JANUARY 17, 2019
REHABILITATION OF BRIDGE 00061 STRAWBERRY HILL AVENUE OVER I-95
FEDERAL AID PROJECT NO. 1102(122)
STATE PROJECT NO. 0102-0363
CITY OF NORWALK

ADDENDUM NO. 1

This Addendum addresses the following questions and answers contained on the "CT DOT QUESTIONS AND ANSWERS WEBSITE FOR ADVERTISED CONSTRUCTION PROJECTS":

Question and Answer Nos. 1, 2, 3, 4, 6, 10b, 12, 14, 15, 20, 23, 24, and 27.

SPECIAL PROVISIONS
NEW SPECIAL PROVISIONS

The following Special Provisions are hereby added to the Contract:

- NOTICE TO CONTRACTOR – COORDINATION WITH NORWALK TRANSIT DISTRICT
- NOTICE TO CONTRACTOR – SMART WORK ZONE ITEMS
- ITEM #1131016A – SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS)
- ITEM #1131017A – SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS) SERVICE
- ITEM #1131018A – SMART WORK ZONE VARIABLE MESSAGE SIGN/QUEUE SENSOR TRAILER (SVMQ)
- ITEM #1131019A – SMART WORK ZONE VARIABLE MESSAGE SIGN/QUEUE SENSOR TRAILER (SVMQ) SERVICE
- ITEM #1131020A – SMART WORK ZONE DEPLOYMENT
- ITEM #1131021A – SMART WORK ZONE OPERATIONS
- ITEM #1131022A – SMART WORK ZONE TRAILER RELOCATION
- ITEM #1131023A – SMART WORK ZONE QUEUE TRAILER/SENSOR (SQT)
- ITEM #1131024A – SMART WORK ZONE QUEUE TRAILER/SENSOR (SQT) SERVICE

REVISED SPECIAL PROVISIONS

The following Special Provisions are hereby deleted in their entirety and replaced with the attached like-named Special Provisions:

- CONTRACT TIME AND LIQUIDATED DAMAGES
- SECTION 1.05 – CONTROL OF THE WORK
- SECTION 1.06 – CONTROL OF MATERIALS
- SECTION 1.08 – PROSECUTION AND PROGRESS
- ITEM #0202000A – EARTH EXCAVATION
- ITEM #0507791A – REBUILD CATCH BASIN
  ITEM #0586001.10A – TYPE 'C' CATCH BASIN - 0' - 10' DEEP
  ITEM #0586001.20A – TYPE 'C' CATCH BASIN - 0' - 20' DEEP
  ITEM #0586005.10A – TYPE 'C' CATCH BASIN DOUBLE GRATE TYPE 2- 0' - 10' DEEP
  ITEM #0586500.10A – MANHOLE 0' - 10' DEEP
  ITEM #0586801A – LAWN DRAIN
- ITEM #0916403A – REMOVE AND RESET SOUND BARRIER
- ITEM #0921026A – 4' TEMPORARY SIDEWALK
- ITEM #1301765A – FURNISHING AND INSTALLING 12" WATER MAIN
- ITEM #1301768A – FURNISHING AND INSTALLING 12" WATER MAIN ON BRIDGE

CONTRACT ITEMS

NEW CONTRACT ITEMS

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
0304002	PROCESSED AGGREGATE BASE	C.Y.	1302
0586001.20A	TYPE 'C' CATCH BASIN - 0' - 20' DEEP	EA.	3
1131016A	SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS)	EA.	2
1131017A	SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS) SERVICE	MO.	60
1131018A	SMART WORK ZONE VARIABLE MESSAGE SIGN/QUEUE SENSOR TRAILER (SVMQ)	EA.	2
1131019A	SMART WORK ZONE VARIABLE MESSAGE SIGN/QUEUE SENSOR TRAILER (SVMQ) SERVICE	MO.	60
1131020A	SMART WORK ZONE DEPLOYMENT	LS	LS
1131021A	SMART WORK ZONE OPERATIONS	MO.	30

1131022A	SMART WORK ZONE TRAILER RELOCATION	EA.	7
1131023A	SMART WORK ZONE QUEUE TRAILER/SENSOR (SQT)	EA.	11
1131024A	SMART WORK ZONE QUEUE TRAILER/SENSOR (SQT) SERVICE	MO.	330

REVISED CONTRACT ITEMS

ITEM NO.	DESCRIPTION	ORIGINAL QUANTITY	REVISED QUANTITY
0406170	HMA S1	759 TON	624 TON
0406171	HMA S0.5	488 TON	413 TON
0406172	HMA S0.375	2349 TON	2476 TON
0586001.10A	TYPE 'C' CATCH BASIN – 0' - 10' DEEP	9 EA.	6 EA.
0916403A	REMOVE AND RESET SOUND BARRIER	450 L.F.	30 L.F.

DELETED CONTRACT ITEM

ITEM NO.	DESCRIPTION	ORIGINAL QUANTITY	REVISED QUANTITY
0212000	SUBBASE	1401 C.Y.	0

PLANS

REVISED PLANS

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheets:

02.01.A1	04.05.A1	05.06.A1	06.35.A1
03.03.A1	04.06.A1	05.020.A1	07.01.A1
03.04.A1	04.10.A1	05.021.A1	07.02.A1
03.05.A1	04.11.A1	05.026.A1	07.03.A1
03.19.A1	04.12.A1	06.03.A1	07.04.A1
04.03.A1	04.13.A1	06.28.A1	

The Bid Proposal Form has been revised to reflect these changes.

The Detailed Estimate Sheets do not reflect these changes.

There will be no change in the number of calendar days due to this Addendum.

The foregoing is hereby made a part of the contract.

NOTICE TO CONTRACTOR – COORDINATION WITH NORWALK TRANSIT DISTRICT

The Contractor is hereby advised that Norwalk Transit District provides regularly scheduled bus services within the vicinity of Bridge No. 00061. Operations impacted by the bridge rehabilitation project are currently limited to the Wheels Route 7 Bus, which operates Monday through Saturday between 6:20am and 7:11pm.

In accordance with "Section 1.08.04 – Limitation of Operations," the Contractor shall notify Norwalk Transit District a minimum of 6 weeks prior to any scheduled closure of any project roadway that will interfere with the operations schedule described above so that alternative routes can be arranged.

NOTICE TO CONTRACTOR – SMART WORK ZONE ITEMS

The Contractor is hereby notified that the Portable Work Zone Management System (PWZMS) items have been changed to Smart Work Zone (SWZ) items. The Contractor should read the special provisions carefully as many requirements have been changed including but not limited to item numbers, new item numbers, method of measurement and basis of payment.

Submittals required for to meet Section 1.05 and 1.06 shall be provided ten (10) days post award to the Engineer.

ITEM #1131016A – SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS)
ITEM #1131017A – SMART WORK ZONE MOBILE VIDEO CAMERA/QUEUE SENSOR TRAILER (SVQS) SERVICE
ITEM #1131018A – SMART WORK ZONE VARIABLE MESSAGE SIGN/QUEUE SENSOR TRAILER (SVMQ)
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ITEM #1131024A – SMART WORK ZONE QUEUE TRAILER/SENSOR (SQT) SERVICE

Description: This work shall consist of furnishing, installing, operating, servicing, maintaining, relocating and removing an automated Smart Work Zone (SWZ) of the complete system for the duration of the Project.

These items shall include vehicle trailers, sensors, cameras, variable message signs, cloud hosted third party traffic speed data, processed rock for leveling trailers, website, communications equipment, relocation, service and maintenance. Included in the operational responsibilities is the assumption of all trailer license plates, communication costs such as FCC licensing, cellular telephone, wireless data networks, satellite and internet subscription charges, solar system support, battery charging and maintenance. In addition to these requirements, the Contractor shall assume all responsibility for any damaged equipment included in the system due to crashes, vandalism, adverse weather, etc. that may occur during system deployment and operation.

This system shall monitor the areas in advance of the project work zone and project's work zone area. The SWZ shall provide Connecticut Department of Transportation (CTDOT) operators control of the cameras to disseminate real-time information to the traveling public and other stakeholders. The system shall be completely operational fourteen (14) days prior to the start of roadwork to allow for traffic data accumulation by the system. The SWZ shall consist of an automated system using trailer-mounted microwave sensors that transmit vehicle speed and related data through cellular communications to a Contractor-hosted central computer system. The camera shall be used to verify traffic conditions within the viewable area of the camera. The central computer system shall send automated and operator manual commands to variable message signs through cellular communications to display travel time, delay and stopped traffic information. The speed data, video images, and variable message sign content shall be hosted on a Contractor-supplied website.

The SWZ shall be capable of detecting the presence of queued traffic in the segments identified on the plans and reporting via the queue warning Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ). The distance from the SVMQ to the detected back of queue shall be reported within one-half (1/2) mile accuracy on the system, but reported on the SVMQ at one (1) mile accuracy rounded up to the nearest mile. This "real-time" queue location information shall be calculated and displayed on the applicable SVMQ to the nearest minute.

The SWZ shall have the capability to notify the construction field office, Contractor or others, as determined by the Engineer, of travel times and when the speed through the work zone decreases below thirty (30) mph. The system shall be capable of transferring real-time data in a file format compatible with Oracle®. "Motion" video feeds updated once per one (1) second shall be available for the CTDOT to display on the Contractor-provided website. In addition, any number of CTDOT or Contractor employees shall be notified via email or text message for these speed changes. Contact information will be furnished by the Engineer at the start of the SMZ deployment.

All the required components of the SWZ shall be fully operational within forty-five (45) days of notice to deploy from the Engineer. If not fully operational within said forty-five (45) days, a payment reduction of five percent (5%) for each day the entire system is not operating will apply, as determined by the Engineer.

Once operations begin, the SWZ shall perform with no major malfunctions throughout the Contract, unless the Engineer requests the system or portions of the system be removed. Malfunctions include, but are not limited to, the inability of the equipment to provide accurate real-time video feeds, delay, or travel time information, inability to withstand the construction roadside environment or normal weather conditions. The Engineer reserves the right to terminate this item at any time if it is determined the SWZ is not performing in accordance with this specification.

Construction Methods:

Submittals:

1. At least twenty (20) days prior to beginning installation, the Contractor shall submit to the Engineer for review and approval, in consultation with the CTDOT's Subject Matter Expert, evidence that the proposed supplier has successfully completed at least five (5) SWZ projects similar in concept and scope to the proposed system in the past five (5) years. The proposed supplier shall also provide the credentials of a qualified technician who shall install and operate the system. Include names, addresses, and telephone numbers of the similar project's owner's representatives for verification.
2. Also, at least twenty (20) days prior to beginning installation, submit brochures and cut sheets on all units of the SWZ, with details of how and which communications systems shall be used, and the technical specifications for the website.
3. The Contractor shall demonstrate to the Engineer an operating SWZ.
4. At least fourteen (14) days prior to installation, the Contractor shall propose the actual device layout to the CTDOT for review and approval.
5. Prior to public viewing, the website map showing device locations and other interactive elements shall be submitted for the Engineer's review.
6. The Engineer reserves the right to add or remove locations as needed.

Equipment:

1. The SWZ shall consist of the following equipment.
   a) Two (2) SVQS with camera with pan-tilt-zoom (PTZ). The computer hardware and software must meet the manufacturer's requirements to operate and monitor the system. The camera response time to web commands for PTZ shall be reviewed and approved by the Engineer. The PTZ response time shall follow the operator's manual commands to move the camera to the desired position.
   b) Eleven (11) SQT shall provide real time speed, volumes, occupancy and other necessary data to the SWZ to activate messaging on the variable message signs and provide historical data.
   c) Two (2) SVMQ shall display real-time travel time messaging and back of queue warning to the traveling public.
   d) Communication equipment including wireless data networks, base stations, cell phone data interfaces, Ethernet network interfaces, and internet interfaces.
   e) Customized Webpage integrated with the SWZ to include traveling public and Project staff accessibility; SWZ website shall be allowed to "link" to the CTDOT's website
   f) Software package customized for this particular Project's needs.

2. The following shall be provided for each SQT, SVMQ and SVQS with PTZ:
   a) Approximate locations of variable message signs and traffic sensors shown on the figures below may be adjusted to ensure sightlines and safety are adequate
   b) Clean stone or processed rock to provide a level area for trailers and provide for sufficient height for sensors to operate correctly.
   c) Individually mounted on trailer units with solar power.
   d) Equipped with digital wireless cellular modems as required.
   e) Linked to the Contractor's central computer server.
   f) Maintained as needed to remain operational, including cleaning and inspecting components, snow and ice removal from solar panels and keeping batteries charged.
   g) Extra set of programming instructions stored in the units for emergency use.

3. The SVQS, SQT, and SVMQ shall collect and process traffic data as programmed within the software provided with the sensors. This data shall be transmitted over a digital cellular network to access and store the respective data remotely. The remote monitoring and data collection shall be placed in areas where wireless communication is available. The SVQS, SQT, and SVMQ shall use both solar power and deep cycle batteries to provide a self-contained completely autonomous system.

The SVQS mobile camera(s) shall provide a mobile, self-contained, all-weather, trailer-mounted equipment platform. The mobile camera system shall use wireless communication. The mobile camera shall provide a rapidly-deployable real-time video system viewable from a remote location. The mobile camera shall be capable as a stand-alone camera system.

   a) Trailer and power requirements:
      i. 2-wheel industrial grade trailer with stabilizer legs
      ii. Available as a mobile unit or permanent mount
      iii. Adjustable solar array for maximum exposure to sun
      iv. Removable trailer tongue
      v. Battery bank sized for thirty (30) day autonomy

b) SVQS requirements:
   i. Microwave detection (Wavetronix Smart Sensor HD) with Dual Radar that reliably detects up to twenty-two (22) lanes of traffic, auto configuration
   ii. Provide data including speed, volume and occupancy
   iii. Digital cellular communications
   iv. Dome camera with day/night adjustable pan/tilt/zoom IP addressable
   v. Mobile camera system shall provide camera operating software to use camera manufacturer's operating system.
   vi. Minimum thirty (30) ft extendable mast with 360 degree lockable rotation
   vii. Capable of providing streaming or snapshot video
   viii. Electric hoists for rapid deployment
c) SQT requirements:
   i. Microwave detection reliably detects up to twenty-two (22) lanes of traffic
   ii. Data provided includes speed, volume and occupancy
   iii. Available as a mobile unit or permanent mount
   iv. Digital cellular communications

4. The SVMQ shall be configured with the following variable message sign requirements or approved equal:
a) Trailer and power requirements:
   i. 2-wheeled trailer structurally adequate to serve as both a carrier and an operating platform
   ii. Meets Federal Regulations for safety and travel
   iii. Color of trailer paint shall be safety orange or as approved by the Engineer
   iv. Bank of batteries capable of being recharged automatically by a group of solar panels located at the highest point on the unit
   v. Variable message signs shall be designed with sufficient energy backup to operate for a period of thirty (30) days (minimum) at 75°F without sun exposure
   vi. Solar panel generator array shall recharge the battery bank at a rate of 2 1/2 hours peak sun per twenty-four (24) hour period of usage
   vii. Solar panel array sized to replace the power used in typical daily operation with less than four (4) hours of sun
   viii. Deep cycle, lead acid 12-volt batteries wired in parallel, housed in a lockable heavy duty steel weatherproof battery box
   ix. Batteries recharged by a solar panel array producing 110 watts of power minimum
   x. Built-in battery charger with minimum 25 ampere per hour rating
   xi. Solar charge current meter and battery charger current meter visible
   xii. Protective housing painted with manufacturer's standard colors
b) Variable Message Sign/Queue Sensor requirements:
   i. Sign panel of welded aluminum alloy construction, assembled to prevent dissimilar metal action from occurring
   ii. Length of sign panel 128 inches or less
   iii. Front face of sign covered with clear UV-inhibited polycarbonate to prevent fading
   iv. Message center:
      1) Three (3) separate lines, center justified

2) Each line up to eight (8) characters, equally spaced a minimum of three (3) inches apart
3) Each character eighteen (18) inches high by twelve (12) inches wide
4) Each character configured with thirty-five (35) LED lamp pixels in a five (5) x seven (7) element arrangement
5) Message color 590 nanometers (yellow-orange)

i. Remote sign operation via central computer
ii. Messages to be displayed shall have capability to be timed to changes at various times of day and days of week
iii. Trailer-mounted variable message board consisting of optically enhanced LED lamp matrix panels powered by a bank of batteries in order to convey bright, distinctive messages to the traveling public
iv. Sign capable of displaying up to eight (8) pages in a multiple page message, with variable timing in one-tenth (1/10) second increments under computer control
v. Sign shall completely change all lines of message copy in not more than one hundred (100) milliseconds
vi. Sign clearly visible and legible from a distance of eight-hundred (800) feet under both day and night conditions, with a photocell automatically adjusting its light source for variable light level conditions
vii. Sign panel supported on a telescoping upright member with hydraulic lift to permit raising the sign for operation and lowering the sign for transport
viii. Telescoping upright able to rotate 360 degrees and shall lock into position
ix. Telescoping distance of nominally five (5) feet to allow bottom of sign to be at least seven (7) feet above the ground
x. Sign panel shall pivot to the longitudinal axis of the trailer for transport, to reduce aerodynamic drag
xi. Static sign attached identifying the message board is for the Project; coordinate sign content and appearance with the Engineer
xii. Microwave detection (Wavetronix Smart Sensor HD) with dual radar that reliably detects up to twenty-two (22) lanes of traffic, auto configuration
xiii. Data provided from sensor to include speed, volume and occupancy
xiv. Available as a mobile unit or permanent mount

c) Variable Message Sign on-board dedicated computer requirements:
i. Solid state design, removable, including a keyboard through which user originated messages may be entered for display or storage
ii. LCD display screen upon which messages can be reviewed before display on the message sign
iii. Storage of a minimum of one hundred (100) preprogrammed messages for display when called upon by an operator through the keyboard and a minimum of one hundred (100) users originated multiple page messages.
iv. Password coding or key entry.
v. Control programming to present sequenced messages under operator control through keyboard entry.
vi. Control for moving arrow displays.
vii. Calendar program to automatically start and stop the display of sequences at predetermined times.

viii. Character board and battery diagnostics.
ix. Computer housing: weather resistant, shock resistant lockable control box with a light for night operation.
x. Power control unit housed in a lockable, steel, weatherproof battery box containing two (2) current meters (to show amperage generated with battery charger and amperage from solar panels to battery bank).
xi. Power control unit to incorporate a PV regulator with thermal compensation for variances in ambient temperature, to regulate the charge rate to the battery bank.
xii. Control circuitry connected to variable message sign's photocell that detects ambient light conditions and reduces lamp intensity at night to reduce glare.

d) Variable Message Sign - other requirements:
i. Variable message sign operation using cellular telephone and cellular telephone service (trailer must be located within cellular telephone coverage), allowing operator remote control of the on-board computer
ii. A Queue Trailer/Sensor may be located next to designated SVMQ to collect data
iii. The message sign shall provide for remote sign operation via central computer base station or Website allowing operators to manually override the automated messaging in order to display a message at any time. The operator shall be able to cancel this override and initiate the systems automated messaging feature.
iv. Any request to change messages on the Variable Message Signs shall be approved by the CTDOT.

Deployment and Operation:

The decision to deploy or remove individual devices or the entire SWZ will be made by the Engineer. Once the decision is made to deploy the system, the Engineer will coordinate with the Contractor for the duration of system deployment.

1. The SWZ shall be installed as shown in the approved layout. The locations may require repositioning as directed by the Engineer and as the project continues. The system shall be maintained and operated for the duration of the Project or as directed by the Engineer. The Contractor shall service the SWZ on a six (6) month regular interval for the duration of the Project or as directed by the Engineer. Additionally, the Contractor shall clean the Camera dome bubbles at least once per month during the winter months between December and March for the duration of the project as directed by the Engineer. The service shall include cleaning the sign panel, removing snow/ice and debris from the solar panels as needed or as directed by the Engineer. The Contractor shall follow the manufacturer's requirements for cleaning the SVQS. The cost of the service shall be included in the items (Item Nos. 1131017A, 1131019A, and 1131024A) for each unit.

2. The Contractor shall prepare the locations to receive the equipment in accordance with the equipment manufacturer's requirements. Each location shall include clean stone or processed rock provided and installed by the Contractor to level the surface area. Some location may require the trailers to be lifted over the safety barrier and placed on the level processed rock.

3. The Contractor shall install each of the system components in accordance with the manufacturer's recommendations, in compliance with all industry standards and codes such that

each system is fully operational and can be operated and controlled from the Construction Field Office or remotely, as approved by the Engineer.

4. The Contractor shall coordinate the work with others as designated by the Engineer to complete installation and integration of all equipment for all system types.

5. System Calibration and Configuration: The SWZ shall provide the following:
   a) Software shall be configured for notification to appropriate personnel at the Highway Operations Center, the Construction Field Office and the Contractor by email each time a malfunction has occurred in the system. A malfunction record shall also be made in the database. The software shall be configured so that any number of approved personnel can be notified. The email shall display an error message for the device or devices affected. Through the Contractor, the SWZ Webpage Integrator shall be responsible for this notification procedure.
   b) Software shall be configured to provide current operational and location status (such as current traffic data and messages, communications system, signs, and sensors as well as latitude/longitude of all deployed devices) via the Internet to a dedicated Website established for the purpose of monitoring the corridor and the SWZ equipment.
   c) Software shall be configured to assess any type of malfunction that has occurred. This assessment includes communications disruption between any device in the system configuration, variable message board malfunctioning, speed sensor malfunction, loss of power, low battery, etc. This malfunction information shall be sent via email in text format to the Highway Operations Center, Engineer, or Contractor, as designated by the Engineer, for each occurrence.
   d) To support incident management, the SWZ software shall be configured to allow Project staff to manually override motorist information messages for a user-specified duration; after which, automatic operation will resume with display of messages appropriate to the prevailing traffic conditions. All overriding messages shall have the message content and the username logged into the database.

