECTION, 24"	5.000 EACH				
0470	601149 REINFORCED CONCRETE FLARED END SECTION, 42"	1.000 EACH				
0480	601171 REINFORCED CONCRETE FLARED END SECTION, 19" X 30"	2.000 EACH				
0490	601217 CORRUGATED POLYETHYLENE PIPE, TYPE S, 8"	1222.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0500	601505 DRAINAGE SAFETY END STRUCTURE	EACH 17.000				
0510	602003 DRAINAGE INLET, 34" X 24"	EACH 21.000				
0520	602004 DRAINAGE INLET, 48" X 30"	EACH 37.000				
0530	602005 DRAINAGE INLET, 48" X 48"	EACH 32.000				
0540	602006 DRAINAGE INLET, 66" X 30"	EACH 1.000				
0550	602007 DRAINAGE INLET, 66" X 48"	EACH 1.000				
0560	602008 DRAINAGE INLET, 66" X 66"	EACH 2.000				
0570	602013 DRAINAGE INLET, SPECIAL	LUMP		LUMP		
0580	602030 MANHOLE, 48" X 30"	EACH 1.000				
0590	602031 MANHOLE, 48" X 48"	EACH 3.000				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0600	602100 REPLACE DRAINAGE INLET GRATE(S)	2.000 EACH				
0610	602130 ADJUSTING AND REPAIRING EXISTING DRAINAGE INLET	7.000 EACH				
0620	602131 ADJUSTING AND REPAIRING EXISTING DOUBLE DRAINAGE INLET	3.000 EACH				
0630	602132 ADJUSTING AND REPAIRING EXISTING MANHOLE	1.000 EACH				
0640	602505 PERSONAL SAFETY GRATE	4.000 EACH				
0650	604003 SHORING	LUMP		LUMP		
0660	606001 DRILLED SHAFT, 36"	285.000 LF				
0670	606502 DRILLED SHAFT IN ROCK, 30"	72.000 LF				
0680	610006 PORTLAND CEMENT CONCRETE MASONRY, APPROACH SLAB, CLASS A	35.000 CY				
0690	610008 PORTLAND CEMENT CONCRETE MASONRY, PARAPET, CLASS A	15.000 CY				

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0700	610010 PORTLAND CEMENT CONCRETE MASONRY, ABUTMENT FOOTING, CLASS B	104.000 CY				
0710	610011 PORTLAND CEMENT CONCRET MASONRY, ABUTMENT ABOVE FOOTING, CLASS B	100.000 CY				
0720	610013 PORTLAND CEMENT CONCRETE MASONRY, PIER ABOVE FOOTING, CLASS B	13.000 CY				
0730	610017 PORTLAND CEMENT CONCRETE MASONRY, SUPERSTRUCTURE, CLASS D	120.000 CY				
0740	611001 BAR REINFORCEMENT, EPOXY COATED	33000.000 LB				
0750	615515 RIDE SHELTER INSTALLATION	1.000 EACH				
0760	615516 PREFABRICATED STEEL TRUSS BRIDGE	LUMP	LUMP			
0770	617515 HEADWALL	2.000 EACH				
0780	621500 TEMPORARY TIMBER MAT	LUMP	LUMP			
0790	626000 STEEL PEDESTRIAN RAILING	106.000 LF				

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CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0800	626010 ALUMINUM PEDESTRIAN RAILING	408.000 LF				
0810	628070 DRILLING HOLES AND INSTALLING DOWELS	90.000 EACH				
0820	701010 PORTLAND CEMENT CONCRETE CURB, TYPE 1-2	59.000 LF				
0830	701012 PORTLAND CEMENT CONCRETE CURB, TYPE 1-6	1477.000 LF				
0840	701013 PORTLAND CEMENT CONCRETE CURB, TYPE 1-8	62.000 LF				
0850	701014 PORTLAND CEMENT CONCRETE CURB, TYPE 2	3620.000 LF				
0860	701017 INTEGRAL PORTLAND CEMENT CONCRETE CURB AND GUTTER, TYPE 1-6	359.000 LF				
0870	701020 INTEGRAL PORTLAND CEMENT CONCRETE CURB AND GUTTER, TYPE 3-2	288.000 LF				
0880	701021 INTEGRAL PORTLAND CEMENT CONCRETE CURB AND GUTTER, TYPE 3-4	8525.000 LF				