6. SWZ Website shall have the following:
   a) Password protected link for approved personnel to access the operational characteristics of the system, allowing manual override of errant messages.
   b) The website shall display current traffic conditions and real time speed at upstream locations to the nearest minute. The “real time” traffic delay information displayed on the SVMQ’s shall be updated every one (1) minute minimum with the website delay information updated simultaneously.
   c) The website shall allow the scheduling of messages by the operator on a sign or group of signs, to turn on and to turn off messages at times set in the future.
   d) Placement of all devices shall be shown on the dedicated website using latitude/longitude coordinates. The placement of these devices on the website shall be approved by the Engineer prior to release of the website.
   e) The website shall display camera images at least five (5) frames per second. Cameras images shall be displayed by a user selectable menu. Cameras can be selected one (1) at a time or all cameras images simultaneously using another page or “video wall.” Camera images can be displayed by “hovering” over and selecting the camera icon.
   f) Via the internet and the dedicated website, the website shall provide a full color map using Google Maps or equivalent depicting the Project area with locations of traffic

sensors and SVMQ's. Using an administrator defined color-coding scheme, the map reflects the current average speed at each traffic sensor and displays the entire information message being shown by each SVMQ either on the map or on the side bar of the website. The Contractor shall use the third party traffic speed data to "fill" in the speed data display on the website between sensors. The contractor shall use the sensors for maximum distance of one-half (1/2) mile on the map. The map shall be automatically refreshed a minimum of once every minute to display any changes to traffic sensor(s) and/or SVMQ's. A legend of all icons and a short description of each shall be placed on the website.

g) The SWZ website shall be capable of providing and displaying the travel delay cost data (monetary values) in a graph and/or chart format and allow users to run reports against the data by hour, day and month intervals through the browser. This feature shall not be accessible by the public. The SWZ website shall have report output formats that include at minimum PDF, rich text format, and Microsoft Excel formats. See requirement 10. part o.

h) The SWZ Website shall provide a map with current traffic conditions by way of a colored layer over the road. The layer on the map shall display a different color for the different traffic speeds by use of colored bars over the existing road, with a legend explaining the meaning of each color. The color descriptions are as follows:

i. less than 10 mph = black
ii. less than 30 mph = red
iii. less than 40 mph = orange
iv. less than 50 mph = yellow
v. 50 mph and over = green

7. Smart Work Zone Operations

a) System Communications shall meet the following requirements:

i. The Contractor shall perform the required configuration of the SWZ's communications system during system initialization.
ii. Communications between the server and any individual SVMQ or SVQS shall be independent through the full range of deployed locations and shall not rely upon communications with any other SVMQ or SVQS sensor.
iii. The SWZ communications system shall incorporate an error detection/ correction mechanism to insure the integrity of all traffic conditions data and motorist information messages.

b) In addition to meeting manufacturer's specifications, the Contractor shall program the SWZ to ensure that the following General Operational requirements are met:

i. The SWZ traffic sensors shall be such that the accuracy is not degraded by inclement weather and visibility conditions including precipitation, fog, darkness, excessive dust and road debris. The sensors shall be capable of acquiring traffic data for a minimum of twenty-two (22) lanes of traffic on a lane-by-lane basis.
ii. The SWZ shall operate continuously (24 hours, 7 days a week) when deployed on the Project. It shall always be collecting and storing data.
iii. All traffic data and motorist information messages displayed by the SWZ shall be archived in the database with time and date stamps.

iv. The SWZ shall be capable of acquiring traffic volume and speed data, developing travel times, and selecting motorist information messages automatically without operator intervention after system initialization.

v. The SWZ shall automatically select default and advisory messages based on traffic conditions at a single traffic sensor point or at multiple traffic sensor points in combination.

vi. Administrative users shall be able to create and save a library of messages with up to twenty (20) different default or automatic advisory messages for each SVMQ.

vii. System operator control functions shall be password protected.

viii. To support incident management, the SWZ shall allow the Engineer and Project staff with password privileges to manually override motorist information messages for a user-specified duration, after which automatic operation shall resume with display of messages appropriate to the prevailing traffic conditions.

ix. The SWZ shall be capable of providing current operational status (such as current traffic data and messages, communications system, signs and sensors, video feeds) via the dedicated Project website.

x. For remote sign operation, the website shall allow password-protected access for Project staff to manually override automated messaging in order to display a message at any time. The staff shall be able to send a pre-programmed or custom message to a selected sign or group of signs. The staff shall be able to cancel this manual override and initiate any and all of the system's automated messaging features at any time.

xi. The default and advisory message content shall be programmable from the website as well as the field laptops.

xii. The dedicated Project website shall provide a full color map depicting the Project area with locations of SVQS sensors and SVMQ's. The graphical representation of each device location is based on latitude/longitude coordinates. The map shall show the current traffic conditions at each SQT and display the entire SVMQ message at each location.

xiii. The website shall have a link to the CTDOT's website and the website shall allow the CTDOT's website to link to it.

xiv. The system shall autonomously restart in case of power failure in any part of the system.

xv. Each SVMQ shall be capable of displaying eight (8) characters on each of three (3) rows. Standard messages shall be as defined in "Smart Work Zone Management System Motorist Information Messages" section below.

xvi. Cameras must be capable of operating on both solar and AC power. Should the visibility of the traffic cameras be degraded by inclement weather including snow, precipitation, excessive dust or road debris, the Contractor shall clean the camera housing to restore proper viewing.

8. Training and Support required:

a) Ensure that the SWZ is furnished, installed and maintained by personnel who are experienced in this type of work. Deploying firm personnel must have a minimum of five (5) similar deployments.

b) Training shall be provided to Project staff on their authorized use and operation of the physical field hardware, software and website of the SWZ.
c) The Contractor shall supply training and documentation to enable the Engineer to add additional signs or traffic sensors to the system. The Contractor shall provide the communications for any of these additional signs or traffic sensors.

9. System Operational Performance:
a) To ensure a prompt response to incidents involving the integrity of the SWZ devices, the Contractor shall be required to make all necessary corrections to the components of the system within twenty-four (24) hours of notification by the CTDOT.
b) If all corrections are made within this twenty-four (24) hour period and the system is brought back on-line, no pay reduction (as outlined in the Method of Measurement section) will occur.
c) If the twenty-four (24) timeframe expires and the components of the system are not fully restored to proper working order, no payment will be made from the time of initial notification until the system is brought back on-line. If the system is restored within ten (10) days, a pro-rated monthly payment reduction will be determined as outlined in the Method of Measurement section.
d) If the components of the SWZ are down for more than ten (10) total days in a month, whether they are consecutive or cumulative, and then NO payment will be made for that month. Components are the SWZ variable message signs, SWZ Mobile Camera with PTZ, Communications Equipment, and SWZ Queue Sensors, computer hardware and software required to place the real time information on the signs, and the project's Website. The CTDOT reserves the right to remove the SWZ components if it determines the system is not performing in accordance with this specification, and no additional payment shall be made.

10. Data Acquisition requirements:
a) Each SVQS sensor shall communicate with the field computers and the website to activate the appropriate SVMQ whenever the prevailing traffic speed slows to below fifteen (15) mph (or other designated speed as determined by the Engineer). Once activated, pre-programmed messages shall be automatically displayed on the SVMQ. The message content shall be as directed by the Engineer.
b) The SWZ shall be capable of calculating and having "real time" delay information displayed on the SVMQ's. This "real time" delay shall be calculated and displayed on the SVMQ's to the nearest minute.
c) The website delay information shall be updated simultaneously with the traffic speed information displayed on the Variable Message Signs.
d) To allow for motorist information messages of high specificity, the SWZ shall acquire quantitative traffic data using an accurate speed measurement technique that includes the capability of detecting stopped traffic and counting traffic volume.
e) The SWZ system's traffic sensors shall be of a type whose accuracy is not degraded by inclement weather or low visibility conditions including precipitation, fog, darkness, excessive dust, and road debris.
f) The SWZ shall be capable of acquiring traffic data from up to twenty-two (22) lanes of traffic in multiple directions, for example: Eleven (11) northbound and eleven (11) southbound.

g) The Contractor shall provide redundancy for data archiving and exchange. The Contractor shall provide Content Delivery Network (CDN) to aggregate video data streams from any PTZ camera to a centralized location to reduce bandwidth consumption from each individual PTZ camera head to end users and allow for separate controllable/ configurable streams for public and operator use.

h) The CDN shall be capable of allowing the Project staff to start and stop public feeds from the SWZ website while not interfering with the private feeds being displayed on the website.

i) All traffic data acquired by the SWZ including, but not limited to, calculated data fields shall be archived in a log file with time and date stamps for the duration of the Project. During the Project, requests for archived data may be made through the Engineer to the SWZ contractor. The Contractor shall provide this data to the Engineer within five (5) days upon receipt of the original request.

j) At the end of the Project, the SWZ Contractor shall provide the CTDOT comprehensive Project archive data with the exception of video. This logged information shall be in a format compatible with CTDOT requirements. The Contractor shall coordinate with the Engineer for requirements.

k) The SWZ shall provide device outage alerts via email to the Engineer for outages greater than fifteen (15) minutes. The alerts shall be used to generate a monthly summary spreadsheet displaying outages greater than twenty-four (24) hours, submitted to the Engineer. The email addresses for recipients of outage alerts shall be provided by the Engineer. Any pay reductions as per the pro-rated schedule will be calculated from the monthly outage summaries, as described in the Method of Measurement section.

l) The system shall be capable of transferring for each camera device a video data format acceptable to the CTDOT.

m) The Contractor shall provide notification of data format changes to the CTDOT before they take place.

n) Unique device identifiers shall be coordinated at the beginning of the Project and shall not change once the SWZ contractor has initially defined them, unless otherwise approved by the Engineer.

o) The SWZ shall be capable of calculating travel delay cost (monetary value) information for passenger cars and trucks from the beginning of the Project to the end of the Project. The SWZ system shall maintain a database of current and historical travel delay cost data. The SWZ travel delay cost information shall be provided in dollars per hours ($/hr.) of travel time. The SWZ travel time delay cost information shall follow the Chapter 2 (Sections 2.2.1 – 2.2.2.3) of the Work Zone Road Users Costs Manual (FHWA-HOP-12-005). The Contractor shall provide the calculations and formulas for the travel delay costs to the Engineer for review and approval prior to the SWZ system implementation. The Contractor shall provide examples of the charts and tables for the travel delay costs to the Engineer for review and approval prior to the SWZ system implementation. The scale of the travel delay costs charts and tables shall be consistent with the data accumulated by the SWZ throughout the Project period.

11. SWZ Motorist Information Message requirements:

a) The SVMQ shall be capable of providing speed, delay, length of traffic queue, travel time, stopped vehicles, and lane closure message advisories to motorists.

b) Records of all motorist information messages and travel times displayed by the SWZ shall be submitted to the Engineer in a format compatible with CTDOT requirements.
c) The SWZ must have capacity to preset up to twenty (20) different default or automatic advisory messages for each SVMQ.
d) Message Sets:
    i. The upstream SVMQs within 1 1/2 miles of the work zone shall display either the following message or an alternate message approved by the Engineer:

ROAD WORK AHEAD
XX MIN THRU WORKZONE

    ii. SVMQs located within the work zone will display different messages as per their location. Either the following sample message or an alternate message approved by the Engineer will be displayed:

TO EXIT XX
X MILES
X - X MIN

    iii. Queue warning SVMQ's located prior to any construction activity that negatively impacts traffic flows shall display the following message or an alternate message approved by the Engineer:

STOPPED TRAFFIC XX MILES
BE PREPARED TO STOP
- or -
SLOW TRAFFIC XX MILES
USE CAUTION

e) The sequences above are a minimum requirement and can be adjusted by the Engineer at his or her discretion.
f) The SWZ shall acquire traffic flow data and use an accurate speed calculation technique that includes the capability of detecting stopped traffic, counting traffic volume and lane occupancy.
g) The wireless cellular communications system(s) used for the Project must be reliable, dependable, and capable of functioning at all times regardless of weather, locations and cell phone usage. The Contractor shall be responsible for all communications costs, utilities, and satellite or cellular phone services needed to provide the dependable functioning SWZ.

Approximate Location of SWZ:

Figures 1-2 and Tables 1-2 are provided as a guide. Actual locations of the SWZ equipment shall be determined in the field. The Engineer will review and approve final locations of the equipment.

FIGURE 1: I-95 Southern Section (Exit 13 – Exit 15)

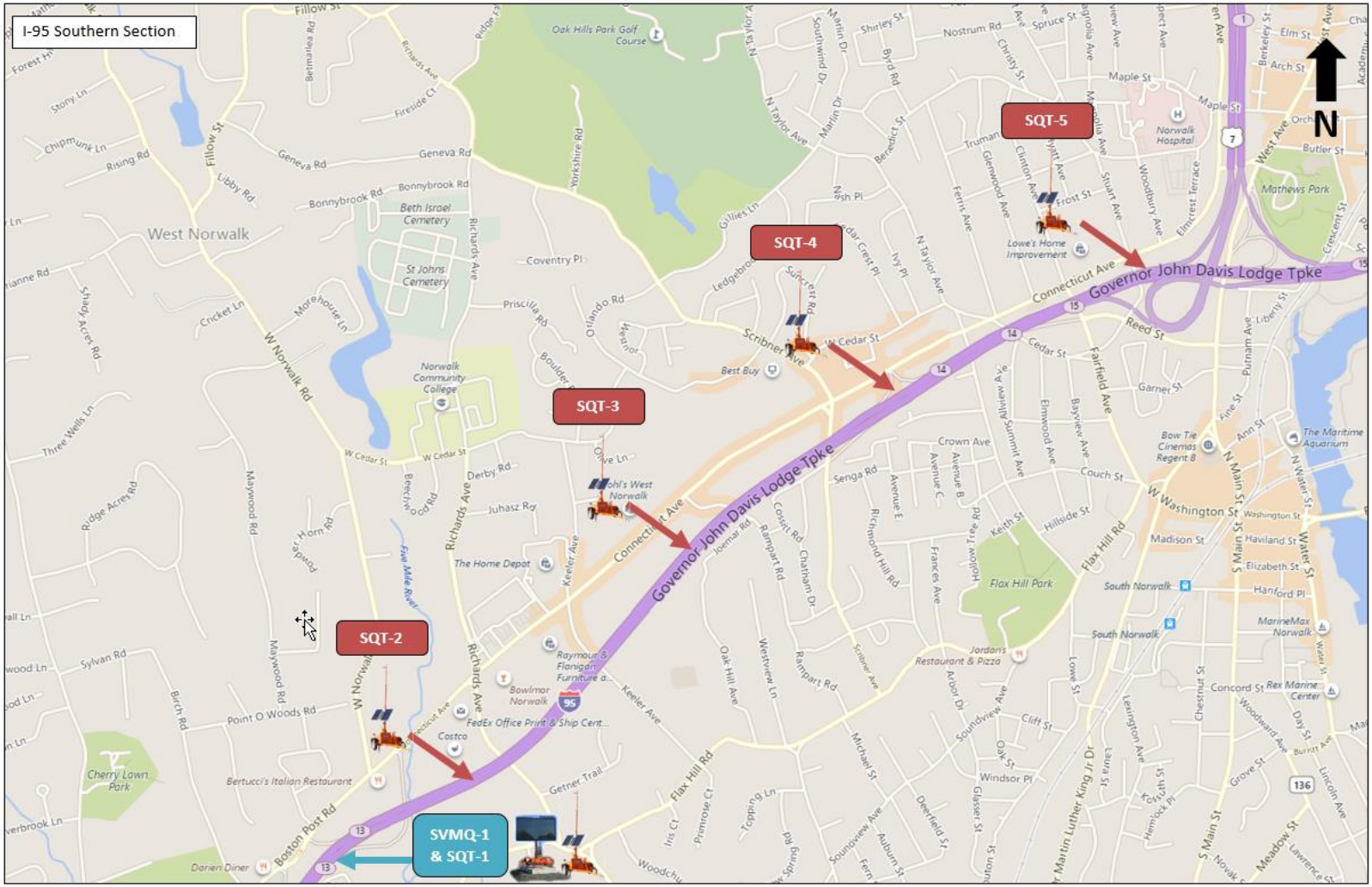
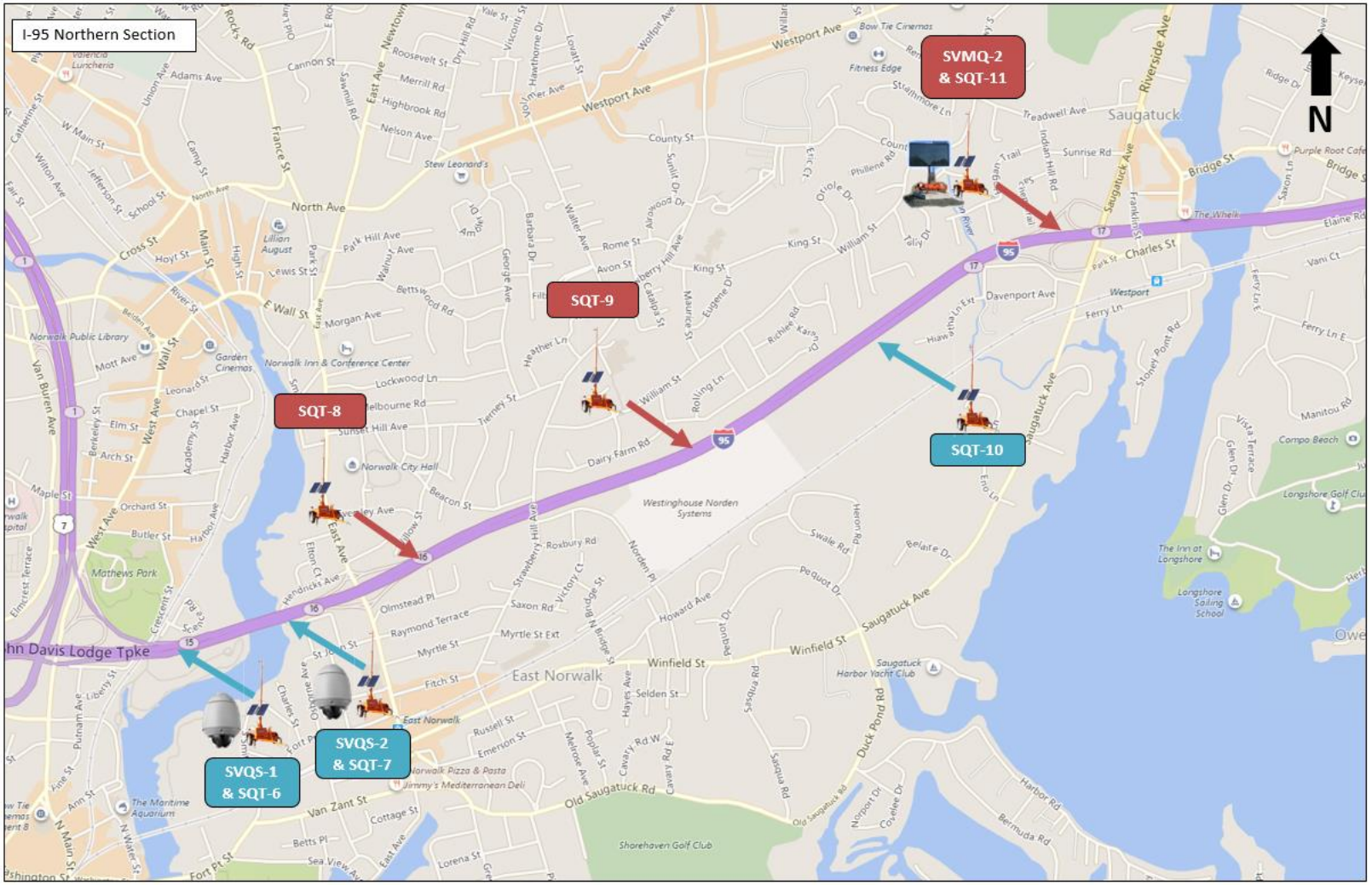


FIGURE 2: I-95 Northern Section (Exit 15 – Exit 17)



Tables: Approximate Location of SWZ Implementation for the Project Site. All locations shall be confirmed with the Engineer.

Table 2 – I-95 Southern Section (Exit 13 – Exit 15)				
Route	**Direction**	**Town**	**Location**	**Type of Equipment**
I-95	Northbound	Darien	I-95 NB Exit 13 Gore Area (~ Mile Point 13.22 & 13.23)	SVMQ-1 & SQT-1
I-95	Southbound	Norwalk	I-95 SB Shoulder Area After Richards Ave Underpass (~ Mile Point 13.55)	SQT-2
I-95	Southbound	Norwalk	I-95 SB Shoulder Area After Rampart Rd Overpass (~ Mile Point 14.16)	SQT-3
I-95	Southbound	Norwalk	I-95 SB Gore Area Near CCTV Camera (~ Mile Point 14.77 & 14.78)	SQT-4
I-95	Southbound	Norwalk	I-95 SB Shoulder Area Before Stuart Ave Overpass (~ Mile Point 15.37)	SQT-5

Table 1 – I-95 Northern Section (Exit 15 – Exit 17)				
Route	**Direction**	**Town**	**Location**	**Type of Equipment**
I-95	Northbound	Norwalk	I-95 NB Shoulder Area Near CCTV Camera Before Yankee Doodle Bridge (~ Mile Point 15.82)	SVQS-1 & SQT-6
I-95	Northbound	Norwalk	I-95 NB Shoulder Area Near Gantry After Yankee Doodle Bridge (~ Between Mile Point 16.11 – 16.12)	SVQS-2 & SQT-7
I-95	Southbound	Norwalk	I-95 SB Before	SQT-8

			Exit 17 Off Ramp Shoulder Area (~ Mile Point 16.44)	
I-95	Southbound	Norwalk	I-95 SB Shoulder Area Before Exit 15 "Norwalk Danbury 1 ¼ MILES" and Exit 16 "East Norwalk ½ MILE" Highway Sign Gantry (~ Mile Point 17.04)	SQT-9
I-95	Northbound	Norwalk	I-95 NB Shoulder Area Before "Westport NEXT 2 EXITS TOWN LINE" Highway Sign (~ Mile Point 17.64)	SQT-10
I-95	Southbound	Westport	I-95 SB Exit 17 Off Ramp Gore Area (~ Mile Point 18.09 & 18.1)	SVMQ-2 & SQT-11

Trailer Relocation Operations:

1. The Contractor shall relocate the SWZ trailers as agreed between the Contractor and the Engineer.

2. The Contractor shall reconfigure the SWZ equipment including the SVQS sensor and the camera with PTZ shall to monitor travel lanes at the relocation site. The Contractor shall confirm the reconfigured settings with the Engineer.
3. The Contractor shall update the website with the relocation sites of the SWZ. The Website shall show the new location of the SWZs upon completion of the update. The update shall occur within two (2) weekdays of the relocation.

Method of Measurement:

1. The SWZ Deployment will be measured as a Contract lump sum item.

2. The SVMQ, SVQS, and SQT items will be measured based on uninterrupted operation of all trailer, sensors, cameras with pan-tilt-zoom, variable message signs, solar panels, batteries. SVMQ, SVQS, and SQT will be measured for payment on a per unit basis for each month that the piece of equipment is in use, and as follows:

a) Measurement will begin from the date each unit is fully operational, as determined by the Engineer, to the date it is released back to the Contractor.
b) The Engineer will compute periods of less than one (1) month at the rate of 1/30 of a month for each day of use.

3. The SVMQ, SVQS, and SQT service items will be measured for payment by the month or fraction of a month as follows:
   a) Includes monthly operations, monthly cellular service communications, maintenance, charging batteries, cleaning solar panels, camera dome bubble, repair, programming, and integration.
   b) The following pro-rated reduction of the monthly payment will be computed if the monthly summary spreadsheet of outages greater than twenty-four (24) hours indicates interruption of service has occurred:

1 day = 5% pay reduction	6 days = 30% pay reduction
2 days = 7% pay reduction	7 days = 35% pay reduction
3 days = 10% pay reduction	8 days = 40% pay reduction
4 days = 20% pay reduction	9 days = 50% pay reduction
5 days = 25% pay reduction	10 days = 75% pay reduction

   c) If the components of the SWZ are down for more than ten (10) total days in a month, whether they are consecutive or cumulative, and then NO payment will be made for that month.

4. The SWZ Operations item will be measure items will be measured for payment by the month for web site operations.

5. The SWZ Trailer Relocation item will be measured for payment each time a SQT, SVQS, or SVMQ is relocated from an existing location to another location, as approved or directed by the Engineer.

Basis of Payment:

1. Payment for accepted SWZ installation will be at the Contract lump sum price for "Smart Work Zone Deployment" which shall include submittals, component delivery, and system set up, all materials, equipment, tools, travel and labor incidental thereto. The Contractor shall comply with the requirements stated in the System Performance section herein.

2. Payment for accepted trailer-mounted components will be at the Contract unit price per month or a fraction of the month for each "Smart Work Zone Queue Trailer/Sensor (SQT)," "Smart Work Zone Mobile Video Camera/Queue Sensor Trailer (SVQS)" and "Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ)" which price shall include queue trailer and sensor, camera/queue sensors and trailers, variable message signs, sensors and trailers, cloud hosted third party traffic speed data, processed rock, temporary license plates, solar panels, batteries, removal, travel, and all materials, equipment, tools and labor incidental thereto.

3. Payment for accepted SQT Service, SVMQ Service, and SVQS Service items shall include all operational and service costs directly related to the furnishing and installing individual trailers and trailer-mounted equipment including, but not limited to, cellular communications, programming, service, maintenance, cleaning, repair, and all materials, equipment, tools, and labor incidental thereto.

4. Payment for uninterrupted SWZ operations as specified will be at the Contract unit price per month for "Smart Work Zone Operations" which price shall include all operations and maintenance costs not directly related to the individual trailers and trailer mounted equipment including, but not limited to, website operations, data collection and travel delay costs calculations, programming, system integration, maintenance, repair, and all materials, equipment, tools and labor Cost for hosting a web site incidental thereto.

5. Payment for approved relocation of SQT, SVQS and SVMQ units will be at the Contract unit price for each "Smart Work Zone Trailer Relocation" which price shall include processed rock, website revisions, and all materials, equipment, tools and labor incidental thereto.

6. The contractor shall provide the project SWZ Operational Data reports on spreadsheets in Microsoft Excel format on a monthly basis to the Engineer. The operational data reports shall include historical and real time data for the following:
   - Work Zone Travel Time
   - Work Zone Travel Speed
   - Work Zone Traffic Volume
   - Work Zone Travel Delay and Queue Length (if Available)
   - Work Zone User Delay Cost

   The data on the spreadsheets, in 15 minute intervals, shall include the directional Average Daily Travel Time (minutes), Average Travel Speed (mph), and Average Daily Traffic Volume (vehicles/hr.).
   Historical baseline (preconstruction phase) data shall be used to establish the benchmark for comparison with the actual real time (construction phase) data for assessment of the work zone mobility impacts. The baseline data should be collected a minimum of two (2) weeks prior to any construction impacts on the roadway.
   The cost of furnishing the monthly Operational Performance Measures report shall be included in the unit price for the Smart Work Zone Operations item.
   A template for a spreadsheet in Microsoft Excel format is shown below.

Time Interval (min)	Traffic Volume (vehicles)	Travel Time (min)	Travel Speed (mph)	Queue Length (mil)	Delay Cost ($)
00:00-00:15					
00:15-00:30					
00:30-00:45					
00:45-01:00					

The pay unit is each that will be paid on a monthly basis for each of the Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ) and the Smart Work Zone Video Camera/Queue Sensor Trailer (SVQS). The Engineer may remove or add SWZ items by unit at the Engineer's discretion. The contractor will be notified thirty (30) days in advance by the Engineer. The payment shall be adjusted based on the actual number of SWZ units installed or removed including corresponding operations items.

Pay Item	*Pay Unit*
Smart Work Zone Deployment	l.s.
Smart Work Zone Operations	mo.
Smart Work Zone Trailer Relocation	ea.
Smart Work Zone Queue Trailer/Sensor (SQT)	ea.
Smart Work Zone Queue Trailer/Sensor (SQT) Service	mo.
Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ)	ea.
Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ) Service	mo.
Smart Work Zone Video Camera/Queue Sensor Trailer (SVQS)	ea.
Smart Work Zone Video Camera/Queue Sensor Trailer (SVQS) Service	mo.

NOVEMBER 7, 2018
FEDERAL AID PROJECT NO. 1102(122)
STATE PROJECT NO. 102-363

REHABILITATION OF BRIDGE 00061
STRAWBERRY HILL AVENUE OVER I-95

Town of Norwalk
Federal Aid Project No. 1102(122)

The State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 817, 2016, as revised by the Supplemental Specifications dated January 2018 (otherwise referred to collectively as "ConnDOT Form 817") is hereby made part of this contract, as modified by the Special Provisions contained herein. Form 817 is available at the following DOT website link http://www.ct.gov/dot/cwp/view.asp?a=3609&q=430362. The current edition of the State of Connecticut Department of Transportation's "Construction Contract Bidding and Award Manual" ("Manual"), is hereby made part of this contract. If the provisions of this Manual conflict with provisions of other Department documents (not including statutes or regulations), the provisions of the Manual will govern. The Manual is available at the following DOT website link http://www.ct.gov/dot/cwp/view.asp?a=2288&q=259258. The Special Provisions relate in particular to the REHABILITATION OF BRIDGE 00061 STRAWBERRY HILL AVENUE OVER I-95 in the Town of Norwalk.

CONTRACT TIME AND LIQUIDATED DAMAGES

In order to minimize the hazard, cost and inconvenience to the traveling public and pollution of the environment, it is necessary to limit the time of construction work, which interferes with traffic as specified in Article 1.08.04 of the Special Provisions.

There will be two assessments for liquidated damages and they will be addressed in the following manner:

1. For this contract, an assessment per day for liquidated damages, at a rate of Three Thousand Seven Hundred Dollars ($3,700.00) per day shall be applied to each calendar day the work runs in excess of the Four Hundred Fifty (450) allowed calendar days for the contract.

2. For this contract, an assessment per hour for liquidated damages shall be applied to each hour, or any portion thereof, in which the Contractor interferes with normal traffic operations during the restricted hours given in Article 1.08.04 of the Special Provisions. The liquidated damages shall be as shown in the following tables entitled “Liquidated Damages Per Hour” for each hour, or any portion thereof, in

which the Contractor interferes with normal traffic operations during the restricted hours.

For the purpose of administering this contract, normal traffic operations are considered interfered with when:

A. Any portion of the travel lanes or shoulders is occupied by any personnel, equipment, materials, or supplies including signs.

B. Any portion of the travel lanes or shoulders impaired by the movement of personnel, equipment, materials or supplies including signs.

C. There is a 1 inch or greater difference in the level of pavement transversely extending for a distance of more than 3 m longitudinally.

D. The transition between the planes of pavement surfaces is at a rate of 1 inch in less than 20 feet longitudinally.

3. For this Contract, an assessment per day for liquidated damages, at a rate of Two Thousand Dollars ($2,000) per day shall be applied to each calendar day that the CCTV Cameras are not operational. The CCTV Camera Sites included in this Contract are the following:

- (Existing) CCTV Camera Site No. 95N-032 (I-95 NB at Exit 17)
- (Existing) CCTV Camera Site No. 95S-031 (I-95 SB at Exit 17)
- (Existing) CCTV Camera Site No. 95N-030 (I-95 NB at Exit 16)
- (Existing) VMS Site No. 95S-079 (I-95 SB at Exit 16)

The contractor shall refer to the "Notice to Contractor – IMS Installation Qualifications", "Notice to Contractor – IMS Installation", Item No. 1050113A Variable Message Sign System Operations and Item No. 1112252A Equipment Operations special provisions for terms and conditions.

LIQUIDATED DAMAGES PER HOUR

Route I-95 NB 3 Lane Section		
If Working Period Extends into:	1 Lane Closure	2 Lane Closure
1st Hour of Restrictive Period	$500	$500
2nd Hour of Restrictive Period	$500	$20,000
3rd Hour of Restrictive Period	$500	$60,000
Route I-95 SB 3 Lane Section		
If Working Period Extends into:	1 Lane Closure	2 Lane Closure
1st Hour of Restrictive Period	$35,000	$90,000
2nd Hour of Restrictive Period	$60,000	$100,000
3rd Hour of Restrictive Period	$60,000	$100,000

The above liquidated damages apply to those hours shown on the Limitation of Operations charts designated with a "0," "1," or "2".

The above liquidated damages shall be applied when the actual number of lanes closed exceeds the number of lanes allowed to be closed, as dictated in the Limitation of Operations Chart.

If all available shoulder widths or gore areas are not available to traffic for each hour designated with a "0" on the Limitation of Operations Chart, then liquidated damages of $500 shall apply for each hour, or part thereof.

SECTION 1.05 – CONTROL OF THE WORK

Article 1.05.02 – Plans, Working Drawings and Shop Drawings is supplemented as follows:

Subarticle 1.05.02 – (2) is supplemented by the following:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit nine (9) copies of the catalog cuts, working drawings, Paint chip samples and calculations to the following for review prior to implementation:

Stephen F. Mitchell, PE
Project Manager
AECOM
500 Enterprise Drive
Suite 3B
Rocky Hill, CT 06067-3913
T 860-990-6755

One complete set of approved working drawings is to be submitted to:

City of Norwalk
Department of Public Works
125 East Avenue
Norwalk, Connecticut
City Traffic Engineer:
Fred Eshraghi
(203) 216-8928

Submittals to the Department of transportation:
The Contractor shall prepare submittals as Portable Document Format (PDF) files. The Contractor is also required to acquire, maintain access and use the Department's document management system for delivery of submittals. The format, digital signing requirements, delivery processes and document tracking procedures shall be performed in accordance with this specification and the Contractor's Digital Submission Manual (CDSM).

Add the following Sub article:

1.05.02 (4) – Schedule of Submission: Prior to the submission of any catalog cuts, working or erection drawings, the Contractor shall prepare and submit to the Engineer, for approval, a schedule for all proposed catalog cuts and working drawings. For this project, this initial schedule should be submitted within thirty (30) days of contract award and must be submitted before the Notice to Proceed. The Contractor shall coordinate, schedule and control all

submittals of working and shop drawings including those of his various subcontractors, suppliers and engineers to provide for an orderly and balanced distribution of the work.
The Contractor shall schedule the submission of working drawings so that thirty (30) calendar days (beginning on the date of receipt) is allowed for review by the City of Norwalk for routine work. For work of more complexity, the time for review by the City of Norwalk will be increased in proportion to the complexity of the work. The Contractor shall adjust his/her schedules so that an additional fifteen (15) calendar day period is provided for each resubmittal.

It is incumbent upon the Contractor to submit the shop drawings in accordance with the approved working and shop drawing schedule to facilitate expeditious review. Voluminous submittals of working drawings at one time are discouraged and may result in increased review time. In no case will the City of Norwalk accept liability for resulting delays, added costs and related damages when the time required for approval extends beyond the approximate times shown herein when the shop drawings are not submitted in conformance with the approve schedule.

Traffic Signal Items:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit product data sheets**,** working drawings and/or shop drawings for all traffic signal items, except Mast Arm Assemblies when applicable, for review before fabrication. The packaged set of product data sheets, working drawings and/or shop drawings shall be submitted either in paper (hard copy) form or in an electronic portable document format (.pdf). The package submitted in paper form shall include one (1) set. Product data sheets shall be printed on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be printed on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please mail to:

Stephen F. Mitchell, PE
Project Manager
AECOM
500 Enterprise Drive
Suite 3B
Rocky Hill, CT 06067-3913
T 860-990-6755

The packaged set submitted in an electronic portable document format (.pdf) shall be in an individual file with appropriate bookmarks for each item. The electronic files for product data sheets shall be created on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be created on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please send the pdf documents via email to:

DOT.TrafficElectrical@ct.gov

Mast Arm Assemblies:
When these items are included in the project, the submission for Mast Arm Assemblies shall follow the format and be sent to the "Engineer of Record" as described in the Steel Mast Arm Assembly special provision.

Incident Management System Items:

When required by the contract documents or when ordered by the Engineer, the Contractor shall prepare and submit product data sheets, working drawings and/or shop drawings for all Incident Management System (IMS) related items to the Bureau of Highway Operations for approval before fabrication. IMS related items include multiduct conduit, pullboxes, fiber optic and communications cables, cabinets, cameras, camera lowering devices, variable message signs (VMS), traffic flow monitors (TFM) and telecommunications related equipment.

The packaged set of product data sheets, working drawings and/or shop drawings shall be submitted either in an electronic portable document format (.pdf). The package submitted in paper form shall include one (1) set. Product data sheets shall be printed on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be printed on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please mail to:

Stephen F. Mitchell, PE
Project Manager
AECOM
500 Enterprise Drive
Suite 3B
Rocky Hill, CT 06067-3913
T 860-990-6755

Please send the pdf documents via email to:

DOT.TrafficElectrical@ct.gov

Smart Work Zone Items:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit product data sheets**,** working drawings and/or shop drawings for all Smart Work Zone items. The packaged set submitted in an electronic portable document format (.pdf) shall be in an individual file with appropriate bookmarks for each item. The electronic files for product data sheets shall be created on ANSI A (8 ½" x 11"; 216 mm x 279mm; letter) sheets. Working drawings and shop drawings shall be printed on ANSI B (11" x 17"; 279 mm x 432 mm; ledger/tabloid) sheets.

Please send the pdf documents via email to:

DOT.ITSEngineering@ct.gov

Article 1.05.07—Coordination with Work by Other Parties:

After the last paragraph add the following:

The Contractor shall be aware that there are other and related projects, and activities that will be on-going adjacent to the project limits, before, during, and/or after project construction.

The Contractor is required to fully coordinate operations with, and cooperate with, all other adjacent projects, activities, and property owners; utility construction; and vehicular and/or pedestrian traffic.

The proximity and timing of the project requires that it be constructed concurrently with these other projects and activities. The successful completion of the project will require the close coordination and cooperation of the other projects and activities to minimize conflicts and impacts so that the required construction, staging, sequencing, and scheduling is maintained.

The Contractor shall coordinate with all other projects through the CTDOT.

The Contractor shall be required to attend coordination meetings for and with the adjacent Walk Bridge Program and Non-Walk Bridge Program projects and MNR projects (as required) and will be required to fully coordinate operations. The Contractor shall be required to account for coordination with adjacent projects in the CPM Schedule for the project.

The Contractor shall schedule and arrange his work to minimize conflicts with the adjacent projects. The Contractor shall prepare two-week and two-month lookahead schedules as needed to share with the adjacent project's contractors to assist in coordination of lane closures and traffic operations.

At this time, Walk Bridge Program projects include, but are not limited to, the following:

State Project No.	**Description**
301-180	Danbury Dockyard Improvements
301-181A	CP243 Interlocking
301-500	Advanced Utilities – Eversource
301-501	Advanced Utilities – Municipal
301-176	WALK Bridge Project
301-187	East Avenue Railroad Bridge Replacement

At this time, the non-Walk Bridge Program projects include, but are not limited to, the following:

State Project No.	**Description**
Private	The SoNo Collection Mall
102-348	Rehabilitation of Bridge No. 00059 (Yankee Doodle Bridge) (I-95 over

State Project No.	**Description**
	Norwalk River)
173-462	Resurfacing Bridge Nos. 00327 (US Route 1 over Housatonic River) and 02295 (Stanley Stroffolino Bridge) (Route 136 over Norwalk River)
102-297	East Avenue Roadway Improvements
173-451	Traffic Control Installations at Various Locations

The Contractor is also required to fully coordinate operations with public and/or private events, festivals, road races, etc., sponsored by the City of Norwalk and the Town of Westport. Major events in the area include, but are not limited to, the following:

- Norwalk Oyster Festival, second weekend of September
- Norwalk Art Festival at Mathews Park, fourth weekend of June
- July 4th Fireworks at Calf Pasture Beach, early July
- SoNo Arts Festival, first weekend of August
- Westport Chowdafest, early October

SECTION 1.06 – CONTROL OF MATERIALS

Article 1.06.01 - Source of Supply and Quality:

Add the following:

Traffic Signal Items:

For the following traffic signal items the contractor shall submit a complete description of the item, working drawings, product data sheets and other descriptive literature which completely illustrates such items presented for formal approval. Such approval shall not change the requirements for a certified test report and materials certificate as may be called for. All documents shall be submitted at one time, unless otherwise approved by the engineer.

- Aluminum Pedestals
- Traffic Signal Housings and Hardware
- Pedestrian Signals Housing and Hardware
- Accessible Pedestrian Signal & Detector
- Traffic Signal Controller Unit
  - Traffic Controller Cabinet
  - Controller Unit
  - Solid State Time Switch
  - Solid State Load Switch
  - Conflict Monitor
  - Solid State Flasher
  - Flash Transfer Relay
- Optical Pre-Emption Equipment
  - Phase Selector
  - Detector (Type)
  - Pre-Emption System Chassis
  - Detector Cable (Optical)
- Video Vehicle Detection
  - Camera Assembly
  - Camera Extension Bracket
  - Video Detector Processor
  - Camera Cable
  - Monitor
- Cable Closure
- Auxiliary Equipment Cabinet

Illumination Items:

For the following materials the Contractor shall submit a complete description of the item consisting of the latest manufacturer shop drawing(s) which completely illustrates the material presented for formal approval. The submitted shop drawing(s) shall clearly call-out all material and operational properties for the item specific to the project. Such approval shall not change the requirements for a certified test report and materials certificate as may be called for.

- Light Standards
- Conductors
- Luminaires
- Conduit
- Cable in Duct
- Fuses and Fuse Holders
- Precast Foundation
- Service Items
- Temporary Illumination Unit
- Aerial Cable
- Handhole
- Junction Box

Required product data sheets for all items listed above shall be submitted in one package at the same time. Please note: the list of items above is a "general" list of items. Certain items listed may or may not be present in a specific project. Please consult the Detailed Estimate sheet for project specific items.

Incident Management System Items:

For the following items required for the Incident Management System, the Contractor shall submit a complete description of the item, together with either in paper (hard copy) form or in an electronic portable document format (.pdf) one (1) copy of shop drawings, cuts, data sheets and other descriptive literature which completely illustrates such items presented for formal approval. Such approval shall not change the requirements for a certified test report, and materials certificate as may be called for.

Approval of the Shop Drawings and product data sheets shall not change the requirements for a certified test report, materials certificate and certificate of compliance as may be called for.

Shop drawings shall be submitted on 8-1/2 inch by 11 inch sheets, 11 inch by 17 inch sheets or on 24 inch by 36 inch standard plan sheets. Shop drawings and data sheets shall be required for, but not limited to the following

Structural supports
Hand holes and covers
Pullboxes and pullbox covers
Fiber Optic Modems
Camera power supply
Traffic Flow Monitors
Cast Iron Handhole Cover
Cast Iron Junction Box
Fiberglass Junction Box
Traffic Management System Cabinets
Traffic Management System Mini-hub Cabinets
Auxiliary Termination Cabinets
Transformers
Steel CCTV Poles
Camera Lowering Device Assembly
Remote Control Flashing Lights
Service Cabinets
Meter Sockets
Conductors
Fiber Optic Cable
Fiber Patch Cords
Fiber Optic Connectors
Fiber Optic Splice Enclosures
Optical Fiber Termination Patch Panels
Optical Video/Data Transmitter
Optical Video/Data Receiver
Network Customer Service Unit
Video encoders and de-coders
Surge Panels
Ethernet switch
Ethernet Port Sharing Device
Cat 6 Cable
CCTV Coax Cable
Coax Cable Connectors
CCTV Twisted Pair cable
CCTV Twisted pair connectors
RJ 45 and RJ 48 Connectors
Surface Mounted Conduit and Appurtenances
Conduit, pulling tape, supports, brackets, hangers, clamps and any hardware involved with the supports and including complete fabrication details.
Field fastener details including chemical and mechanical anchors
Camera Assembly. Schematics of the wiring between the camera and the equipment cabinet shall also be provided.
Camera Video Cables, Data Cables, Power Cables and Connectors
Modify Existing Operations Center Control System including all materials, schematics, diagrams and drawings.
Motorists Aid Variable Message Signs, cabinets, cables, diagrams, schematics etc.

Smart Work Zone Items:

For the following Smart Work Zone items the Contractor shall submit a complete description of the item consisting of the latest manufacturer shop drawing(s) which completely illustrates the material presented for formal approval. The submitted shop drawing(s) shall clearly call-out all material and operational properties for the item specific to the project. Such approval shall not change the requirements for a certified test report and materials certificate as may be called for.

Smart Work Zone Queue Trailer/Sensor (SQT)
Smart Work Zone Variable Message Sign/Queue Sensor Trailer (SVMQ)
Smart Work Zone Mobile Video Camera/Queue Sensor Trailer (SVQS)

Required product data sheets for all items listed above shall be submitted in one package at the same time. Please note: the list of items above is a "general" list of items. Certain items listed may or may not be present in a specific project. Please consult the Detailed Estimate sheet for project specific items.

Article 1.06.05 - Shipping Materials: Add the following:

Incident Management System Items:

All vehicles transporting materials on highways and bridges in the State shall comply with all the vehicle regulations of the Connecticut General Statutes and regulations of Connecticut State Agencies as they apply to vehicle length, width, height and weight.

Any vehicle, either loaded or unloaded, will not be allowed to travel across any bridge or on any highway when such vehicle exceeds the legal limits or posted limits of such bridge or highway without a permit. The owner of the vehicle must apply to the Department for a permit for such travel, as provided in the statutes.

The General Statutes include the following limitations:

Vehicle Width (Section 14-262(a)(1)) - The width of a vehicle and combination vehicle and trailer, including its load, is limited to 8.5 ft. (2,590 mm), without a permit.

Vehicle Length (Section 14-262(c)) - The length of the semitrailer portion of a tractor-trailer unit, including its load, is limited to 48 ft. (14,630 mm), without a permit.

Vehicle Height (Section 14-264) - The height of a vehicle, with its load, is limited to 13.5 ft. (4,110 mm), without a permit.

Vehicle Weight (Section 14-267a(b)(7)) - The gross vehicle weight (weight of vehicle including its load) is limited to 80,000 lbs. (36,280 kg) on 5 axles for vehicles with a 51 ft. (15,540 mm) wheelbase, without a permit.