0890	701022 INTEGRAL PORTLAND CEMENT CONCRETE CURB AND GUTTER, TYPE 3-6	106.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0900	701023 INTEGRAL PORTLAND CEMENT CONCRETE CURB AND GUTTER, TYPE 3-8	203.000 LF				
0910	702000 TRIANGULAR CHANNELIZING ISLANDS	11135.000 SF				
0920	705001 PORTLAND CEMENT CONCRETE SIDEWALK, 4"	28258.000 SF				
0930	705002 PORTLAND CEMENT CONCRETE SIDEWALK, 6"	1475.000 SF				
0940	705005 PORTLAND CEMENT CONCRETE SIDEWALK, 8"	6758.000 SF				
0950	705007 SIDEWALK SURFACE DETECTABLE WARNING SYSTEM	1864.000 SF				
0960	705011 PEDESTRIAN CONNECTION	4028.000 SF				
0980	705528 TEMPORARY PEDESTRIAN CONNECTION	8.000 EACH				
0990	706000 MONUMENT	15.000 EACH				
1000	706500 RIGHT-OF-WAY MARKER, CAPPED REBAR	43.000 EACH				
1010	707001 RIPRAP, R-4	352.000 SY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1020	707002 RIPRAP, R-5	358.000 SY				
1030	707500 CHANNEL BED FILL	233.000 CY				
1040	708001 GEOTEXTILES, STABILIZATION	556.000 SY				
1050	708002 GEOTEXTILES, SEPARATION	87570.000 SY				
1060	708003 GEOTEXTILES, RIPRAP	722.000 SY				
1070	709000 PERFORATED PIPE UNDERDRAINS, 4"	131.000 LF				
1080	709001 PERFORATED PIPE UNDERDRAINS, 6"	16636.000 LF				
1090	709011 UNDERDRAIN OUTLET PIPE, 6"	631.000 LF				
1100	709017 UNDERDRAIN OUTLET	32.000 EACH				
1110	710504 WATER SERVICES	LUMP	LUMP			

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1120	711500 ADJUST AND REPAIR EXISTING SANITARY MANHOLE	14.000 EACH				
1130	711501 SANITARY SEWER SYSTEM	LUMP	LUMP			
1140	711505 HORIZONTAL DIRECTIONAL DRILLING FOR SANITARY SEWER	241.000 LF				
1150	720021 GALVANIZED STEEL BEAM GUARDRAIL, TYPE 1-31	1125.000 LF				
1160	720557 BOLLARD, STEEL	6.000 EACH				
1170	721006 END ANCHORAGE 31	4.000 EACH				
1180	721009 GUARDRAIL TO BARRIER CONNECTION (EXIT TYPE 31)	2.000 EACH				
1190	721010 GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31	3.000 EACH				
1200	723003 PORTLAND CEMENT CONCRETE SAFETY BARRIER, PERMANENT, SINGLE FACE, 42"	116.000 LF				
1210	724001 PERMANENT IMPACT ATTENUATOR, TYPE 1	4.000 EACH				

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			DOLLARS	CTS	DOLLARS	CTS
1220	727000 CHAIN LINK FENCE	310.000				
		LF				
1230	727006 TEMPORARY CONSTRUCTION FENCE	473.000				
		LF				
1240	760003 BIKE-FREINDLY RUMBLE STRIPS, CONCRETE	3445.000				
		LF				
1250	760007 RUMBLE STRIPS, CONCRETE	6987.000				
		LF				
1260	760010 PAVEMENT MILLING, BITUMINOUS CONCRETE PAVEMENT	17836.000				
		SYIN				
1270	760011 PAVEMENT MILLING, BITUMINOUS CONCRETE PAVEMENT, TAPER CUT	340.000				
		SYIN				
1280	760012 PAVEMENT MILLING, BITUMINOUS CONCRETE PAVEMENT, VARIABLE DEPTH	14949.000				
		SYIN				
1290	762000 SAW CUTTING, BITUMINOUS CONCRETE	10344.000				
		LF				
1300	762001 SAW CUTTING, CONCRETE, FULL DEPTH	3417.000				
		LF				
1310	763000 INITIAL EXPENSE/DE-MOBILIZATION					
		LUMP			LUMP	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1320	763501 CONSTRUCTION ENGINEERING	LUMP	LUMP			
1330	763503 TRAINEE	1040.000 HOUR	0.80000		832.00	
1340	763508 PROJECT CONTROL SYSTEM DEVELOPMENT PLAN	LUMP	LUMP			
1350	763509 CPM SCHEDULE UPDATES AND/OR REVISED UPDATES	EAMO 30.000				
1360	763598 FIELD OFFICE, SPECIAL I	EAMO 30.000				
1370	801000 MAINTENANCE OF TRAFFIC	LUMP	LUMP			
1380	801500 MAINTENANCE OF TRAFFIC, ALL INCLUSIVE	LUMP	LUMP			
1390	802003 ARROW PANELS TYPE C	EADY 1547.000				
1400	803001 FURNISH AND MAINTAIN PORTABLE CHANGEABLE MESSAGE SIGN	EADY 2413.000				
1410	804001 FURNISH AND MAINTAIN PORTABLE LIGHT ASSEMBLY (FLOOD LIGHTS)	EADY 2288.000				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1420	805001 PLASTIC DRUMS	498280.000 EADY				
1430	806001 TRAFFIC OFFICERS	518.000 HOUR	75.00000		38850.00	
1440	808001 FURNISH AND MAINTAIN TRUCK MOUNTED ATTENUATOR, TYPE I	522.000 EADY				
1450	810001 TEMPORARY WARNING SIGNS AND PLAQUES	94365.000 EADY				
1460	811001 FLAGGER, NEW CASTLE COUNTY STATE	3975.000 HOUR				
1470	813001 TEMPORARY BARRICADES, TYPE III	293313.000 LFDY				
1480	813500 PEDESTRIAN CHANNELIZING BARRICADE SYSTEM	98075.000 LFDY				
1490	813503 TEMPORARY PEDESTRIAN PATHWAY	195.000 SY				
1500	817002 PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, ALKYD-THERMOPLASTIC	5550.000 SF				
1510	817008 BLACKOUT TAPE, 6"	5000.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1520	817009 TEMPORARY MARKINGS, TAPE, 4"	5615.000 LF				
1530	817010 TEMPORARY MARKINGS, TAPE, WORDS/SYMBOLS	115.000 SF				
1540	817012 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, SYMBOL/LEGEND	10061.000 SF				
1550	817013 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"	218145.000 LF				
1560	817014 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 10"	1480.000 LF				
1570	817015 PREFORMED RETROREFLECTIVE THERMOPLASTIC MARKINGS, BIKE SYMBOL	16.000 EACH				
1580	817017 PREFORMED RETROREFLECTIVE THERMOPLASTIC MARKINGS, HANDICAP SYMBOL	2.000 EACH				
1590	817018 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 3"	18860.000 LF				
1600	817019 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 5"	6710.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1610	817022 RETROREFLECTIVE PREFORMED PATTERNED MARKINGS, 8"	LF 335.000				
1620	817024 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 9"	LF 16225.000				
1630	817025 PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, BLACK, 14"	LF 235.000				
1640	817026 PAINTING OF WHITE OR YELLOW, 5" LINE	LF 1185.000				
1650	817027 RAISED/RECESSED PAVEMENT MARKER	EACH 222.000				
1660	817031 REMOVAL OF PAVEMENT STRIPING	SF 19645.000				
1670	817033 TEMPORARY MARKINGS, TAPE, 6"	LF 781.000				
1680	818001 SUPPLY OF FLAT SHEET ALUMINUM SIGN PANEL, TYPE IV, RETROREFLECTIVE SHEETING	SF 522.000				
1690	819011 GALVANIZED TELESCOPING STEEL SIGN POSTS, 12' X 2", COMPLETE W/ BASEPOSTS AND HARDWARE	EACH 207.000				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1700	819013 WOODEN SIGN POSTS, 4" X 6"	EACH	34.000			