Axle Weights of Vehicles (Section 14-267a) – For the above five axle vehicle, weight on a single axle may not exceed 22,400 lbs. (10,160 kg) or in the case of axles spaced less than 6 ft. (1,828 mm) apart, 18,000 lbs. (8,160 kg).

On Department projects, in accordance with the Commissioner's policy, any member or component, either temporary or permanent, that measures 120 ft. (36,570 mm) or less and weighs no greater than 120,000 lbs. (54,430 kg), is transportable via an authorized permit route established by the Department provided the individual axle weights on the vehicle and trailer transporting the member or component do not exceed 20,000 lbs. (9,070 kg).

Members and components, shown in the contract documents, that exceed the above length and weight limits have been reviewed by the Department's Oversize and Overweight Permits Section and are transportable via an authorized permit route established by the Department provided the individual axle weights on the vehicle and trailer transporting the member or component do not exceed 20,000 lbs. (9,070 kg).

All permits to transport materials are subject to shipping times established by the Department's Oversize and Overweight Permits Section.

Applications for permits, required to transport materials, shall be submitted a minimum of two weeks prior to their required use, to the Department's Oversize and Overweight Permits Sections.

Article 1.06.07 - Certified Test Reports and Materials Certificate. Add the following:

Traffic Signal Items:

1) For the materials in the following Traffic Signal items, a Certified Test Report will be required confirming their conformance to the requirements set forth in these plans or specifications or both. Should the consignee noted on a Certified Test Report be other than the Prime Contractor, then Materials Certificates shall be required to identify the shipment.

    Steel Span Pole Anchor Bolts
    Steel Span Poles

2) For the materials in the following Traffic Signal items, a Materials Certificate will be required confirming their conformance to the requirements set forth in these plans or specifications or both.

Aluminum Pedestals
Steel Span Poles
Traffic Signal Housings and Hardware
Pedestrian Signals Housing and Hardware
Accessible Pedestrian Signal & Detector
Traffic Signal Controller Unit
- Traffic Controller Cabinet
- Controller Unit
- Solid State Time Switch
- Solid State Load Switch
- Conflict Monitor
- Solid State Flasher
- Flash Transfer Relay

Optical Pre-Emption Equipment
- Phase Selector
- Detector (Type)
- Pre-Emption System Chassis
- Detector Cable (Optical)

Video Vehicle Detection
- Camera Assembly
- Camera Extension Bracket
- Video Detector Processor
- Camera Cable
- Monitor
- Cable Closure

Auxiliary Equipment Cabinet

Illumination Items:

1) For the materials in the following Illumination items, a Certified Test Report will be required confirming their conformance to the requirements set forth in these plans or specifications or both. Should the consignee noted on a Certified Test Report be other than the Prime Contractor, then Materials Certificates shall be required to identify the shipment.

Light Standards	Anchor Bolts

2) For the materials in the following Illumination items, a Materials Certificate will be required confirming their conformance to the requirements set forth in these plans or specifications or both.

Light Standards	Luminaires
Conductors	Anchor Bolts
Cable in Duct	

Incident Management System (IMS) Items:

1) For the materials in the following Incident Management System items, a Materials Certificate will be required confirming their conformance to the requirements set forth in these plans or specifications or both.

Structural Steel (Poles and Sign Supports)	Rigid Metal Conduit
Structural Tubing	Anchor Bolts
Galvanizing (certifying compliance with ASTM)	Conduit hangers, supports, clamps
Zinc Rich Primer	Handholes
Neoprene Gasket	Cast Iron Junction Box
Polyurethane Sealant	Pull Box
Grounding Rods	Pull Box Cover
Copper Wire	Lowering Device Assembly
	Fiber Optic Cable
	Fiber Optic Cable Connectors

2) For the materials in the following Incident Management System items, a Certified Test Report will be required confirming their conformance to the requirements set forth in these plans or specifications or both.

Anchor Bolt and Hardware	Service Cabinet
Structural Steel (Poles and Sign Supports)	Transformer
Structural Tubing	Camera Cables
Welds	Structural Steel (Poles)
Conduit	Fiber Optic Cable
	Fiber Optic Cable Connectors

SECTION 1.08 – PROSECUTION AND PROGRESS

Article 1.08.03 - Prosecution of Work - Add the following:

City of Norwalk Traffic Signals
The Contractor shall notify the City of Norwalk forty -five (45) days prior to starting work on computer controlled signalized intersections only. This notice will initiate work to be completed by others. The Contractor shall be responsible for any timely updates that need to be reported to this Unit for the successful coordination of work by others.
The Contractor shall notify the project engineer on construction projects, or the district permit agent on permit jobs, when all traffic signal work is completed. This will include all work at signalized intersections including loop replacements, adjusting existing traffic signals or any relocation work including handholes. The project engineer or district permit agent will notify the City of Norwalk/ Department of Traffic Engineering to coordinate a field inspection of all work.

Article 1.08.04 - Limitation of Operations - Add the following:

In order to provide for traffic operations as outlined in the Special Provision "Maintenance and Protection of Traffic," the Contractor will not be permitted to perform any work which will interfere with the described traffic operations on all project roadways as follows:

Route I-95
On the following State observed Legal Holidays:
New Year's Day
Good Friday, Easter*
Memorial Day
Independence Day
Labor Day
Thanksgiving Day**
Christmas Day

The following restrictions also apply:

On the day before and the day after any of the above Legal Holidays.

On the Friday, Saturday, and Sunday immediately preceding any of the above Holidays celebrated on a Monday.

On the Saturday, Sunday, and Monday immediately following any of the above Holidays celebrated on a Friday.

* From 6:00 a.m. the Thursday before the Holiday to 8:00 p.m. the Monday after the Holiday.

** From 6:00 a.m. the Wednesday before the Holiday to 8:00 p.m. the Monday after the Holiday.

During all other times

The Contractor shall maintain and protect traffic as shown on the accompanying "Limitation of Operations" charts, which dictate the minimum number of lanes that must remain open for each day of the week.

The Contractor will be permitted to halt traffic for a period not to exceed 10 minutes on Route I-95 for the purpose of erecting structural steel members and erecting/removing overhead steel supports on all days except during the Holiday restrictions as mentioned above between 12:01 a.m. and 5:00 a.m.

The Contractor shall reopen Route I-95 until all stored vehicles are allowed to pass the construction site at which time the Contractor may halt Route I-95 traffic again. All Route I-95 closures shall be approved by the Engineer. The Contractor is alerted that erection or dismantling of steel or concrete will not be permitted over live roadways.

It is anticipated that work on adjacent projects may be ongoing simultaneously with this project. The Contractor shall be aware of those projects so that coordination is maintained for proper traffic flow at all times on Route I-95 and this coordination is acceptable to the Engineer.

The Contractor will not be allowed to perform any work that will interfere with traffic operations on a roadway when traffic operations are being restricted on that same roadway, unless there is at least a one mile clear area length where the entire roadway is open to traffic or the closures have been coordinated and are acceptable to the Engineer. The one mile clear area length shall be measured from the end of the first work area to the beginning of the signing pattern for the next work area.

Limitation of Operations Chart
Maximum Number of Lanes Allowed to be Closed

Route: I-95 NB Location: At Strawberry Hill Ave Number of Through Lanes: 3							
Hour Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Mid	2	2	2	2	1	1	1
1 AM	2	2	2	2	2	1	2
2 AM	2	2	2	2	2	2	2
3 AM	2	2	2	2	2	2	2
4 AM	2	2	2	2	2	2	2
5 AM	1	1	2	1	2	2	2
6 AM	**0**	**0**	**0**	**0**	**0**	1	2
7 AM	**0**	**0**	**0**	**0**	**0**	S	1
8 AM	**0**	**0**	**0**	**0**	**0**	S	1
9 AM	S	S	S	S	S	0	S
10 AM	S	S	S	S	S	0	S
11 AM	S	S	S	S	S	S	0
Noon	S	S	S	S	0	S	0
1 PM	S	S	S	S	0	S	S
2 PM	S	S	S	S	0	S	S
3 PM	**0**	**0**	**0**	**0**	**0**	S	S
4 PM	**0**	**0**	**0**	**0**	**0**	S	S
5 PM	**0**	**0**	**0**	**0**	**0**	S	S
6 PM	0	S	S	S	S	S	S
7 PM	S	S	S	S	S	S	S
8 PM	S	S	S	S	S	S	S
9 PM	1	1	S	1	S	S	S
10 PM	1	1	1	1	S	S	1
11 PM	2	1	1	1	1	1	1

Route: I-95 SB Location: At Strawberry Hill Ave Number of Through Lanes: 3							
Hour Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Mid	2	2	2	2	2	2	2
1 AM	2	2	2	2	2	2	2
2 AM	2	2	2	2	2	2	2
3 AM	2	2	2	2	2	2	2
4 AM	2	2	2	2	2	2	2
5 AM	1	1	1	1	1	2	2
6 AM	**0**	**0**	**0**	**0**	**0**	1	2
7 AM	**0**	**0**	**0**	**0**	**0**	S	1
8 AM	**0**	**0**	**0**	**0**	**0**	S	1
9 AM	S	S	S	S	S	S	S
10 AM	S	S	S	S	S	S	S
11 AM	S	S	S	S	S	S	S
Noon	S	S	S	S	S	S	S
1 PM	S	S	S	S	S	S	S
2 PM	S	S	S	S	S	S	S
3 PM	**0**	**0**	**0**	**0**	**0**	S	S
4 PM	**0**	**0**	**0**	**0**	**0**	S	S
5 PM	**0**	**0**	**0**	**0**	**0**	S	S
6 PM	S	S	S	S	S	S	S
7 PM	1	S	S	S	S	S	S
8 PM	1	1	1	1	S	S	S
9 PM	1	1	1	1	1	1	1
10 PM	2	1	1	1	1	1	1
11 PM	2	2	2	2	1	1	2

On Holidays and within Holiday Periods, all Hours shall be '0.'
"0" = No lanes are allowed to be closed = all available travel lanes, including exit only lanes, climbing lanes, gore areas, and all available shoulder widths shall be open to traffic during this time period.
"S" = Shoulders are allowed to be closed = all available travel lanes, including exit only lanes, climbing lanes, and gore areas shall be open to traffic during this time period.
"1" or "2" = One lane closure or two lane closure, respectively, is allowed. Adjacent shoulder(s) and/or gore areas can also be closed as necessary.

All Other Roadways

Strawberry Hill Avenue
Two way traffic shall be maintained at all times except as noted as follows.

The Contractor will be permitted to implement an alternating one-way traffic operation Monday – Friday from 8:00 PM to 6:00 AM. The Contractor shall control traffic using Trafficperson (Municipal Police Officers).

The Contractor will be allowed to close Strawberry Hill Avenue and access to Strawberry Hill Avenue from Norden Place and Beacon Street over four weekend periods starting at 7:00PM Friday to 5:00AM Monday. The work activities to be performed with the closures shall be:

1. Perform grade tie in to the west side of the new bridge for stage 4 traffic
2. Perform grade tie in to the west and center of the new bridge for Stage 5 traffic
3. Perform final grade tie in
4. Perform final paving

Prior to the closures the Contractor shall set up detour routes and coordinate with all stakeholders which include the State, City, Emergency Services, and schools in advance of the closure.

Not less than 6 weeks prior to any anticipated closure which affects bus service operations (see Notice to Contractor – Coordination with Norwalk Transit District) the Contractor shall notify Norwalk Transit District as follows:

Kimberlee A. Morton
Chief Executive Officer
Norwalk Transit District
275 Wilson Avenue
Norwalk, CT 06854
P (203) 852-0000 ext. 163
D (203) 299-5163
F (203) 299-5166
kimberleeamorton@norwalktransit.com

Britt T. Liotta
Chief Operating Officer
Norwalk Transit District
275 Wilson Avenue
Norwalk, CT 06854
P (203) 852-0000 ext. 181
D (203) 299-5181
F (203) 299-5166
bliotta@norwalktransit.com

Christina E. Harrison
Superintendent of Operations
Norwalk Transit District
275 Wilson Avenue
Norwalk, CT 06854
P (203) 852-0000 ext. 175
D (203) 299-5175
F (203) 299-5177
charrison@norwalktransit.com

Dennis O'Connor
Manager of Planning & Marketing
Norwalk Transit District
275 Wilson Avenue
Norwalk, CT 06854
P (203) 852-0000 ext. 164
D (203) 299-5164
F (203) 299-5166
doconnor@norwalktransit.com

To perform the relocation of traffic signal mast arms, controller and other traffic signal equipment from the existing location to the new location as shown on the plans, the Contractor shall control traffic using Trafficperson (Municipal Police Officers) until the new signals are activated and operational.

The Contractor shall notify the Engineer at least 14 days in advance of the start of the Strawberry Hill Avenue closure. Said notification shall include a record that all required advance coordination has been undertaken and/or concluded.

In the event the Contractor wishes to employ any additional weekend closures beyond what is specified above, such closures shall be subject to the same requirements for advance coordination and approval as noted herein.

Beacon Street
Two way traffic shall be maintained at all times except as noted as follows.

The Contractor will be permitted to implement an alternating one-way traffic operation Monday – Friday from 8:00 PM to 6:00 AM. The Contractor shall control traffic using Trafficperson (Municipal Police Officers).

The Contractor will be allowed to close Beacon Street for a period not to exceed four weeks to perform fill operations and roadway construction. Local access to three residences within the work area shall be maintained at all times from the west during the closure period.

The Contractor shall notify the Engineer at least 14 days in advance of the start of the Beacon Street closure.

Norden Place
Two way traffic shall be maintained at all times except as noted as follows.

The Contractor will be permitted to implement an alternating one-way traffic operation Monday – Friday from 8:00 PM to 6:00 AM. The Contractor shall control traffic using Trafficperson (Municipal Police Officers).

Incident Management System
The Contractor will not be allowed to perform any work that will disrupt the normal operation of the Incident Management System (IMS) as follows:

- On Monday through Friday from 5:00 a.m. to 9:00 p.m.
- On Saturday and Sunday.
- On the day before or after any of the Legal Holidays listed below:
  - New Years Day
  - Good Friday
  - Memorial Day

Independence Day
Labor Day
Thanksgiving Day
Christmas Day

- On the Saturday, Sunday and Monday following Thanksgiving Day.
- On the Friday, Saturday and Sunday immediately preceding any of the above Legal holidays celebrated on a Monday.
- On the Saturday, Sunday and Monday immediately following any of the above Legal holidays celebrated on a Friday.

In order to maintain continuous operation of the Incident Management System, the Contractor shall adhere to the requirements in the special provision "Notice to Contractor – Installation Qualifications" and "Notice to Contractor –Installation of IMS Systems".

1.08.07 - Determination of Contract Time:

Replace the first paragraph with the following:

The number of calendar days allowed for the completion of the Project will be fixed by the Department, will be stated in the proposal form and Contract, and will be known as the "Contract time." If a Contractor, prior to award of the Contract, anticipates completing the project before the Contract completion date or in less time than the calendar days allowed, the Contractor must submit to the Transportation Manager of Contracts, prior to award, a project schedule indicating the anticipated early completion date and the schedule by which the Contractor would achieve that early completion. If the Contractor does not submit such a schedule prior to award of the Contract, the Contractor shall be barred from making any formal or informal claim for damages or additional compensation that is based (in whole or in part) on an assertion that the Contractor could have completed the Project prior to the Contract completion date if not for the action or inaction of the State. If such a schedule is submitted to
the Transportation Manager of Contracts prior to award of the Contract, the failure of the Department to challenge the feasibility or reasonableness of the schedule at that time may not be construed as an admission or acknowledgment that the schedule is feasible or reasonable .

If the Contractor has submitted, prior to commencement of the Project, a schedule that indicates completion of the Project more than 30 calendar days in advance of the Contract completion date, the Department, after award, may issue a no-cost construction order revising the allowable Contract time to that shown on the Contractor's schedule.

1.08.08 - Extension of Time:

In the first paragraph, replace the first sentence "The Contractor will be responsible for providing all the documentation necessary to support the reasonableness of the additional time requested." *with:*

The Contractor must provide to the Engineer all documentation necessary to support the reasonableness of the additional time requested. When applicable, the documentation shall include, but not be limited to, the following: (a) a complete description of the request or relevant delay(s); (b) all correspondence that shows or reflects how critical-path project activities were affected or delayed; (c) for material delays, all relevant purchase order requests and delivery dates, including all correspondence relating to those matters; and (d) a time chart comparing (i) an original, baseline or recovery schedule created prior to the alleged causes underlying the request for a time extension with (ii) a schedule showing the actual or anticipated time effects of said underlying causes on the project's progress and completion.

In the second paragraph, insert the following as a new paragraph after the sentence ending " .... concurrent delays for which the State was not responsible.":

If, in the opinion of the Contractor, an unanticipated event or sequence of events subsequent to award of the Contract makes it feasible for the Contractor to complete the Project at least thirty (30) calendar days earlier than the then-current Contract completion date, the Contractor must either (a) submit to the Engineer, within thirty (30) calendar days of said event(s), a revised Project schedule showing the anticipated early completion, with a written explanation of how said event(s) made that early completion feasible when it otherwise would not have been feasible; or (b) forego any formal or informal claims based on the assertion that the Contractor, because of that event or sequence of events, could have completed the Project early if not for the action or inaction of the State.

Following this paragraph, insert a paragraph break, and continue with the revised text of the current article:

Damages for periods of Project delay for which the State has sole responsibility ....

ITEM #0202000A – EARTH EXCAVATION

Work under this item shall conform to Section 2.02 supplemented as follows:

Article 2.02.01 – Description:

Add the following: The work shall include the excavation, removal and disposal of bituminous concrete pavement, sidewalk and curbing as called for on the plans or as directed by the Engineer. The work will include all sidewalk and curb type. Curb to be reset shall be removed and stockpiled as part of the item "Earth Excavation" and reset under the individual item for reset curb. Curbing to be reset and later deemed unsuitable shall be discarded by the Contractor as part of the work Earth Excavation.

Article 2.02.04 – Method of Measurment:

Add the following: Bituminous concrete pavement, sidewalk and curbing to be removed will be measured for payment by the volume in cubic yards of the bituminous concrete pavement, sidewalk or curbing removed. Stockpiling of curbing to be reset shall be included in the measurement for removal.

Article 2.02.01 – Basis of Payment:

Add the following: Bituminous concrete pavement, sidewalk and curbing to be removed will be paid for at the contract unit price per cubic yard for "Earth Excavation". No separate payment will be made for stockpiling of curbing to be reset but the cost to transport, stockpile and discard curbing deemed not suitable to be reset will be included in the cubic yard payment for Earth Excavation.

Pay Item	Pay Unit
Earth Excavation	C.Y.

ITEM #0507791A – REBUILD CATCH BASIN
ITEM #0586001.10A – TYPE "C" CATCH BASIN 0'-10' DEEP
ITEM #0586001.20A – TYPE "C" CATCH BASIN 0'-20' DEEP
ITEM #0586005.10A – TYPE "C" CATCH BASIN DOUBLE GRATE TYPE 2- 0'-10' DEEP
ITEM #0586500.10A – MANHOLE 0'-10' DEEP
ITEM #0586801A – LAWN DRAIN

The work shall conform to Section 5.86 and Section 5.07 supplemented as follows:

Article 5.86.01 – Description add the following:

The work will include temporary shoring needed for excavations adjacent to the existing travelway. Temporary shoring will not be paid for separately but will be included in the cost of the work under this item.

In areas of rock, rock will be removed by mechanical means only. No blasting is permitted unless approved by the Engineer.

In areas where incremental raising is required to raise the roadway, new catch basins and manholes shall be reset to accommodate the incremental roadway grade so that the difference in the structure rim or grate elevation is no more than 3 inches above or below the roadway grade at the time the roadway is opened to traffic at the end of the work day. Resetting new catch basins and or manholes will be included as part of the manhole or type of catch basin specified.

Rebuild Catch Basin shall include rebuilding the structure to a depth to the bottom of lowest pipe in the structure. The work shall also include pipe and work necessary to tie into existing pipes running in the I-95 shoulder.

Section 5.86.04 – Method of Measurement: is supplemented with the following:

There will be no measurement for incremental adjustment of new catch basins to accommodate incremental raising of the roadway during construction. Incremental raising or lowering to accommodate traffic and roadway grades shall be considered incidental to the work.

There will be no measurement for multiple raising or lowering of manholes to accommodate incremental raising of the roadway. Incremental adjustments to accommodate traffic and roadway grades shall be considered part of the item.

The measurement for Rebuild Catch Basin shall include the pipe and work required to connect existing pipe running along the shoulder of I-95.

Section 5.07.05 – Basis of Payment: is supplemented with the following:

There will be no payment for adjustment new catch basins to accommodate incremental raising or lowering of the roadway construction. Incremental adjustment to accommodate traffic and roadway grades shall be considered incidental to the work, no matter how many times a structure requires adjustment to accommodate roadway grades during construction.

There will be no payment for multiple adjustment of manholes to accommodate incremental raising or lowering of the roadway, no matter how many times a structure requires adjustment to accommodate the roadway grades.

The payment for Rebuild catch Basin shall include the pipe and work required to connect existing pipe running along the shoulder of I-95.

There will be no separate payment for resetting catch basins and or manholes to accommodate the incremental lowering for the roadway construction. The work, materials and labor required to reset the structure, no matter how many times a structure requires resetting to accommodate incremental raising of the roadway shall be paid as part of the structure specified.

There will be no payment for the pipe required to connect Catch Basin to the existing pipe. This work will be paid as part of the Catch Basin Item for the type specified including the pipe and fitting.

Pay Item	Pay Unit
Rebuild Catch Basin	Each
Type C Catch Basin 0’- 10’ Deep	Each
Type C Catch Basin 0’- 20’ Deep	Each
Type “C” Catch Basin Double Grate Type 2 - 0’-10’ Deep	Each
Manhole 0’- 10’ Deep	Each
Lawn Drain	Each

ITEM #0916403A – REMOVE AND RESET SOUND BARRIER

Remove and Reset Sound Barrier shall comply with Article 9.16, supplemented as follows:

Article 9.16.01 - Description: Delete the first paragraph and replace with the following:
This item shall include the removal and resetting of existing noise barrier 2"x8"x12' Tongue and Groove Plank panel sections and 2"x4" Battens as required to gain access for the installation of drainage as shown on the plans or as directed by the Engineer. The new panel sections and battens shall be painted or stained to match the existing wall. The noise barrier is to be reset to the existing height.

Article 9.16.02 – Materials: Add the following:
The 2"x8"x12' Tongue and Groove Plank panel sections and 2"x4" Battens shall be new to match the existing. Painting or staining will not be measured but shall be included in the item.

Article 9.16.03 – Construction Methods: Add the following:
Painting or staining will not be measured but shall be included in the item.