1710	819016 INSTALLATION OF 4" DIAMETER HOLE, LESS THAN OR EQUAL TO 6" DEPTH	EACH	35.000			
1720	819018 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON SINGLE SIGN POST	EACH	540.000			
1730	819019 INSTALLATION OR REMOVAL OF TRAFFIC SIGN(S) ON MULTIPLE SIGN POSTS	SF	280.000			
1740	820001 REINFORCED CONCRETE MASONRY SIGN FOUNDATION, W-6	EACH	2.000			
1750	820008 SUPPLY OF BREAKAWAY I-BEAM SIGN POSTS, W-6	LF	30.000			
1760	820017 INSTALLATION OF BREAKAWAY I-BEAM SIGN POSTS	EACH	2.000			
1770	820018 REMOVAL OF BREAKAWAY I-BEAM SIGN POSTS	EACH	2.000			
1780	820019 INSTALL SIGN PANEL ON BREAKAWAY I-BEAM SIGN SUPPORT	SF	54.000			

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1790	820020 REMOVE SIGN PANEL ON BREAKAWAY I-BEAM SIGN SUPPORT	54.000 SF				
1800	825001 TUBULAR MARKERS	499.000 EACH				
1810	830001 CONDUIT JUNCTION WELL, TYPE 1, 20" X 20" PRECAST CONCRETE	68.000 EACH				
1820	830002 CONDUIT JUNCTION WELL, TYPE 4, 20" X 42-1/2" PRECAST CONCRETE	31.000 EACH				
1830	830003 CONDUIT JUNCTION WELL, TYPE 5, 24" X 16" PRECAST CONCRETE	3.000 EACH				
1840	830004 CONDUIT JUNCTION WELL, TYPE 7, 36" X 60" PRECAST POLYMER CONCRETE	9.000 EACH				
1850	831501 FURNISH AND INSTALL 4" SCHEDULE 80 PVC CONDUIT (OPEN CUT)	565.000 LF				
1860	831502 FURNISH AND INSTALL 3" SCHEDULE 80 PVC CONDUIT (OPEN CUT)	560.000 LF				
1870	831514 FURNISH AND INSTALL 2-1/2" SCHEDULE 80 PVC CONDUIT (TRENCH)	15.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1880	831515 FURNISH AND INSTALL 3" SCHEDULE 80 PVC CONDUIT (TRENCH)	LF	2140.000			
1890	831516 FURNISH AND INSTALL 4" SCHEDULE 80 PVC CONDUIT (TRENCH)	LF	8930.000			
1900	831523 FURNISH AND INSTALL 2" GALVANIZED CONDUIT (TRENCH)	LF	300.000			
1910	831526 FURNISH AND INSTALL 4" GALVANIZED STEEL CONDUIT (TRENCH)	LF	370.000			
1920	831540 FURNISH AND INSTALL 3" GALVANIZED STEEL CONDUIT (ON STRUCTURE)	LF	135.000			
1930	831541 FURNISH AND INSTALL 4" GALVANIZED STEEL CONDUIT (ON STRUCTURE)	LF	90.000			
1940	831544 FURNISH AND INSTALL 3" HDPE SDR-13.5 CONDUIT (BORE)	LF	105.000			
1950	831545 FURNISH AND INSTALL 4" HDPE SDR-13.5 CONDUIT (BORE)	LF	6365.000			
1960	831572 FURNISH AND INSTALL SECOND AND SUBSEQUENT ADDITIONAL 2-1/2" SCHEDULE 80 PVC CONDUITS IN TRENCH OR OPEN CUT	LF	25.000			

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			DOLLARS	CTS	DOLLARS	CTS
1970	831573 FURNISH AND INSTALL SECOND AND SUBSEQUENT ADDITIONAL 3" SCHEDULE 80 PVC CONDUITS IN TRENCH OR OPEN CUT	100.000 LF				
1980	831574 FURNISH AND INSTALL SECOND AND SUBSEQUENT ADDITIONAL 4" SCHEDULE 80 PVC CONDUIT IN TRENCH OR OPEN CUT	380.000 LF				
1990	832006 FURNISH AND INSTALL 1-CONDUCTOR #2 AWG STRANDED COPPER, TYPE USE-2	690.000 LF				
2000	832007 FURNISH AND INSTALL 1-CONDUCTOR #4 AWG STRANDED COPPER, TYPE USE-2	180.000 LF				
2010	832008 FURNISH AND INSTALL 1-CONDUCTOR #6 STRANDED COPPER, TYPE USE-2	9955.000 LF				