Article 9.16.04 – Method of Measurement: Delete the first sentence and replace with the following:
This item will be measured for payment by the number of lineal feet of Remove and Reset Sound Barrier that is removed, completed and accepted.

Delete the third and fourth sentence beginning with "The vertical pay limit...."

Article 9.16.05 – Basis of Payment:
In the first sentence delete "square foot for "Noise Barrier Wall" or "Noise barrier Wall (Type)"" and replace with "lineal foot for Remove and Reset Sound Barrier"

Add the following:
Painting or staining will not be paid for separately but shall be included in the item.

Pay Item	Pay Unit
Remove and Reset Sound Barrier	LF

ITEM #0921026A – 4’ TEMPORARY SIDEWALK

The work shall conform to Section 9.22 amended as follows:

Article 9.22.01 – Description is deleted in its entirety and replaced with the following.

This item shall consist of a bituminous concrete surfaced sidewalk (2” HMA S0.375) constructed on an 8” granular fill base course to transition the sidewalk on the bridge to existing sidewalk on the four corners during stage construction. Limits and locations to be field determined.

Article 9.22.04 – Add the following paragraph.

4. 4’ Temporary Sidewalk: This work will be measured by the actual number of square yard of completed and accepted 4’ Temporary Sidewalk.

Article 9.22.05 – Delete following in the first two lines “This work will be paid for at the Contract unit price per square yard for “Bituminous Concrete Sidewalk” or “Bituminous Concrete Driveway” “

and replace with “This work will be paid for at the Contract unit price per square foot for “4’ Temporary Sidewalk”

Pay Item	Pay Unit
4’ Temporary Sidewalk	SF

ITEM #1301765A – FURNISHING AND INSTALLING 12” WATER MAIN

Description: The Contractor shall furnish and install ductile iron pipe, of the sizes indicated, and all the fittings and appurtenances to the lines and grades shown on the Contract Drawings, complete as shown, specified or directed, including but not limited to; pressure reducing valves, bends, restraint, blow off assemblies, gate/butterfly valves, air valves, sterilization fittings, tapping sleeves, tapping gates, RCP sleeve, gate boxes, tees, thrust blocks and anchors, polystyrene, transporting materials, digging test pits, the clearing, trenching, disposing of unused excavated materials, removing and disposing of sections of the present water mains and concrete anchors, furnishing, installing and field testing the pipelines complete with pipe restraints, concrete anchor/thrust blocks and utility identification tape, all trenching, rock removal, refilling trenches, filter fabric, furnishing additional material for refilling, trench compaction/testing, temporary and permanent surface restoration, miscellaneous grading, sheeting, bracing, pumping and all incidental work where required, to the specifications and details of the District, except as otherwise herein provided for.

ITEM	PAY UNIT	APPROXIMATE QUANTITY FOR LUMP SUM PRICE
INSTALL 6” DUCTILE IRON WATER MAIN	LF	10
INSTALL 8” DUCTILE IRON WATER MAIN	LF	10
INSTALL 12” DUCTILE IRON WATER MAIN	LF	250
THRUST RESTRAINTS	EA	3
6” CI TO DI TRANSITION COUPLING	EA	1
12” CI TO DI TRANSITION COUPLING	EA	4
6” GATE VALVE	EA	2
8” GATE VALVE	EA	2
12” GATE VALVES	EA	5
6” LINE STOP	EA	1
12” LINE STOP	EA	1
8” X 4” REDUCER	EA	1
8” X 12” REDUCER	EA	1
6” X 6” X 6” TEES	EA	1
8” X 8” X 6” TEES	EA	1
12” X 12” X 12” TEES	EA	3
6” 45 DEGREE BENDS	EA	2
12” 11.25 DEGREE BENDS	EA	1
12” 22.5 DEGREE BENDS	EA	1
12” 45 DEGREE BENDS	EA	5
4” BLOWOFF ASSEMBLY	EA	1
¾” AIR VALVE	EA	1
MJ PLUGS	EA	3
HYDRANT REPLACEMENT/RELOCATION	EA	2

TEMPORARY PAVEMENT REPAIRS (WATER MAIN)	SY	120
ADDITIONAL BACKFILL MATERIAL (WATER MAIN)	CY	10
EXCAVATION AND DISPOSAL OF UNSUITABLE MATERIALS (WATER MAIN)	CY	5

The Contractor shall submit a schedule of values for the above items within 7 days of award of the contract.

The above quantities are for information only and not to be considered as the actual for development of the cost. The cost of testing and disinfection shall be covered under Item #1301768A – FURNISHING AND INSTALLING 12" WATER MAIN ON BRIDGE.

Reference to "FTDWD" in this Item refers to "First Taxing Distract Water Department".

The Contractor shall salvage 45 degree bend fittings on the above ground water main portion of the existing water main currently on the east sidewalk of the bridge. Four fittings are estimated to be salvaged. The Contractor shall remove the fittings from the water pipe and deliver the fittings to the yard behind the FTDWD office located at 12 New Canaan Avenue, Norwalk, CT.

Materials: All materials used shall be from manufacturers and models as specified in the FTDWD "Approved Materials List For Water Main Installations" unless otherwise approved by the Engineer

Ductile Iron Pipe - Submittals: Six (6) sets of the manufacturer's literature and/or shop drawings for the materials of this section shall be submitted for approval. The Contractor shall furnish detailed drawings as follows and no work shall be fabricated until they have been approved by the Engineer:

1. Dimensions and general details for typical length of pipe.

2. Detail of joint between pipes for both push-on and restrained joints together with installation instructions.

3. Dimensions and general details for all fittings including joint details for both mechanical and restrained joints.

4. Location plans or lists showing number of pipes and fittings and other such information as needed for installation.

Prior to pipe-laying, the Contractor shall dig test pits where the new pipe connects to the present water main to ascertain the location, elevation and cross sectional dimensions of the present mains.

Pipe Specifications: All ductile iron pipe with push-on joints shall be the 60-42-10 grade cast in revolving molds in full accord with the following American National Standard, except for details for the joints and other modifications stated herein: "Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids".

ANSI/AWWA C151/A 21.51, furnished in 18-foot or 20-foot lengths. Push-on joints for such pipe shall be in accordance with ANSI/AWWA C111/A 21.11.

All requirements of the American National Standards Institute Specifications will be rigidly enforced and the foundry shall submit regularly to the Engineer, single copies of the report of tensile tests and low temperature impact tests as required in Section 51-12 and 51-13 of the ANSI/AWWA C151/A 21.51.

The Contractor shall submit to the Engineer a certified statement that the inspection and all of the specified tests have been made and met as required in Section 511.4.2 of ANSI/AWWA C151/ A21.51.

The ductile iron pipe to be furnished under this Contract shall conform to the following dimensions:

Size (Inches)	Thickness (Inches)	Thickness (Class)
12	0.43	54

Where shown, specified or ordered, the pipe shall have push-on joints of the type which employs a single elongated, grooved rubber gasket to affect a watertight joint seal. The joints shall conform to the latest American National Standard for "Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings", ANSI/AWWA C111/A21.11, except as otherwise specified herein. The rubber gaskets shall be manufactured from high quality rubber satisfactory to the Engineer and shall be similar to the gaskets used in the Tyton joint as manufactured by the United States Pipe and Foundry Company or the Fastite joint as manufactured by the American Cast Iron Pipe Company or the Grip-Tite joint as manufactured by Griffin Pipe Products Co. or approved equal.

Where shown, specified or ordered, the pipe shall have restrained joints of a type which employs a single elongated, rubber gasket to affect a watertight joint seal. The joints shall conform in general to ANSI/AWWA C111/A21.11. The rubber gaskets shall be manufactured from high quality rubber satisfactory to the Engineer. The restrained joint pipe shall be as manufactured by the American Cast Iron Pipe Company, McWane, Super Lock, TR Flex, or approved equal.

The grooved rubber gaskets and joint lubricant shall be furnished with the pipe and shall be considered included in the price bid per linear feet of pipe. The gasket shall be plainly identified as to pipe size and packaged in a suitable and satisfactory manner for shipment.

Each pipe shall have cast or stamped on it the maker's name or mark, the year in which the pipe is cast, and the letters "DI" or "DUCTILE" as required by the American National Standards Institute Specifications. The weight and thickness class shall be painted on each pipe, as required by the American National Standards Institute Specifications, and a record of weight for each pipe before the application of a lining or coating shall be submitted to the Engineer.

Fitting Specifications: All ductile iron fittings to be furnished under this Contract shall conform to the American National Standard for "Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and other Liquids", ANSI/AWWA C110/A21.10. In addition to the marking required by the American National Standards Institute Specifications, the year of casting shall be cast on all fittings. Single copies of the results of tests required by the ANSI/AWWA C110-A21.10 shall be submitted to the Engineer.

Bolt holes in the mechanical joint bells of all fittings shall straddle the vertical centerline of the fitting (fitting laying in horizontal position).

Unless otherwise shown, specified or ordered, all fittings shall be mechanical joint (MJ).

Joint Accessories: All joint accessories shall be furnished with each pipe and fitting and shall be plainly identified as to pipe size. A certified statement that all required tests on the joint accessories have been made and met as specified shall be submitted to the Engineer.

Lining and Coating: All pipe and fittings, except sleeves, caps and plugs shall be lined with cement mortar in accord with the American National Standard for "Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water", ANSI/AWWA C104/A21.4. However, linings with thickness twice those specified in Section 4-10.1 shall be furnished. Thickness determinations, in accord with Section 4-9, shall be made on at least one fitting of each type.

All pipe and fittings, including steel sleeves, caps, plugs, tees, bends and reducers, shall be coated inside and outside with an approved bituminous material, neither sufficiently soft to flow when exposed to the summer sun, nor brittle enough to crack and scale off when exposed to temperatures below freezing.

Coating may be applied by painting, dipping or spraying, but in no case are the pipe fittings or the coating material to be heated to a high enough temperature to be detrimental to the cement lining. In addition, the coating of the interior shall conform to the requirements of ANSI/AWWA C104/A21.1.

The Contractor shall submit to the Engineer a certified statement that the inspection and all of the specified tests have been made and met.

THE FOLLOWING ARE ACCEPTABLE PIPE MANUFACTURERS:

Atlantic States Pipe (McWane)
United States Pipe & Foundry Co.

Griffin Pipe Products, Inc.
Clow Corp. (McWane)
ACIPCO

Inspection: All pipe and fittings shall be subject to inspection by the Engineer after delivery to the job site and may also be subject to inspection at the foundry by a representative of the District.

Harnessing Specifications: Eyebolts and lacing rods shall be of A-36 steel as manufactured by Star National Products, Columbus, Ohio or approved equal. All components shall be hot -dipped galvanized.

Retainer glands for mechanical joints shall conform to ANSI/AWWA C111/A21.11 and the following additional requirements:

1. All retainer glands shall be ductile iron and all retaining devices shall be heat treated ductile iron.

2. All retainer glands shall have a minimum rated working pressure of 250 psi.

The retainer glands shall be Megalug Series 1100 as manufactured by EBAA Iron Sales, Inc. Eastland, Texas or approved equal.

Components of the harnessing system for push-on joint ductile iron pipe shall be in general accord with the above requirements for lacing rods and retainer glands. The harnessing system shall be the Series 1700 Megalug Restraint Harness, as manufactured by EBAA Iron Sales, Inc., Eastland, Texas or approved equal.

Transition couplings shall conform to AWWA C-219, NSF 61 and NSF 372 and the following additional requirements:

1. End rings shall be ASTM A283/A283M Grade C Steel.
2. Center ring shall be ASTM A53 Grade A Steel.
3. Gaskets shall be EPDM or NBR.
4. Bridge and spherical spacers shall be AISI 304 Stainless Steel.
5. Coating shall be fusion bonded epoxy.
6. Nuts and bolts shall be AISI 304 Stainless Steel.
7. All transition couplings shall have a minimum working pressure of 260 psi and a rated pressure of 390 psi
8. All transition couplings shall have a working temperature from -20 degrees F up to 125 degrees F.

The transition couplings shall be Hymax Couplings as manufactured by Krausz USA, Ocala, Florida or approved equal.

Trench Refill: Trench refill materials shall meet the following requirements:

Native Backfill: Native backfill shall consist of granular soil excavated on site meeting the approval of the Engineer. Materials shall be of such a nature that they will form a stable dense fill. Materials shall not contain stones larger than 6-inch, vegetation, masses of roots, individual roots more than 12-feet long or more than ½-inch in diameter, trash, clays, or plastic fines. Organic matter shall not exceed two percent (2%). Non-plastic fines (silts) shall not exceed 20 percent (20%).

Pipe Bedding: Pipe bedding shall conform to the requirements of Article M.01.01, Gradation passing through square mesh sieve No. 8, CDOT Form 817.

Crushed Stone: Crushed stone shall conform to the requirements of Article M.02.01-1 Grading A, CDOT Form 817 and Sub article M.02.02-2(a), CDOT Form 817, for loss on abrasion.

Granular Base: Granular base shall conform to the requirements of Article M.02.03, Grading "C", CTDOT Form 817.

Sand: Sand shall conform to the requirements of Article M.11.04 Grading "A", CDOT Form 817.

Utility Identification Tape: Utility identification tape shall be 6-inch wide non-detectable, designed to withstand extended underground exposure, colored blue and be durably imprinted with an appropriate warning indicating the presence of the buried pipe.

Ductile Iron Pipe and Fittings: Refer to the "Ductile Iron Pipe (Water Main)" specification.

Gate Valve, Extension Stem and Gate Box: Refer to FTDWD Detail.

Gate Valves – 3 inch through 12 inch:
Resilient Seated Gate Valves shall be manufactured and tested to the requirements of AWWA C509-01 and C500-03 as applicable, shall be ductile iron with a working pressure of 250 psi, a test pressure of 500 psi, and shall have mechanical joint ends conforming to the requirements of ANSI 21.11/AWWA C111. This pressure rating shall be cast on the outside of the valve. The valve body and bonnet shall be coated on all exterior and interior surfaces with a fusion bonded epoxy conforming to the requirements of AWWA C550-90.

Valves shall be resilient-seated, non-rising stem with 2" square nut and open clockwise. All surfaces of the solid ductile iron gate, including the stem hole, shall be encapsulated in SBR rubber tightly bonded to the gate. No bare metal shall be left exposed. Both the rubber and the adhesive must meet or exceed all the requirements of AWWA C509 (3" gates shall be bronze). Stem seal shall be O-Ring packing designed for renewal under line pressure in the full open position.

The stuffing box and bonnet bolts and nuts shall be 304 stainless steel. The valve body and bonnet shall be A536 ductile iron.

In order to assure compliance with AWWA and other applicable standards, and access to the manufacturing facilities for inspection purposes, and assure timely shipment and delivery, all valves must be manufactured, assembled and tested in plants located within the continental United States. Valves shall be manufactured by Meuller A2360 or approved equal.

Existing valves to be abandoned shall be indicated on the contract documents and/or as directed by the Engineer.

Existing valves that require removal from an abandoned water main and salvaging as required by the contract documents and/or as required by the Engineer shall be cleaned 12 New Canaan Avenue Norwalk.

Line Stops:
Line Stop sleeves where shown on the plans shall be of the mechanical joint type of epoxy coated carbon steel construction for installations on ductile iron pipe. I. Follower ring gaskets shall be of molded rubber. Bolts and nuts shall be of corrosion resistant material. Line stop sleeves shall be manufactured by the manufacturer of the line stop equipment and shall be Smith Blair 687 line stop or approved equal.

The tapping and line stopping shall be accomplished utilizing specialized machinery and methods and shall consist of tapping sleeves permanently attached to the pipeline, plugs and blind flanges for permanently plugging the outlet of the tapping sleeve, temporary tapping valve, tapping machine, and line stopping machine. Tapping and line stopping equipment shall include all accessories required to successfully perform the work described here in.

The tapping sleeve for the cast iron pipes which are not of standard diameter shall be of shop fabricated carbon steel construction consisting of three parts, the top and bottom saddle sections and the nozzle. The fittings shall be full encirclement type. The top and bottom saddle sections shall be shaped to accurately fit around the pipelines in such a manner that they will provide structural support for the existing pipe sections after removal of the tapping coupon.

The top saddle section shall bear against the pipe wall and clamp around the pipe to provide structural reinforcement for the portion of the pipe to be removed. The thickness of the tapping sleeve components shall be based upon the design calculations for the operating pressure of the pipe system and the grade of the steel used for the sleeve. Material shall be ASTM A283 Grade C, ASTM A36, or equal. All weldments shall be braced and stress relieved. The top saddle section shall fit essentially half the circumference of the pipeline to provide support and structural integrity to the remaining portion of the existing pipeline.

The top saddle shall incorporate a gasket to be placed against the existing pipeline to seal between the saddle and the pipeline. Gaskets shall be molded from elastomer compounds that resist compression setting and are compatible with potable water in the 32 to 140 degrees F temperature range.

The bottom saddle section shall fit essentially half the circumference of the pipeline. The section shall be of continuous steel plate or individual bands shaped to accurately fit the pipe circumference.

The top and bottom saddle sections shall be joined to clamp against the pipe wall with a sufficient number and size of bolts for the specified operating pressure.

The nozzle section shall be of the same nominal pipe size as required for the line stop machine. The nozzle shall be ASTM A283 Grade C, ASTM A36, or equal. All weldments shall be braced and stress relieved. The nozzle outlet shall be flanged with flange dimensions conforming to ANSI B16.5, 150 lb pattern. The nozzle shall bear against the exposed pipe. The nozzle shall incorporate a gasket to be placed against the existing pipe to seal between the nozzle and the pipeline. Gaskets shall be molded from elastomer compounds that resist compression setting and are compatible with potable in the 32 to 140 degrees F temperature range.

Line stop sleeves and valves shall be designed for working pressure of 200 psi and shop tested at 400 psi. The line stop sleeve shall be tested in place to a minimum of 200 psi, for a minimum of 60 minutes with no loss of pressure. If the sleeve fails the 200 psi pressure test, the original failed sleeve shall be replaced with an entirely new sleeve.

The completion plug shall be machined from a stress relieved carbon steel plate. It shall contain two circumferential grooves; one to receive the locking devices from the nozzle flange, and the second to contain a compressible O-ring to seal pressure tight against the bore of the flange.

Upon completion of the work, the line stop nozzles shall be closed with a blind flange placed over the completion plug. Facing and drilling of the blind flange shall be compatible with the nozzle flange. Minimum blind flange thickness shall be AWWA C207, Class D. The blind flange shall include a minimum 1 inch NPT tapped outlet with plug to allow pressure testing of the complete plug.

The tapping sleeves, completion plug, and blind flange shall be designed for permanent installation in the pipeline and provide permanent plugging of the temporary tap. As such, the tapping sleeve components shall be manufactured of corrosion resistant materials, or shall be treated to enhance corrosion resistance.

Valve Boxes:
Valve boxes shall be ductile or cast iron (2) two piece, Buffalo type, round body, heavy pattern, adjustable of the sliding type with at least 10-inch overlap of top section over the other with flanged top section. The covers shall have the word “WATER” cast in the top. Extensions shall be provided. Boxes shall be made in North America.

Concrete anchor/ Thrust blocks: Anchors and thrust blocks shall be Class “A” concrete conforming to Article M.03.01.

Harnessing: Refer to FTDWD Detail.

Filter fabric: Fabric shall conform to Article M.08.01-19.

Utility Identification Tape: The tape shall be 4-inches wide, designed to withstand extended underground exposure, colored blue and be durably imprinted with an appropriate warning indicating the presence of the buried pipe.

Expansion fittings shall be as manufactured by EBAA Iron EX-TEND 200 or approved equal

Construction Methods:

Transporting and Distributing Pipe: The Contractor shall transport the pipe and fittings from the place of manufacture, shall secure all permits which may be necessary, and comply with the requirements of the Connecticut Bureau of Highways, Cities and Towns, concerning heavy transporting over State, City and Town highways.

During loading, transportation and unloading, more than ordinary care shall be taken to prevent injury to the pipes. Such work shall be done with each section of the pipe under full control at all times and under no condition shall a pipe be dropped on the ground. Pipes shall be placed on sand beds or other methods may be employed to avoid chances of pipe being frozen to the ground surface.

In distributing the pipe in the field, as permitted, each piece shall be placed as near as possible to the point where it is to be installed and faced in the proper direction. In case any pipe received damage from handling or other cause and made unacceptable to the Engineer, it shall be replaced with a new pipe at the expense of the Contractor. The Contractor is cautioned that State, City, or Town authorities may not permit storing pipe, etc., within street or highway limits.

Clearing Trees and Bushes: No trees within streets and highways, or adjacent to the normal trench therein, shall be damaged or removed. In streets and highways where there is no permanent paving, the Contractor shall, unless otherwise directed, remove and dispose of only those trees, bushes or shrubs required for construction and approved by the Engineer. The unlimited removal of trees and brush will generally not be required or permitted. All trees, bushes or shrubs which are not to be removed shall be preserved and protected by the Contractor. Should any trees, bushes or shrubs, which are to be preserved and protected, become damaged by the conduct of the work, the Contractor shall replace them at his own expense. Brush, small branches, trash, large trunks, stumps and all other surplus material and debris shall be removed from the site of the work.

Trenching: Prior to any excavation, the Contractor shall notify all affected utilities in accord with Public Act 77-350 (CALL BEFORE YOU DIG 1-800-922-4455).

The trench for the pipe shall be 18-inches beyond the outside of the barrel of the pipe on each side, the top of the barrel of the pipe shall be as shown on the Contract Drawings or as directed by the Engineer; and the bottom of the trench shall be at the bottom of the pipe. The Contractor alone shall be responsible for the stability and safety of the trenches and adjacent structures, and shall use such trench support and bracing as necessary without additional payment therefor.

Pavement cuts shall be made with the edges reasonably smooth and without cracking or damage to the pavement outside the limits of the portion excavated. The methods used and the location of such cuts shall conform to the requirements and specifications of the City or State. Repairs to pavement shall be made in accordance with the requirements and specifications of the City/Town or State.

In any area to receive fill, no pipe trench shall be excavated until the fill has been placed and compacted to a level at least 3-feet above the top of the pipe to be installed.

The Contractor may be required to excavate locally to determine the location and depth of existing underground structures on the lines of the pipe well in advance of the pipe laying. There will be no additional payment for this work, including backfilling and temporary surfacing.

Sheeting, Bracing and Pumping: The Contractor shall furnish and put in place such sheeting and bracing as may be necessary, to support the sides of the excavation, to prevent undermining of the pavement or to protect from possible injury any pipes, sewers, ducts, poles, conduits or other structures existing in the streets, or highways, and shall remove such sheeting and bracing as the trench is refilled unless the Engineer shall order it left in place.

The Contractor shall maintain all excavations in proper condition for carrying on the work, and to this end shall do all bailing, draining, or pumping which may be necessary to keep the trenches or other excavations free of water. No direct payment will be made for this work but the cost thereof will be considered as having been included in the price bid per linear feet of pipe.