2020	834001 POLE BASE, TYPE 3	2.000 EACH				
2030	834002 POLE BASE, TYPE 3A	6.000 EACH				
2040	834003 POLE BASE, TYPE 3B	8.000 EACH				
2050	834004 POLE BASE, TYPE 3C	4.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2060	834005 POLE BASE, TYPE 4A	29.000 EACH				
2070	834006 POLE BASE, TYPE 6	18.000 EACH				
2080	835002 CABINET BASE TYPE M	2.000 EACH				
2090	835003 CABINET BASE TYPE P	6.000 EACH				
2100	839003 REMOVAL OF WOOD POLE	3.000 EACH				
2110	842006 FURNISH AND INSTALL EMBEDDED METERED SERVICE PEDESTAL (100 AMP)	2.000 EACH				
2120	846001 FURNISH AND INSTALL LOOP WIRE 1-CONDUCTOR #14 AWG ENCASED IN 1/4" FLEXIBLE TUBING IN A LOOP SAWCUT	5380.000 LF				
2130	846002 FURNISH AND INSTALL A 1-1/2 INCH GALVANIZED RIGID METAL CONDUIT DETECTOR SLEEVE WITH LOOP WIRE	645.000 LF				
2140	847004 LIGHTING CONTROL AND DISTRIBUTION ENCLOSURE (120/240;100 AMP)	2.000 EACH				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2150	850011 REMOVAL OF LUMINAIRE	4.000 EACH				
2160	850519 LED LUMINAIRE, SPECIAL FIXTURE	11.000 EACH				
2170	850521 LUMINAIRE (LED), 250 WATTS, HPS EQUIVALENT	34.000 EACH				
2180	851001 ALUMINUM LIGHTING STANDARD WITH SINGLE DAVIT ARM, 30' POLE	18.000 EACH				
2190	905001 SILT FENCE	8216.000 LF				
2200	905002 REINFORCED SILT FENCE	2524.000 LF				
2210	905004 INLET SEDIMENT CONTROL, DRAINAGE INLET	139.000 EACH				
2220	905005 INLET SEDIMENT CONTROL, CURB INLET	83.000 EACH				
2230	905006 INLET SEDIMENT CONTROL, CULVERT INLET	1.000 EACH				
2240	905500 SUPER SILT FENCE	700.000 LF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2250	906001 PORTABLE SEDIMENT TANK	2.000 EACH				
2260	907011 STONE CHECK DAM	5.000 TON				
2270	907012 TEMPORARY SLOPE DRAIN, 12"	120.000 LF				
2280	907017 COMPOST FILTER LOGS	1060.000 LF				
2290	908004 TOPSOIL, 6" DEPTH	12350.000 SY				
2300	908005 TOPSOIL, 12" DEPTH	278.000 SY				
2310	908010 TOPSOILING, 6" DEPTH	72125.000 SY				
2320	908014 PERMANENT GRASS SEEDING, DRY GROUND	91389.000 SY				
2330	908017 TEMPORARY GRASS SEEDING	99688.000 SY				
2340	908019 PERMANENT GRASS SEEDING, STREAMBANK	74.000 SY				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
2350	908020 EROSION CONTROL BLANKET MULCH	11840.000 SY				
2360	908023 STABILIZED CONSTRUCTION ENTRANCE	1933.000 SY				
2370	908024 STABILIZED CONSTRUCTION ENTRANCE, TOPDRESSING	125.000 TON				
2380	909001 SANDBAG DIKE	170.000 CF				
2390	909004 TURBIDITY CURTAIN, FLOATING	30.000 LF				
2400	909006 STILLING WELL	2.000 CY				
2410	910001 INFILTRATION STONE, NO. 3	557.000 CY				
2420	910002 INFILTRATION STONE, NO. 8	1248.000 CY				
2430	910006 OUTLET STRUCTURE	4.000 EACH				
2440	910009 INFILTRATION TRENCH	450.000 CY				

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			DOLLARS CTS	DOLLARS CTS
2450	910010 BIORETENTION AREA	1607.000 CY		
2460	910500 BIORETENTION SOIL MIX	665.000 CY		
	SECTION 0001 TOTAL			
	TOTAL BID			

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