If the Contractor installs and operates wellpoints on any section of the work, the expense of the same shall be borne by the Contractor.

Protection of Pipes, Drains, Culverts, etc.: All existing gas pipes, water pipes, sewers, drains, manholes, catch basins, culverts, electrical conduits, telephone ducts, utility poles or other structures which are uncovered by the excavation, and which do not, in the opinion of the Engineer, require to be changed in location, shall be carefully supported and protected from injury by the Contractor; and in case of damage, they shall be restored by him without compensation; therefore, to as good condition as that in which they were found and shall be kept in repair during the existence of this Contract.

Laying Ductile Iron Pipe: Proper and suitable tools and appliances for safe and convenient handling and laying of pipe shall be used, and care shall be taken to prevent the coating of the pipe from being damaged, particularly on the inside of the pipes. The Contractor shall not start any pipe work until he has satisfied the Engineer that he has on hand and available the following minimum equipment:

1. Wheel pipe cutters, hydraulic pipe cutter or a pipe saw for the sizes of pipe to be laid;

2. Ratchet type socket wrenches for mechanical joint bolts and nuts;

3. At least two expandable pipe stops of the proper size for closing the end of the pipe being laid when not actually laying pipe.

All pipes shall be carefully examined for defects and no pipe or other casting shall be laid which is known to be defective, and should any defective pipe or other casting be discovered after being laid, it shall be removed and replaced with a sound casting at the expense of the Contractor.

Pipe located on the bridges shall be carefully cut to length and carefully installed to insure proper positioning of joints between pipe support assemblies.

The pipe shall be laid upon sound soil, cut true and even so that the barrel of the pipe will have a bearing for its full length. In the event the trench is excavated below the grade of the bottom of the pipe, the trench will be brought up to grade with acceptable crushed stone or processed gravel, pneumatically tamped, at the expense of the Contractor, before the pipe is laid.

The utility identification tape shall be place approximately two (2) feet above the top of the pipe.

When not actually laying pipe (e.g. overnight, weekends, holidays, etc.) the open ends of the pipe shall be kept plugged with approved watertight night caps furnished by the Contractor.

The Contractor shall take all necessary precautions to prevent water from entering the pipe during installation of the pipeline.

Unless shown otherwise on the Contract Drawings or directed otherwise by the Engineer, the pipeline shall be installed a minimum of four (4) feet - six (6) inches below finished grade. The pipeline shall also be installed to provide at least eighteen (18) inches of vertical clearance between the water pipe and storm drains or sanitary sewers.

Cutting Pipe: Whenever the pipes require cutting, an approved saw, wheel, or hydraulic type cutter shall be used. This work shall be done by the Contractor without extra compensation, in a manner satisfactory to the Engineer, and only experienced men shall be engaged thereon.

Joints: On pipe with rubber gasket push-on joints, the gasket shall be installed in the socket of the pipe previously laid and the gasket then lubricated. The plain end of the pipe being laid shall then be inserted and pulled or pushed to the full depth of the socket. An approved jack-type tool shall be used to assemble pipe 10-inchs and larger. Plain ends of cut pipe shall be filed or ground to a taper to prevent damage to the gasket during insertion.

On fittings, butterfly and gate valves with mechanical joints, the follower ring and rubber gaskets shall be placed on the plain end of the pipe being (or previously) laid and entered into the socket of the fitting. The gasket shall then be evenly seated in the socket, the follower ring moved up to the face of the gasket and the “T” bolts inserted and made finger tight. The “T” bolts shall then

be tightened with a ratchet or torque wrench to between 60 and 80 foot-pounds. See U-03 for additional joint requirements.

Joint Restraints: Where and as shown on the Contract Drawings, or as directed by the Engineer, retaining glands or eye bolts and lacing rods shall be installed with the standard lacing details shown for mechanical joint pipe or fittings.

The retaining glands shall be installed in lieu of the standard mechanical joint gland. The "T" bolts shall be tightened with a ratchet or torque wrench to between 60 and 80 foot-pounds. Only then shall the set screws be tightened to a maximum of 70 foot-pounds, tightening 180 degrees apart and making a final check with the wrench to ascertain that all set screws have 70 foot-pounds. The joint is then complete. Torque settings shall be done with the pipe laid in the trench in place.

Retaining glands shall also be installed adjacent to the pipe bells. No "T" bolts will be installed; however, the set screws will be installed as above.

The standard mechanical joint gland placed behind the pipe shall be installed snugly against the back of the bell to preclude movement. No "T" bolts will be installed on this gland.

Other special lacing or harnessing, if shown on the Contract Drawings, or directed by the Engineer shall be installed by the Contractor to the satisfaction of the Engineer.

Refilling Trenches: As soon as practicable after the pipes have been laid, the trenches shall be refilled at least to a level 2-feet above the top of the pipe with approved gravel, deposited in layers no more than 6-inchs in depth and satisfactorily compacted with pneumatic hand tampers, each layer to be leveled and thoroughly compacted to the satisfaction of the Engineer before the next layer is deposited. There will be no additional payment for necessary borrow to refill to this level. Special care shall be taken to consolidate the gravel under the pipes and the whole work of refilling shall be done in a manner which will prevent subsequent settlement and injury to the pipe. Above this level except for the surfacing material, the Contractor may use approved material from the trench excavation.

Line Stop:
Submit measurements of pipe outer diameter verified by test pit and complete detail drawings and design calculations of the proposed thrust block design for restraining the tapping sleeve and line stop.

After completion of the tap, submit the coupon removed to the Owner.

Except for the segment of pipe between the line stop and existing valves closed for water main shut downs, flow in the pipeline shall not be stopped, and the pipeline shall not be drained during any portion of the tapping and line stopping operation.

Upon completion of the connection, testing and acceptance of the work, remove the line stop and plug the tapping sleeve branch outlet.

The Contractor shall employ a specialty subcontractor to perform the tapping and line stopping work. The subcontractor shall have demonstrated experience with tapping and line stopping work of pipelines for a minimum of 5 years. The subcontractor's demonstrated experience shall be on water mains of similar material and size as the pipelines on this project.

A concrete encasement shall be installed around each completed tapping sleeve following successful pressure testing of the completed sleeve installation but prior to installation of the tapping machine and start of the tapping operation. Concrete and reinforcement shall be as specified in Item 601 (Concrete for Structures) of the Standard Specifications. The encasement shall provide support for the pipe, support the weight of the tapping and line stopping machines and provide thrust restraint for the pipe. The encasement shall be constructed in accordance with the subcontractor's recommendations and designed for the operating pressure of the pipeline. Provide additional thrust restraint as required to prevent movement of the pipe and joint failure. For the design of the encasement and restraints, it shall be assumed that the existing joints of the pipeline provide no thrust restraint.

The work of the line stopping shall be done with the pipelines filled and under pressure. Service in the pipelines shall not be interrupted.

The Contractor and his subcontractor shall be responsible for providing all necessary thrust blocks to properly restrain the tapping sleeve and line stop assembly. The means and methods of thrust restrain shall be submitted to the Owner and Engineer for review and comments prior to execution of the work. The installation and function of the thrust restraint system.

The tapping operation shall proceed approximately as follows:

1. Perform an initial field inspection of the pipe to receive the tap under the supervision of the Engineer to verify the location of the line stop tap and determine its exact pipe dimensions (diameter and ovality) for shop fabrication of the tapping sleeve components.

Place a minimum of a 2 inch blowoff in the area of the line stop.

2. Install the sleeves and bolt in place. Power wire brush and grind the exterior surface of the main to remove any debris, corrosion deposits or other surface. Disinfect as specified herein the surface of all components of the tapping sleeve, valve, piping and tapping equipment that will come into contact with potable water prior to the installation of the tapping sleeve and valve.

3. Prepare the coupon to be removed from the pipe by the tapping operation such that the coupon will be retained by the tapping machine and removed from the line. None of the cut material shall remain in the pipeline.

4. Install the tapping nozzle in place. Install the tapping valve and pressure test the nozzle and tapping saddle to the operating pressure of the line using caution to not exceed the collapse pressure of the pipeline. The Engineer shall witness the pressure test. Upon successful completion of the pressure test, install the concrete encasement around the tapping sleeve.

5. Install the tapping machine. The tapping machine cutting component (shell cutter and pilot drill) shall be designed to provide a clean cut of the pipe wall and to retain the cut coupon for removal. Upson approval from the Engineer, perform the tap and withdraw the cutter.

6. The line stop shall consist of a folding plugging head that contains an elastomer sealing element. The element shall be monolithically molded from a polyurethane compound suitable for water service. The element shall be in a flat plane perpendicular to the flow in the pipeline when the plugging head is in the full open position. The plugging head shall have a sealing element to seal against the inside of the pipeline when in the full open position. The plugging head shall be advanced into and retracted from the main by means of a linear actuator. When retracted, the plugging head and carrier shall be housed in an adapter, bolted pressure tight between the tapping valve and actuator.

7. Upon closure of the main pipeline with the line stop, work on the main pipeline shall proceed as expeditiously as possible. Prior to open cutting the main pipeline, install a 1" inch test tap into the segment between the line stop to demonstrate the effectiveness of the shut down and provide a drain. The main pipeline shall be drained and opened at each end of the segment to be removed of construction and acceptance of the new piping and valves, the line stops shall be removed. A permanent blind flange shall be placed on the outlet of each tapping sleeve. All components of the tapping sleeve shall receive a coat of coal tar epoxy to a minimum cured thickness of not less than 0.020-in.

Trench Backfill: Backfill above the 24-inch level will comply with and be paid for under the appropriate items included in this Contract.

Frost in Trench or Refill: Every effort shall be extended to eliminate the presence of frost in the bottom and sides of the trench and refill material. The Contractor shall cover and heat the trench or take such other means as necessary to eliminate the frost and chance of subsequent pipe settlement.

Cleaning: Prior to the installation of the pipeline, the Contractor shall clean the interior of the pipelines to the satisfaction of the Engineer, by such means as the Engineer approves.

Filling, Sterilizing and Flushing: At the location(s) as shown on the Contract Drawings or as ordered by the Engineer, the Contractor shall install an appropriately sized chlorination inlet, chlorination blow-off and sterilization sampling connection point on the crown of the pipe for sterilization testing. All costs for providing and installing said fittings shall be included in the unit price bid per foot of pipe or pipeline installed. As soon as practicable after the Contractor has

completed installation of the pipeline to include a successful leakage and hydrostatic test, the FTDWD will fill, and flush the pipeline. The Contractor shall supply labor to assist the FTDWD in filling and flushing the pipeline. If the pipeline is not connected to an existing operating water main, the Contractor shall furnish all labor, materials, equipment, at no extra cost to the FTDWD or State, to temporarily connect a FTDWD water main to the pipeline to be tested. The Contractor will not be charged for the FTDWD water used in this operation. The Contractor shall be responsible for labor, equipment and material necessary for erosion control.

Subsequent to sterilizing and flushing the water main(s), the FTDWD will test the water in accord with required state regulations. Should the water fail to pass the required tests and it is determined that the failure was caused by the Contractor's operations, all costs for re-sterilization, re-flushing, re-testing, etc., shall be borne by the Contractor.

The Contractor will attempt to minimize any damage to the road work that may occur during the flushing operation; however, he shall repair any such minor damage and the cost thereof will be considered as included in the price bid per linear feet of pipe.

Disinfecting and Flushing Water Mains Continuous Hypochlorite Feed Method

The work specified in this section describes continuous feed method of disinfecting newly constructed potable-water mains. The Contractor installing water mains and appurtenances such as pipe, valves, fittings and accessories within the FTDWD service area is responsible for disinfecting the water main and pipe sections. The FTDWD requires the Contractor to adhere to the strict standards stipulated in latest edition of AWWA C651, "Standard for Disinfecting Water Mains" when performing disinfection procedures. The standards represent the physical, chemical and bacteriological parameters that must be satisfied prior to determining if newly installed water mains can be placed into service.

The Contractor installing water mains and appurtenances within the District service area is responsible for all operations related to disinfecting water mains and pipe sections except working on the existing water distribution system. The gates within the existing water distribution system shall be operated only by the FTDWD.
The Contractor shall be required to issue a submittal for the subcontractor that will be performing the chlorine injection. The submittal shall include a minimum of three disinfection jobs of equal size and scope within the last two years and three references with contact information to establish the minimum level of required experience to perform the chlorine injection on the project. The Contractor shall be allowed to proceed with the implementation of this Section only if the submittal has been approved by the FTDWD.

After flushing and subsequent to performing the disinfection operation, the FTDWD will collect and analyze two complete sets of water samples**.** The two sets of water samples will be collected approximately twenty-four hours apart from each other. The first sample will be taken 2 hours after flushing and the second sample 24 hours after the first sample. Anticipate

approximately two business days for sampling and test results. The FTDWD will compare the results from the water samples collected to the maximum allowable limits for each parameter. If all parameters are satisfactory then the water main is considered to have passed and can now be opened for service. It is important to note that if any one parameter fails then two additional water samples will be collected twenty-four hours apart from each other. The parameters used to compare to the water sample results are listed in Table 1.

Use of FTDWD supplied water for flushing purposes may be limited during periods of high demand or when temperatures exceed 95 degrees Fahrenheit.

Submittals

The Contractor shall be responsible for developing a detailed plan that discusses at a minimum the scouring full pipe diameter flushing, methods for handling the volume of water from the flushing operation, disinfecting procedure with liquid sodium hypochlorite solution, de-chlorination procedure and sampling for each section of new water main to be tested. The Contractor shall provide a detailed submittal to the Engineer and FTDWD that outlines the specifics of the proposed procedures for each location.

SODIUM HYPOCHLORITE SOLUTION. Sodium hypochlorite conforming to ANSI/AWWA B300 is available in liquid form in glass, rubber-lined or plastic containers typically ranging in size from 1 quart to 5 gallons. Sodium hypochlorite contains approximately 5% to 15% available chlorine, and the storage conditions and time must be controlled to minimize its deterioration.

The sanitary handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main. The effectiveness of disinfection depends on maintaining clean pipes and avoiding major contamination during construction activities.

PREVENTATIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION. Heavy particles generally harbor bacteria and prevent elevated chlorine concentrations from contacting and killing these organisms. The procedures of this specification must be observed to assure that a water main and its appurtenances have been thoroughly cleaned for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system prior to the receipt of satisfactory physical and bacteriological sample results may constitute a cross-connection. Therefore, new water mains must be isolated until physical and bacteriological tests, immediately after and 24 hours following flushing of the water main, are satisfactorily completed and meeting District specifications.

A successful disinfection process begins at the early stages of construction. The Contractor must protect piping systems from contamination including interiors of pipes, fittings and valves. Pipe and appurtenances delivered for construction shall be capped or bagged to minimize the entrance of foreign material. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when

thorough cleaning will be performed by flushing or other means. The sanitary handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main.

Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the risk of contamination.

JOINTS. Joints of all pipes in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

SEALING MATERIALS. No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and approved by the pipe manufacturer, and not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated, clean applicator brushes.

CLEANING AND SWABBING. Each pipe section that is being readied for assembly in the field and just prior to installation, shall have the interior pipe surface swabbed with a 1% to 5% hypochlorite disinfecting solution using mechanical means like pulling a chlorine soaked mop or pigging device through the pipe or by power washing . If in the opinion of the Engineer, any dirt enters the pipe while being installed, the pipe will be swabbed again with 1% to 5%. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the Engineer.

WET TRENCH CONSTRUCTION. If it is not possible to keep the pipe and fittings dry during installation, the water that may enter the pipe-joint spaces shall contain an available chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of the pipe before it is lowered into a wet trench or by treating the trench water with hypochlorite tablets.

FLOODING BY STORM OR ACCIDENT DURING CONSTRUCTION. If the main is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main.

PREFLUSHING OF SOURCE WATER. The source water used for disinfection and pressure testing shall be flushed prior to its use to ensure that normally occurring contaminants or debris are not introduced into the new water main pipe. The FTDWD will be responsible for operating gate valves in the street as necessary. Adequate drainage must be provided during flushing, away from the construction area. The contractor shall be responsible for constructing temporary discharge piping and/or materials as necessary, at no additional cost to the FTDWD.

CONTINUOUS FEED METHOD OF CHLORINATION. Hypo-chlorination utilizes a concentrated dose of chlorine solution, usually 25 ppm for a 24 hour period, to eradicate bacterial contamination. This is a critical operation that requires skilled personnel and therefore the FTDWD reserves his right to request the replacement of any Contractor / Subcontractor's personnel for lack of skills performing these tests The Contractor shall not be compensated for the replacement of his Subcontractor or its personnel if requested by the District as a result of lack of skills in performing these tests. The FTDWD has developed safe and effective hypo-chlorination procedures. These procedures allow for disinfecting a new section of the FTDWD water distribution system, minimizing the risk to the field crews, to customers and to the environment. These procedures are to be followed when disinfecting all new pipelines which utilize the injection of sodium hypochlorite.

FINAL FLUSHING. After the applicable retention period of 24 hours, heavily chlorinated water should not remain in prolonged contact with the pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main, fittings, valves and branches until chlorine measurements show that the concentration in the main is no higher than that generally prevailing in the distribution system.

The Contractor shall make arrangements with the FTDWD to flush the new water main following disinfection. FTDWD forces shall be responsible for operating the gate valves in the street as necessary. It is important to note here that the new water main shall be kept isolated from the active distribution system using a physical separation until disinfectant has been flushed and satisfactory bacteriological, physical and VOC testing has been completed. Operation of all valves used in filling and flushing the line shall be performed by FTDWD personnel.

The Contractor shall be responsible for supplying necessary materials, equipment and appurtenances for neutralizing the chlorine and to perform all flushing operations except the operating of gate valves within the existing water distribution system. The minimum materials and equipment required to flush and neutralize the water main are:

- Five 3-inch x 20-foot rubber hoses, each with 3-inch male x female Camlock Couplings.
- Dechlorination device, model 3M-CLA, manufactured by Measurement Technologies, Sammamish WA or approved equal.
- Standard hydrant wrench.
- 90-degree ductile iron elbow with retaining gland, either 4 or 6-inch depending on blow off size.
- Customized 4 or 6-inch, 3/8-inch thick metal plate that bolts on to the 90-degree ductile iron elbow with 2-1/2-inch male fire connection (NST) thread. 4 or 6-inch depends on the blow off size.
- Ascorbic acid powder supplied by Bran NU Labs in Meriden CT or approved equal.

The Contractor shall also be responsible for determining where the water will drain during the flushing operation so as not to cause localized flooding or cause damage to property or the environment. The environment to which the chlorinated water is to be discharged shall be inspected. Following neutralization of the chlorinated water, the level of chlorine shall be

between 0.1 and 0.8 mg/l and in no case higher than the chlorine level in the distribution system. It is important to note that during the summer months water mains tend to take longer to disinfect due to higher ambient temperatures increasing the bacterial count. Usually, additional flushing will result in successfully disinfecting the water main.

DISINFECTION TESTS. Following disinfection and flushing, FTDWD forces will collect and analyze water samples from the new main utilizing a copper sterilization sampling fitting located no more than every 1,200 feet along the newly constructed water main. One set of water samples will be collected: approximately 2 hours following the flushing operation. The results are available approximately two business days following collection. The analytical results for the samples will be compared to the maximum allowable limits for each parameter as established by the FTDWD shown in Table 1. If the parameters are satisfactory for water samples, then the water main is considered passing and can be opened for service.

To ensure the water sample integrity, the FTDWD requires the person taking the sample to complete a "Chain of Custody" form, see attachment. This form must accompany the water sample when transporting to the FTDWD's laboratory at for analyzing.

Table 1
Physical, Chemical and Bacteriological Parameters for Water Mains

Parameter	Maximum Allowable Limit
pH	6.4 to 10
Color	15 units
Turbidity	1.0 NTU
Odor	2
Hardness	60 ppm.
Specific Conductance	150 microhms at 25 ^{o}C
Coliform Bacteria	0 per 100 milliliters
Standard Heterotrophic Plate Count	< 500 per milliliter at 35 ^{o}C
Chlorine Residual	<0.1- 0.8 ppm.
Volatile Organic Compounds (VOC)	See attached **Procedure**

RESAMPLING

If the initial disinfection fails to produce satisfactory physical and bacteriological results for the water samples, the new main shall be re-flushed and re-sampled.

If the new water main fails two rounds of sampling, the FTDWD shall determine if re-disinfection is needed or if the new main should only be flushed.

ATTACHMENT-CHAIN OF CUSTODY FORM
FTDWD **- Sample Collection \ Chain of Custody**
Distribution Specials
New Mains

Project DVW (when applicable to Developer Permit Agreement): _____

Project Name (for all projects): _____

Town: _____

Sample I.D.	Location (street)	Size of Main	Length of Main
S1			
S2			
S3			
S4			

Is a VOC being submitted? YES / NO

Time Collected

S1	S2	S3	S4

Chlorine residual

S1	S2	S3	S4

Collected by: _____

Any observations that might affect the physical and bacteriological quality of the water should be noted below:

_____

_____

Relinquished By:	Date / Time:
Received By:	Date / Time:
Relinquished By:	Date / Time:
Received By:	Date / Time:

Air Valve Assembly:

All brass fittings shall be of standard design generally used by water utilities and be in accord with ASTM B62 and ANSI/AWWA C800.

The corporation stops and angle valves shall be of good, tough, composition bronze well-mixed and free from flaws and imperfections. The corporation stops shall be of a type suitable for use in ductile iron mains. The inlet end shall have an inlet taper thread type known as the "Mueller Taper Thread".

Fittings, valves, etc. shall be flared connectors.

The gate valve box shall conform to the following requirements:

1. Cast iron shall conform to ASTM A48, Class 25.

2. Top section shall be of the top flange design and shall have no bead on the bottom.

3. The word "WATER" shall be cast with raised letters in the center of the cover.
4. Base section shall be of the Dwyer design which centers the operating nut for positive access to the valve.

5. For specific gate box details, see the FTDWD Details.

Inspection Before Installation: All tubing and fittings shall be carefully examined for defects and no material shall be installed which is known to be defective and should any defective tubing or fitting

be discovered after being installed, it shall be removed and replaced with sound material at no additional cost to the FTDWD.

Installation: The air valves, chlorination valve and blow-off shall be installed according to the details and to the satisfaction of the Engineer. To properly receive the air valve or other assembly the ductile iron pipe shall be drilled and tapped. All tapped holes for corporation stops shall be tapped Mueller Thread.

All tapped holes in ductile iron pipe shall be cleaned by running the correct size tap into the hole immediately prior to installing the corporation.

Gate valve boxes shall be set plumb and centered on the fitting, etc. Earth fill shall be carefully tamped around the gate box to a distance of 4 feet on all sides of the box or to the undistributed trench face, if less than 4 feet.

Excavation and refill shall conform to the requirements under other applicable Contract Sections.

12-Inch and Smaller Gate Valves:

Quality Assurance: All gate valves, accessories and gate boxes shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured.

A certified statement that inspection and all of the specified tests have been made and met shall also be submitted.

All gate valves, accessories and gate boxes shall be subject to inspection by the Engineer after delivery to the job site and may also be subject to inspection at the foundry by a representative of the FTDWD.

In addition the FTDWD reserves the right to have any or all materials inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the FTDWD 's expense.

A certified statement that inspection and all of the specified tests have been made and met shall also be submitted.

Gate Valve: The gate valve shall conform to ANSI/AWWA C500, ANSI/AWWA C509 and the following additional requirements:

1. Valve shall be double disc or resilient seated.

2. Bolts and nuts for connecting O-ring seal plates and bonnet to body shall either be copper-silicon alloy or stainless steel.

3. Valve shall be furnished with O-ring seals utilizing two O-rings, consistent with appropriate specifications.

4. Valve shall have mechanical joint ends, unless otherwise specifically indicated, which shall conform to ANSI/AWWA C111/A21.11. All joint accessories shall be furnished with each valve.

5. Direction to open shall be right-hand.

6. Operating nut shall be 2" square.

Gate Valve Box: The gate valve box shall conform to the following requirements:

1. Cast iron shall conform to ASTM A48, Class 25.

2. Top section shall be of the top flange design and shall have no bead on the bottom.

3. The word "WATER" shall be cast with raised letters in the center of the cover.

4. Base section shall be of the Dwyer design which centers the operating nut for positive access to the valve.

5. For specific gate box details, see the FTDWD Details.

Extension Stem: The extension stem shall be fabricated from steel conforming to ASTM A 36. Galvanizing shall conform to the latest edition of ASTM A 123.

Inspection Before Installation: The gate valve, gate box, etc. shall be subject to a careful inspection before being installed. The valve shall be run through a full open-close cycle to insure proper operation.

Installation of Gate Valve: The gate valve shall be installed according to the details shown and to the satisfaction of the Engineer.

All debris and foreign material shall be cleared from valve openings and seats. All mechanisms shall be checked and all nuts and bolts checked for tightness.

The valve box shall be set plumb and centered directly over the operating nut of the valves. Earth fill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box or to the undisturbed trench face, if less than 4 feet.

Where and as shown on the Contract Drawings, or ordered, a valve extension stem shall be installed. An extension stem will be ordered when the valve-operating nut is more than 4.5 feet below finished grade.

Excavation and refill shall conform to the requirements under other applicable Contract Sections.

Blow-Off Assembly:
Quality Assurance: All blow-off assemblies including gate valves and fittings shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured.

All blow-off assemblies including valves and fittings shall be subject to inspection by the Engineer after delivery to the job site and may also be subject to inspection at the foundry by a representative of the FTDWD.

In addition, the FTDWD reserves the right to have any or all blow-off assemblies including valves, fittings and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or the tests shall be at the FTDWD 's expense.

A certified statement that inspection and all of the specified tests have been made and met shall also be submitted.

Inspection Before Installation: Blow-off assemblies including gate valves, pipe, fittings, gate boxes, etc. shall be subject to a careful inspection before being installed. Valves shall be run through a full open-close cycle to insure proper operation.

Installation of Blow-off Assemblies: Blow-off assemblies including piping, gate valves, fittings, etc. shall be installed according to the details shown and to the satisfaction of the Engineer.

All debris and foreign material shall be cleared from valve openings. The blow-off assembly shall be set plumb. Blow-off assemblies and connecting pipe shall have at least the same depth of cover as the distributing main.

Special trench refill shall be placed over the pipe and fittings from the bottom of the trench to 2 feet above the top of the pipe and fittings.

Ductile iron pipe and harnessing shall be installed in accord with the specifications.

The utility identification tape shall be placed approximately two (2) feet above the top of the pipe.

Gate valves and gate boxes shall be installed in accord with the specifications.

Three-quarter inch (3/4") crushed stone, special trench refill and concrete shall be placed in accord with the specifications.

Excavation and refill shall conform to the requirements under other applicable Contract Sections. Temporary and permanent paved and unpaved surface restoration shall conform to the requirements under other applicable Contract Sections.

Method of Measurement: This work will be measured for payment as follows:

"12" Ductile Iron Pipe (Water Main)" which is considered to be the portion of pipe buried within the soil will be measured as a Contract Lump Sum item. The Lump Sum shall be the ductile iron pipe, in the sizes indicated, complete as shown, specified and directed. The pipe shall be installed as shown on the Contract Drawing between the connection to existing water main and the buried installation on the bridge. The change between buried installation and installation on the bridge shall be considered to occur at the back face (roadway approach side) of the concrete thrust block. The Lump Sum shall include all pipe, valves, bends and mainline fitting, retainers, thrust blocks, blow-off assemblies, regardless of their diameter and all material, transportation, labor, including labor required to assist the FTDWD during the testing, and equipment necessary to construct the pipelines in accord with the Contract Drawings.

Gravel fill from the bottom of the trench to the level 24-inches above the top of the pipe will not be measured for payment, but will be included in the cost of the pipe.

Basis of Payment: This work will be paid for at the contract lump sum price for "FURNISHING AND INSTALLING 12" WATER MAIN", complete and in place. The price shall also include the cost of digging test pits; transporting the materials; clearing, trenching; disposing of excavated materials, removing and disposing of the present water pipes and any appurtenances as needed; furnishing and installing the pipelines complete as shown on plans or as directed, with lacing and harnessing where required, including fittings, pressure reducing valves, line stops, bends, restraint, filter fabric, bank gravel, sand, blow off assemblies, gate/butterfly valves, air valves, sterilization fittings, tapping sleeves, tapping gates, RCP sleeve, gate boxes, tees, thrust blocks, anchors, expansion fittings, polystyrene, utility identification tape and fire hydrant assemblies; refilling trenches; furnishing the additional materials; temporary and permanent resurfacing; grading; sheeting; bracing; pumping and all incidental work, except as otherwise herein provided for. No claim will be allowed because the number of pipes and joints may be greater than estimated by the Contractor. The price shall also include all material, transportation, labor, including labor required to assist the FTDWD during the testing, and equipment necessary to construct the pipelines in accord with the Contract Drawings, the Specifications and the requirements of the Engineer there under.

The cost of all excavation, disposing of excavated material, except that which is suitable for refilling, and furnishing other materials for refilling, unless otherwise specified, will be considered as having been included in the lump sum price.

The cost of testing and disinfection shall be covered under Item #1301768A – FURNISHING AND INSTALLING 12" WATER MAIN ON BRIDGE.

No direct payment will be made for any work done or materials used in making the pipeline tight.

Pay Item	Pay Unit
FURNISHING AND INSTALLING 12” WATER MAIN	L.S.

ITEM #1301768A – FURNISHING AND INSTALLING 12" WATER MAIN ON BRIDGE

Description: The Contractor shall furnish and install high density polyethylene pipe of the sizes indicated, and all the fittings and appurtenances to the lines and grades shown on the Contract Drawings, complete as shown, specified or directed, including but not limited to; pressure reducing valves, bends, restraint, blow off assemblies, gate/butterfly valves, air valves, sterilization fittings, tapping sleeves, tapping gates, RCP sleeve, gate boxes, tees, thrust blocks and anchors, polystyrene, transporting materials, digging test pits, the clearing, trenching, disposing of unused excavated materials, removing and disposing of sections of the present water mains and concrete anchors, furnishing installing and field testing the pipelines complete with lacings and harnessing, concrete anchor/thrust blocks and utility identification tape, all trenching, rock removal, refilling trenches, filter fabric, furnishing additional material for refilling, trench compaction/testing, miscellaneous grading, sheeting, bracing, pumping and all incidental work where required, to the specifications and details of the District, except as otherwise herein provided for.

ITEM	PAY UNIT	APPROXIMATE QUANTITY FOR LUMP SUM PRICE
INSTALL 12" HDPE WATER MAIN ON BRIDGE	LF	170
12" EXPANSION COUPLING	EA	1
12" HDPE MJ ADAPTOR CONNECTION TO DI PIPE	EA	2
REMOVAL AND DISPOSAL OF EXISTING 12" WATER MAIN ON BRIDGE	LF	200
HYDROSTATIC PRESSURE TEST	EA	2
DISINFECTION AND TESTING	EA	2

The Contractor shall submit a schedule of values for the above items within 7 days of award of the contract.

The above quantities are for information only and not to be considered as the actual for development of the cost. The cost of temporary surface restoration shall be covered under Item #1301765A – FURNISH AND INSTALL 12" WATER MAIN. The cost of the all necessary supports, hardware and appurtenant work for the support of the water main on the bridge shall be covered under Item #1300061 – WATER MAIN SUPPORT SYSTEM.

Reference to "FTDWD" in this Item refers to "First Taxing District Water Department".

Materials: All materials used shall be from manufacturers and models as specified in the FTDWD "Approved Materials List For Water Main Installations" unless otherwise approved by the Engineer

Ductile Iron Pipe - Submittals: Six (6) sets of the manufacturer's literature and/or shop drawings for the materials of this section shall be submitted for approval. The Contractor shall furnish detailed drawings as follows and no work shall be fabricated until they have been approved by the Engineer:

1. Dimensions and general details for typical length of pipe.

2. Detail of joint between pipes for both push-on and restrained joints together with installation instructions.

3. Dimensions and general details for all fittings including joint details for both mechanical and restrained joints.

4. Location plans or lists showing number of pipes and fittings and other such information as needed for installation.

Prior to pipe-laying, the Contractor shall dig test pits where the new pipe connects to the present water main to ascertain the location, elevation and cross sectional dimensions of the present mains.

Pipe Specifications: All ductile iron pipe with push-on joints shall be the 60-42-10 grade cast in revolving molds in full accord with the following American National Standard, except for details for the joints and other modifications stated herein: "Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids".

ANSI/AWWA C151/A 21.51, furnished in 18-foot or 20-foot lengths. Push-on joints for such pipe shall be in accordance with ANSI/AWWA C111/A 21.11.

All requirements of the American National Standards Institute Specifications will be rigidly enforced and the foundry shall submit regularly to the Engineer, single copies of the report of tensile tests and low temperature impact tests as required in Section 51-12 and 51-13 of the ANSI/AWWA C151/A 21.51.

The Contractor shall submit to the Engineer a certified statement that the inspection and all of the specified tests have been made and met as required in Section 511.4.2 of ANSI/AWWA C151/ A21.51.

The ductile iron pipe to be furnished under this Contract shall conform to the following dimensions:

Size (Inches)	Thickness (Inches)	Thickness (Class)
12	0.43	54

Where shown, specified or ordered, the pipe shall have push-on joints of the type which employs a single elongated, grooved rubber gasket to affect a watertight joint seal. The joints shall conform

to the latest American National Standard for "Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings", ANSI/AWWA C111/A21.11, except as otherwise specified herein. The rubber gaskets shall be manufactured from high quality rubber satisfactory to the Engineer and shall be similar to the gaskets used in the Tyton joint as manufactured by the United States Pipe and Foundry Company or the Fastite joint as manufactured by the American Cast Iron Pipe Company or the Grip-Tite joint as manufactured by Griffin Pipe Products Co. or approved equal.

Where shown, specified or ordered, the pipe shall have restrained joints of a type which employs a single elongated, rubber gasket to affect a watertight joint seal. The joints shall conform in general to ANSI/AWWA C111/A21.11. The rubber gaskets shall be manufactured from high quality rubber satisfactory to the Engineer. The restrained joint pipe shall be as manufactured by the American Cast Iron Pipe Company, McWane, Super Lock, TR Flex, or approved equal.

The grooved rubber gaskets and joint lubricant shall be furnished with the pipe and shall be considered included in the price bid per linear feet of pipe. The gasket shall be plainly identified as to pipe size and packaged in a suitable and satisfactory manner for shipment.

Each pipe shall have cast or stamped on it the maker's name or mark, the year in which the pipe is cast, and the letters "DI" or "DUCTILE" as required by the American National Standards Institute Specifications. The weight and thickness class shall be painted on each pipe, as required by the American National Standards Institute Specifications, and a record of weight for each pipe before the application of a lining or coating shall be submitted to the Engineer.

Fitting Specifications: All ductile iron fittings to be furnished under this Contract shall conform to the American National Standard for "Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and other Liquids", ANSI/AWWA C110/A21.10. In addition to the marking required by the American National Standards Institute Specifications, the year of casting shall be cast on all fittings. Single copies of the results of tests required by the ANSI/AWWA C110-A21.10 shall be submitted to the Engineer.

Bolt holes in the mechanical joint bells of all fittings shall straddle the vertical centerline of the fitting (fitting laying in horizontal position).

Unless otherwise shown, specified or ordered, all fittings shall be mechanical joint (MJ).

Joint Accessories: All joint accessories shall be furnished with each pipe and fitting and shall be plainly identified as to pipe size. A certified statement that all required tests on the joint accessories have been made and met as specified shall be submitted to the Engineer.

Lining and Coating: All pipe and fittings, except sleeves, caps and plugs shall be lined with cement mortar in accord with the American National Standard for "Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water", ANSI/AWWA C104/A21.4. However, linings with thickness twice those specified in Section 4-10.1 shall be furnished. Thickness determinations, in accord with Section 4-9, shall be made on at least one fitting of each type.

All pipe and fittings, including steel sleeves, caps, plugs, tees, bends and reducers, shall be coated inside and outside with an approved bituminous material, neither sufficiently soft to flow when exposed to the summer sun, nor brittle enough to crack and scale off when exposed to temperatures below freezing.

Coating may be applied by painting, dipping or spraying, but in no case are the pipe fittings or the coating material to be heated to a high enough temperature to be detrimental to the cement lining. In addition, the coating of the interior shall conform to the requirements of ANSI/AWWA C104/A21.1.

The Contractor shall submit to the Engineer a certified statement that the inspection and all of the specified tests have been made and met.

THE FOLLOWING ARE ACCEPTABLE PIPE MANUFACTURERS:

Atlantic States Pipe (McWane)
United States Pipe & Foundry Co.
Griffin Pipe Products, Inc.
Clow Corp. (McWane)
ACIPCO

Inspection: All pipe and fittings shall be subject to inspection by the Engineer after delivery to the job site and may also be subject to inspection at the foundry by a representative of the District.

Harnessing Specifications: Eyebolts and lacing rods shall be of A-36 steel as manufactured by Star National Products, Columbus, Ohio or approved equal. All components shall be hot -dipped galvanized.

Retainer glands for mechanical joints shall conform to ANSI/AWWA C111/A21.11 and the following additional requirements:

1. All retainer glands shall be ductile iron and all retaining devices shall be heat treated ductile iron.

2. All retainer glands shall have a minimum rated working pressure of 250 psi.

The retainer glands shall be Megalug Series 1100 as manufactured by EBAA Iron Sales, Inc. Eastland, Texas or approved equal.

Components of the harnessing system for push-on joint ductile iron pipe shall be in general accord with the above requirements for lacing rods and retainer glands. The harnessing system shall be the Series 1700 Megalug Restraint Harness, as manufactured by EBAA Iron Sales, Inc., Eastland, Texas or approved equal.

High Density Polyethylene Pipe - Submittals: Six (6) sets of the manufacturer's literature and/or shop drawings for the materials of this section shall be submitted for approval. The Contractor shall furnish detailed drawings as follows and no work shall be fabricated until they have been approved by the Engineer:

1. Dimensions and general details for typical length of pipe.

2. Detail of joint between pipes for welded and restrained joints together with installation instructions.

3. Dimensions and general details for all fittings including joint details for both butt-fused and restrained joints.

4. Location plans or lists showing number of pipes and fittings and other such information as needed for installation.

Prior to pipe-laying, the Contractor shall dig test pits where the new pipe connects to the present water main to ascertain the location, elevation and cross sectional dimensions of the present mains.

Pipe Specifications: All high density polyethylene (HDPE) pipe shall be manufactured from virgin polyethylene resin, PE 3408 and shall conform to ASTM D3350. All HDPE pipe and fitting shall be DR 17 rated at 100 psi.

AWWA C960-90/ASTM D1248/ASTM D2837/ASTM F714, furnished Polyethylene PE Pressure Pipe and fitting for water distribution, for polyethylene plastic molding and extrusions, method for obtaining hydrostatic design basis for thermoplastic pipe materials, for Polyethylene plastic pipe based on outside diameter per AWWA C960-90/ASTM D1248/ASTM D2838/ASTM F714.

HDPE pipe shall be homogeneous throughout, free from voids, cracks, and other defect; as uniform as commercially practical in color density and other physical properties. Pipe surfaces shall be free of nicks, scratches, and other blemishes. The joint surfaces of pipe shall be free from gouges and imperfections that could cause leakage at joints.

The Contractor shall submit to the Engineer a certified statement that the inspection and all of the specified tests have been made and met.

The HDPE pipe to be furnished under this Contract shall conform to the following dimensions:

Size (Inches)	Thickness (Inches)	Thickness (Class)
12	0.75	DR-17

Where shown, specified or ordered, the pipe shall be joined by butt-fusion methods, having a complete uniform and monolithic pipe interior according to the fusion joining procedures as instructed by the manufacture. Each individual performing fusion joining shall have a minimum of one year of experience in the use of the fusion procedure.

Each pipe shall have cast or stamped on it the maker's name or mark, the year in which the pipe is cast, and the letters "HDPE" as required by the American National Standards Institute Specifications. The weight and thickness class shall be painted on each pipe, as required by the American National Standards Institute Specifications, and a record of weight for each pipe before the application of a lining or coating shall be submitted to the Engineer.

The pipes shall be pre-insulated by URECON Limited, Perma-Pipe, or approved equal.

The pipe shall be factory pre-insulated under strict factory quality control conditions in accordance with ISO 9001 Standards. Carrier pipe shall be high density polyethylene pipe as specified herein. Factory applied pipe insulation shall be rigid polyurethane foam with the following characteristics:

1. Minimum Thickness: 2-inches (50 mm).
2. Density: 2.2 to 3.0 lbs/ft3 (35 to 46 kg/m3) as determined in accordance with ASTM D1622.
3. Minimum Closed Cell Content: 90% as determined in accordance with ASTM D6226.
4. Maximum Water Absorption: 4.0% by volume as determined in accordance with ASTM C272.
5. Thermal Conductivity: 0.14 to 0.17 Btu/in/ft2/hr/degree Fahrenheit (0.020 to 0.026 W/m/degree Celsius) as determined in accordance with ASTM C518.

Outer jacket shall be minimum 16 gage spirally wrapped galvanized steel. Prepare outer jacket surface in accordance with coating manufacturer's written instructions and provide a primer coat of Tnemec Series N69 Hi-Build Epoxoline (DFT 2.0 to 3.0 mils) and a finish coat of Tnemec Series 1075U Endura-Shield (DFT 2.0 to 3.0 mils). Coating color to be Owner selected from coating manufacturer's standard colors.

Insulated pipe joints shall be completed using prefabricated polyisocyanurate or urethane foam half shells and metal consistent with that on the factory insulated pipe. All metal overlaps at the joints and fittings shall be 2-inches (50 mm) minimum and shall be field positioned in such a way as to shed water.

HDPE Fittings: Insulation kits for fittings shall consist of rigid polyisocyanurate or urethane foam insulation complete with a thin elastomeric coating on the outside surfaces for strength during transit and installation, and fabricated galvanized steel or aluminum outer protective jacket consistent with that on the factory insulated pipe. All kits to be supplied complete with stainless steel bands, stainless steel band-it clips, and stainless steel screws to suit. Fitting insulation shall conform to the following requirements:

1. Density (ASTM D1622) 27 to 32 kg/m3 (1.7 to 2.0 lbs/ft3).
2. Compressive strength (ASTM D1621) 131 to 158 kPa (19 to 23 lbs/in2) .
3. Minimum Closed Cell Content: 90% as determined in accordance with ASTM D6226.
4. Maximum Water Absorption: 4.0% by volume as determined in accordance with ASTM D2842.

5. K Factor: 0.19 Btu/in/ft2/hr/degree Fahrenheit (0.027 W/m/degree Celsius) as determined in accordance with ASTM C518.
6. Thickness to match pipe insulation thickness.

Provide roller protection saddles at pipe support roller locations as an integral part of the pre-insulated piping system.

Flexible Expansion Joint: Flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of: 20º, (2" - 12" diameters), 15º, (14" - 36" diameters); and 12º, (42"-48" diameters). Two ball and sockets are required. Linear expansion shall not be less than 15-inches minimum. Flexible expansion joint shall be provided with flanged end connections conforming to ANSI/ AWWA C111/A21.11.

Flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 250 psi. A minimum 2:1 safety factor, determined from the published pressure rating, shall apply.

All internal surfaces and external surfaces shall be coated with a fusion bonded epoxy coating conforming to the requirements of AWWA C213. Interior surface holiday testing shall be performed.

Flexible expansion joints shall be manufactured by EBAA Iron, Inc., Eastland TX or approved equal.

Joint gaskets: Shall be Nitrile (NBR) (Acrylonitrile Butadiene). Gaskets for flanged joints shall be full face Flange-Tyte as manufactured by U.S. Pipe.

Bolts, nuts, and fastening hardware: Type 316L stainless steel, hex head conforming to ASTM F593 or ASTM F594 as applicable. Threads shall be coated with Never-Seez anti-seize and lubricating compound as manufactured by Bostik, Inc.

Adjustable Pipe Roll Stands: Provide cast iron base plate and stand roll with steel adjusting screws. Provide resilient coating. Comply with ANSI/MSS SP-69 and MSS SP-58. Size roller assembly to accommodate pipe insulation and protection saddles. Provide dielectric insulation pads between dissimilar metals.

Unless otherwise shown, specified or ordered, all fittings shall be butt-fused joint (BJ).

Joint Accessories: All joint accessories shall be furnished with each pipe and fitting and shall be plainly identified as to pipe size. A certified statement that all required tests on the joint accessories have been made and met as specified shall be submitted to the Engineer.

The Contractor shall submit to the Engineer a certified statement that the inspection and all of the specified tests have been made and met.

Inspection: All pipe and fittings shall be subject to inspection by the Engineer after delivery to the job site and may also be subject to inspection at the foundry by a representative of the FTDWD.

Retainer glands for mechanical joints shall conform to ANSI/AWWA C111/A21.11 and the following additional requirements:

3. All retainer glands shall be ductile iron and all retaining devices shall be heat treated ductile iron.

4. All retainer glands shall have a minimum rated working pressure of 250 psi.

The retainer glands shall be Megalug Series 2000PV as manufactured by EBAA Iron Sales, Inc. Eastland, Texas or approved equal.

Trench Refill: Trench refill materials shall meet the following requirements:

Native Backfill: Native backfill shall consist of granular soil excavated on site meeting the approval of the Engineer. Materials shall be of such a nature that they will form a stable dense fill. Materials shall not contain stones larger than 6-inch, vegetation, masses of roots, individual roots more than 12-feet long or more than ½-inch in diameter, trash, clays, or plastic fines. Organic matter shall not exceed two percent (2%). Non-plastic fines (silts) shall not exceed 20 percent (20%).

Bank Gravel: Bank gravel shall conform to the requirements of Article M.02.01-2, CDOT Form 817.

Crushed Stone: Crushed stone shall conform to the requirements of Article M.02.01-1 Grading A, CDOT Form 817 and Sub article M.02.02-2(a), CDOT Form 817, for loss on abrasion.

Granular Base: Granular base shall conform to the requirements of Article M.02.03, Grading "C", CTDOT Form 817.

Sand: Sand shall conform to the requirements of Sub article M.11.04c, CDOT Form 817.

Utility Identification Tape: Utility identification tape shall be 4-inch wide non-detectable, designed to withstand extended underground exposure, colored blue and be durably imprinted with an appropriate warning indicating the presence of the buried pipe.

Ductile Iron Pipe and Fittings: Refer to the "Ductile Iron Pipe (Water Main)" specification.

Gate Valve, Extension Stem and Gate Box: Refer to FTDWD Detail.

Concrete anchor/ Thrust blocks: Anchors and thrust blocks shall be Class "A" concrete conforming to Article M.03.01.

Harnessing: Refer to FTDWD Detail.

Filter fabric: Fabric shall conform to Article M.08.01-26.

Expansion fittings shall be as manufactured by EBAA Iron EX-TEND 200 or approved equal

Construction Methods:

Transporting and Distributing Pipe: The Contractor shall transport the pipe and fittings from the place of manufacture, shall secure all permits which may be necessary, and comply with the requirements of the Connecticut Bureau of Highways, Cities and Towns, concerning heavy transporting over State, City and Town highways.

During loading, transportation and unloading, more than ordinary care shall be taken to prevent injury to the pipes. Such work shall be done with each section of the pipe under full control at all times and under no condition shall a pipe be dropped on the ground. Pipes shall be placed on sand beds or other methods may be employed to avoid chances of pipe being frozen to the ground surface.

In distributing the pipe in the field, as permitted, each piece shall be placed as near as possible to the point where it is to be installed and faced in the proper direction. In case any pipe received damage from handling or other cause and made unacceptable to the Engineer, it shall be replaced with a new pipe at the expense of the Contractor. The Contractor is cautioned that State, City, or Town authorities may not permit storing pipe, etc., within street or highway limits.

Clearing Trees and Bushes: No trees within streets and highways, or adjacent to the normal trench therein, shall be damaged or removed. In streets and highways where there is no permanent paving, the Contractor shall, unless otherwise directed, remove and dispose of only those trees, bushes or shrubs required for construction and approved by the Engineer. The unlimited removal of trees and brush will generally not be required or permitted. All trees, bushes or shrubs which are not to be removed shall be preserved and protected by the Contractor. Should any trees, bushes or shrubs, which are to be preserved and protected, become damaged by the conduct of the work, the Contractor shall replace them at his own expense. Brush, small branches, trash, large trunks, stumps and all other surplus material and debris shall be removed from the site of the work.

Trenching: Prior to any excavation, the Contractor shall notify all affected utilities in accord with Public Act 77-350 (CALL BEFORE YOU DIG 1-800-922-4455).

The trench for the pipe shall be 18-inches beyond the outside of the barrel of the pipe on each side, the top of the barrel of the pipe shall be as shown on the Contract Drawings or as directed by the Engineer; and the bottom of the trench shall be at the bottom of the pipe. The Contractor alone shall be responsible for the stability and safety of the trenches and adjacent structures, and shall use such trench support and bracing as necessary without additional payment therefor. Pavement

cuts shall be made with the edges reasonably smooth and without cracking or damage to the pavement outside the limits of the portion excavated. The methods used and the location of such cuts shall conform to the requirements and specifications of the City or State. Repairs to pavement shall be made in accordance with the requirements and specifications of the City/Town or State.

In any area to receive fill, no pipe trench shall be excavated until the fill has been placed and compacted to a level at least 3-feet above the top of the pipe to be installed.

The Contractor may be required to excavate locally to determine the location and depth of existing underground structures on the lines of the pipe well in advance of the pipe laying. There will be no additional payment for this work, including backfilling and temporary surfacing.

Sheeting, Bracing and Pumping: The Contractor shall furnish and put in place such sheeting and bracing as may be necessary, to support the sides of the excavation, to prevent undermining of the pavement or to protect from possible injury any pipes, sewers, ducts, poles, conduits or other structures existing in the streets, or highways, and shall remove such sheeting and bracing as the trench is refilled unless the Engineer shall order it left in place.

The Contractor shall maintain all excavations in proper condition for carrying on the work, and to this end shall do all bailing, draining, or pumping which may be necessary to keep the trenches or other excavations free of water. No direct payment will be made for this work but the cost thereof will be considered as having been included in the price bid per linear feet of pipe.

If the Contractor installs and operates wellpoints on any section of the work, the expense of the same shall be borne by the Contractor.

Protection of Pipes, Drains, Culverts, etc.: All existing gas pipes, water pipes, sewers, drains, manholes, catch basins, culverts, electrical conduits, telephone ducts, utility poles or other structures which are uncovered by the excavation, and which do not, in the opinion of the Engineer, require to be changed in location, shall be carefully supported and protected from injury by the Contractor; and in case of damage, they shall be restored by him without compensation; therefore, to as good condition as that in which they were found and shall be kept in repair during the existence of this Contract.

Laying HDPE Pipe: Proper and suitable tools and appliances for safe and convenient handling and laying of pipe shall be used, and care shall be taken to prevent the coating of the pipe from being damaged, particularly on the inside of the pipes. The Contractor shall not start any pipe work until he has satisfied the Engineer that he has on hand and available the following minimum equipment:

1. Wheel pipe cutters, hydraulic pipe cutter or a pipe saw for the sizes of pipe to be laid;

2. Ratchet type socket wrenches for mechanical joint bolts and nuts;

3. At least two expandable pipe stops of the proper size for closing the end of the pipe being laid when not actually laying pipe.

All pipes shall be carefully examined for defects and no pipe shall be laid which is known to be defective, and should any defective pipe or other casting be discovered after being laid, it shall be removed and replaced with a sound casting at the expense of the Contractor.

Pipe located on the bridges shall be carefully cut to length and carefully installed to insure proper positioning of joints between pipe support assemblies.

The pipe shall be laid upon sound soil, cut true and even so that the barrel of the pipe will have a bearing for its full length. In the event the trench is excavated below the grade of the bottom of the pipe, the trench will be brought up to grade with acceptable crushed stone or processed gravel, pneumatically tamped, at the expense of the Contractor, before the pipe is laid.

The utility identification tape shall be place approximately two (2) feet above the top of the pipe.

When not actually laying pipe (e.g. overnight, weekends, holidays, etc.) the open ends of the pipe shall be kept plugged with approved watertight night caps furnished by the Contractor.

The Contractor shall take all necessary precautions to prevent water from entering the pipe during installation of the pipeline.

Unless shown otherwise on the Contract Drawings or directed otherwise by the Engineer, the pipeline shall be installed a minimum of four (4) feet - six (6) inches below finished grade. The pipeline shall also be installed to provide at least eighteen (18) inches of vertical clearance between the water pipe and storm drains or sanitary sewers.

Cutting Pipe: Whenever the pipes require cutting, an approved saw, wheel, or hydraulic type cutter shall be used. This work shall be done by the Contractor without extra compensation, in a manner satisfactory to the Engineer, and only experienced men shall be engaged thereon.

Joints: HDPE pipe joints shall be joined by butt-fusion, having a complete uniform and monolithic pipe interior according to the fusion joining procedure as instructed by the manufacturer, unless noted otherwise on the plans or directed by the engineer.

On fittings, butterfly and gate valves with mechanical joints, the follower ring and rubber gaskets shall be placed on the plain end of the pipe being (or previously) laid and entered into the socket of the fitting. The gasket shall then be evenly seated in the socket, the follower ring moved up to the face of the gasket and the "T" bolts inserted and made finger tight. The "T" bolts shall then be tightened with a ratchet or torque wrench to between 60 and 80 foot-pounds. See U-03 for additional joint requirements.

Joint Restraints: Where and as shown on the Contract Drawings, or as directed by the Engineer, retaining glands or eye bolts and lacing rods shall be installed with the standard lacing details shown for mechanical joint pipe or fittings.

The retaining glands shall be installed in lieu of the standard mechanical joint gland. The "T" bolts shall be tightened with a ratchet or torque wrench to between 60 and 80 foot-pounds. Only then shall the set screws be tightened to a maximum of 70 foot-pounds, tightening 180 degrees apart and making a final check with the wrench to ascertain that all set screws have 70 foot-pounds. The joint is then complete. Torque settings shall be done with the pipe laid in the trench in place.

Retaining glands shall also be installed adjacent to the pipe bells. No "T" bolts will be installed; however, the set screws will be installed as above.

The standard mechanical joint gland placed behind the pipe shall be installed snugly against the back of the bell to preclude movement. No "T" bolts will be installed on this gland.

Other special lacing or harnessing, if shown on the Contract Drawings, or directed by the Engineer shall be installed by the Contractor to the satisfaction of the Engineer.

Refilling Trenches: As soon as practicable after the pipes have been laid, the trenches shall be refilled at least to a level 2-feet above the top of the pipe with approved sand, deposited in layers no more than 6-inchs in depth and satisfactorily compacted with pneumatic hand tampers, each layer to be leveled and thoroughly compacted to the satisfaction of the Engineer before the next layer is deposited. There will be no additional payment for necessary borrow to refill to this level. Special care shall be taken to consolidate the gravel under the pipes and the whole work of refilling shall be done in a manner which will prevent subsequent settlement and injury to the pipe. Above this level except for the surfacing material, the Contractor may use approved material from the trench excavation.

Trench Backfill: Backfill above the 24-inch level will comply with and be paid for under the appropriate items included in this Contract.

Frost in Trench or Refill: Every effort shall be extended to eliminate the presence of frost in the bottom and sides of the trench and refill material. The Contractor shall cover and heat the trench or take such other means as necessary to eliminate the frost and chance of subsequent pipe settlement.

Cleaning: Prior to the installation of the pipeline, the Contractor shall clean the interior of the pipelines to the satisfaction of the Engineer, by such means as the Engineer approves.

Filling, Sterilizing and Flushing: At the location(s) as shown on the Contract Drawings or as ordered by the Engineer, the Contractor shall install an appropriately sized chlorination inlet, chlorination blow-off and sterilization sampling connection point on the crown of the pipe for sterilization testing. All costs for providing and installing said fittings shall be included in the unit price bid per foot of pipe or pipeline installed. As soon as practicable after the Contractor has completed installation of

the pipeline to include a successful leakage and hydrostatic test, the FTDWD will fill, and flush the pipeline. The Contractor shall supply labor to assist the FTDWD in filling and flushing the pipeline. If the pipeline is not connected to an existing operating water main, the Contractor shall furnish all labor, materials, equipment, at no extra cost to the District or State, to temporarily connect a FTDWD water main to the pipeline to be tested. The Contractor will not be charged for the FTDWD water used in this operation. The Contractor shall be responsible for labor, equipment and material necessary for erosion control.

Subsequent to sterilizing and flushing the water main(s), the FTDWD will test the water in accord with required state regulations. Should the water fail to pass the required tests and it is determined that the failure was caused by the Contractor's operations, all costs for re-sterilization, re-flushing, re-testing, etc., shall be borne by the Contractor.

The Contractor will attempt to minimize any damage to the road work that may occur during the flushing operation; however, he shall repair any such minor damage and the cost thereof will be considered as included in the price bid per linear feet of pipe.

Disinfecting and Flushing Water Mains Continuous Hypochlorite Feed Method

The work specified in this section describes continuous feed method of disinfecting newly constructed potable-water mains. The Contractor installing water mains and appurtenances such as pipe, valves, fittings and accessories within the FTDWD service area is responsible for disinfecting the water main and pipe sections. The FTDWD requires the Contractor to adhere to the strict standards stipulated in latest edition of AWWA C651, "Standard for Disinfecting Water Mains" when performing disinfection procedures. The standards represent the physical, chemical and bacteriological parameters that must be satisfied prior to determining if newly installed water mains can be placed into service.

The Contractor installing water mains and appurtenances within the FTDWD service area is responsible for all operations related to disinfecting water mains and pipe sections except working on the existing water distribution system. The gates within the existing water distribution system shall be operated only by the FTDWD.

The Contractor shall be required to issue a submittal for the subcontractor that will be performing the chlorine injection. The submittal shall include a minimum of three disinfection jobs of equal size and scope within the last two years and three references with contact information to establish the minimum level of required experience to perform the chlorine injection on the project. The Contractor shall be allowed to proceed with the implementation of this Section only if the submittal has been approved by the FTDWD.

After flushing and subsequent to performing the disinfection operation, the FTDWD will collect and analyze two complete sets of water samples**.** The two sets of water samples will be collected approximately twenty-four hours apart from each other. The first sample will be taken 2

hours after flushing and the second sample 24 hours after the first sample. Anticipate approximately two business days for sampling and test results. The FTDWD will compare the results from the water samples collected to the maximum allowable limits for each parameter. If all parameters are satisfactory then the water main is considered to have passed and can now be opened for service. It is important to note that if any one parameter fails then two additional water samples will be collected twenty-four hours apart from each other. The parameters used to compare to the water sample results are listed in Table 1.

Use of FTDWD supplied water for flushing purposes may be limited during periods of high demand or when temperatures exceed 95 degrees Fahrenheit.

Submittals

The Contractor shall be responsible for developing a detailed plan that discusses at a minimum the scouring full pipe diameter flushing, methods for handling the volume of water from the flushing operation, disinfecting procedure with liquid sodium hypochlorite solution, de-chlorination procedure and sampling for each section of new water main to be tested. The Contractor shall provide a detailed submittal to the Engineer and FTDWD that outlines the specifics of the proposed procedures for each location.

SODIUM HYPOCHLORITE SOLUTION. Sodium hypochlorite conforming to ANSI/AWWA B300 is available in liquid form in glass, rubber-lined or plastic containers typically ranging in size from 1 quart to 5 gallons. Sodium hypochlorite contains approximately 5% to 15% available chlorine, and the storage conditions and time must be controlled to minimize its deterioration.

The sanitary handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main. The effectiveness of disinfection depends on maintaining clean pipes and avoiding major contamination during construction activities.

PREVENTATIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION. Heavy particles generally harbor bacteria and prevent elevated chlorine concentrations from contacting and killing these organisms. The procedures of this specification must be observed to assure that a water main and its appurtenances have been thoroughly cleaned for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system prior to the receipt of satisfactory physical and bacteriological sample results may constitute a cross-connection. Therefore, new water mains must be isolated until physical and bacteriological tests, immediately after and 24 hours following flushing of the water main, are satisfactorily completed and meeting FTDWD specifications.

A successful disinfection process begins at the early stages of construction. The Contractor must protect piping systems from contamination including interiors of pipes, fittings and valves. Pipe and appurtenances delivered for construction shall be capped or bagged to minimize the entrance of foreign material. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when

thorough cleaning will be performed by flushing or other means. The sanitary handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main.

Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the risk of contamination.

JOINTS. Joints of all pipes in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

SEALING MATERIALS. No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and approved by the pipe manufacturer, and not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated, clean applicator brushes.

CLEANING AND SWABBING. Each pipe section that is being readied for assembly in the field and just prior to installation, shall have the interior pipe surface swabbed with a 1% to 5% hypochlorite disinfecting solution using mechanical means like pulling a chlorine soaked mop or pigging device through the pipe or by power washing . If in the opinion of the Engineer, any dirt enters the pipe while being installed, the pipe will be swabbed again with 1% to 5%. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the Engineer.

WET TRENCH CONSTRUCTION. If it is not possible to keep the pipe and fittings dry during installation, the water that may enter the pipe-joint spaces shall contain an available chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of the pipe before it is lowered into a wet trench or by treating the trench water with hypochlorite tablets.

FLOODING BY STORM OR ACCIDENT DURING CONSTRUCTION. If the main is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main.

PREFLUSHING OF SOURCE WATER. The source water used for disinfection and pressure testing shall be flushed prior to its use to ensure that normally occurring contaminants or debris are not introduced into the new water main pipe. The FTDWD will be responsible for operating gate valves in the street as necessary. Adequate drainage must be provided during flushing, away from the construction area. The contractor shall be responsible for constructing temporary discharge piping and/or materials as necessary, at no additional cost to the FTDWD.

CONTINUOUS FEED METHOD OF CHLORINATION. Hypo-chlorination utilizes a concentrated dose of chlorine solution, usually 25 ppm for a 24 hour period, to eradicate bacterial contamination. This is a critical operation that requires skilled personnel and therefore the FTDWD reserves his right to request the replacement of any Contractor / Subcontractor's personnel for lack of skills performing these tests The Contractor shall not be compensated for the replacement of his Subcontractor or its personnel if requested by the FTDWD as a result of lack of skills in performing these tests. The FTDWD has developed safe and effective hypo-chlorination procedures. These procedures allow for disinfecting a new section of the FTDWD water distribution system, minimizing the risk to the field crews, to customers and to the environment. These procedures are to be followed when disinfecting all new pipelines which utilize the injection of sodium hypochlorite.

FINAL FLUSHING. After the applicable retention period of 24 hours, heavily chlorinated water should not remain in prolonged contact with the pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main, fittings, valves and branches until chlorine measurements show that the concentration in the main is no higher than that generally prevailing in the distribution system.

The Contractor shall make arrangements with the FTDWD to flush the new water main following disinfection. FTDWD forces shall be responsible for operating the gate valves in the street as necessary. It is important to note here that the new water main shall be kept isolated from the active distribution system using a physical separation until disinfectant has been flushed and satisfactory bacteriological, physical and VOC testing has been completed. Operation of all valves used in filling and flushing the line shall be performed by FTDWD personnel.

The Contractor shall be responsible for supplying necessary materials, equipment and appurtenances for neutralizing the chlorine and to perform all flushing operations except the operating of gate valves within the existing water distribution system. The minimum materials and equipment required to flush and neutralize the water main are:

- Five 3-inch x 20-foot rubber hoses, each with 3-inch male x female Camlock Couplings.
- Dechlorination device, model 3M-CLA, manufactured by Measurement Technologies, Sammamish WA or approved equal.
- Standard hydrant wrench.
- 90-degree ductile iron elbow with retaining gland, either 4 or 6-inch depending on blow off size.
- Customized 4 or 6-inch, 3/8-inch thick metal plate that bolts on to the 90-degree ductile iron elbow with 2-1/2-inch male fire connection (NST) thread. 4 or 6-inch depends on the blow off size.
- Ascorbic acid powder supplied by Bran NU Labs in Meriden CT or approved equal.

The Contractor shall also be responsible for determining where the water will drain during the flushing operation so as not to cause localized flooding or cause damage to property or the environment. The environment to which the chlorinated water is to be discharged shall be

inspected. Following neutralization of the chlorinated water, the level of chlorine shall be between 0.1 and 0.8 mg/l and in no case higher than the chlorine level in the distribution system. It is important to note that during the summer months water mains tend to take longer to disinfect due to higher ambient temperatures increasing the bacterial count. Usually, additional flushing will result in successfully disinfecting the water main.

DISINFECTION TESTS. Following disinfection and flushing, FTDWD forces will collect and analyze water samples from the new main utilizing a copper sterilization sampling fitting located no more than every 1,200 feet along the newly constructed water main. One set of water samples will be collected: approximately 2 hours following the flushing operation. The results are available approximately two business days following collection. The analytical results for the samples will be compared to the maximum allowable limits for each parameter as established by the FTDWD shown in Table 1. If the parameters are satisfactory for the water sample, then the water main is considered passing and can be opened for service.

To ensure the water sample integrity, the FTDWD requires the person taking the sample to complete a "Chain of Custody" form, see attachment. This form must accompany the water sample when transporting to the FTDWD's laboratory prior to analyzing.

Table 1
Physical, Chemical and Bacteriological Parameters for Water Mains

Parameter	Maximum Allowable Limit
pH	6.4 to 10
Color	15 units
Turbidity	1.0 NTU
Odor	2
Hardness	60 ppm.
Specific Conductance	150 microhms at 25 ^{o}C
Coliform Bacteria	0 per 100 milliliters
Standard Heterotrophic Plate Count	< 500 per milliliter at 35 ^{o}C
Chlorine Residual	<0.1- 0.8 ppm.
Volatile Organic Compounds (VOC)	See attached **Procedure**

RESAMPLING

If the initial disinfection fails to produce satisfactory physical and bacteriological results for the water sample, the new main shall be re-flushed and re-sampled.

If the new water main fails two rounds of sampling, the FTDWD shall determine if re-disinfection is needed or if the new main should only be flushed.

ATTACHMENT-CHAIN OF CUSTODY FORM

FTDWD - **Sample Collection \ Chain of Custody**
Distribution Specials
New Mains

Project DVW (when applicable to Developer Permit Agreement): _____

Project Name (for all projects): _____

Town: _____

Sample I.D.	Location (street)	Size of Main	Length of Main
S1			
S2			
S3			
S4			

Is a VOC being submitted? YES / NO

Time Collected

S1	**S2**	**S3**	**S4**

Chlorine residual

S1	**S2**	**S3**	**S4**

Collected by: _____

Any observations that might affect the physical and bacteriological quality of the water should be noted below:

_____

_____

Relinquished By:	Date / Time:
Received By:	Date / Time:
Relinquished By:	Date / Time:
Received By:	Date / Time:

Air Valve Assembly:
All brass fittings shall be of standard design generally used by water utilities and be in accord with ASTM B62 and ANSI/AWWA C800.

The corporation stops and angle valves shall be of good, tough, composition bronze well-mixed and free from flaws and imperfections. The corporation stops shall be of a type suitable for use in ductile iron mains. The inlet end shall have an inlet taper thread type known as the "Mueller Taper Thread".

Compression fittings, valves, etc. shall be of the design employing the pipe clamp feature.

The gate valve box shall conform to the following requirements:

1. Cast iron shall conform to ASTM A48, Class 25.

2. Top section shall be of the top flange design and shall have no bead on the bottom.

3. The word "WATER" shall be cast with raised letters in the center of the cover.
4. Base section shall be of the Dwyer design which centers the operating nut for positive access to the valve.

5. For specific gate box details, see the FTDWD Details.

Inspection Before Installation: All tubing and fittings shall be carefully examined for defects and no material shall be installed which is known to be defective and should any defective tubing or fitting be discovered after being installed, it shall be removed and replaced with sound material at no additional cost to the FTDWD.

Installation: The air valves, chlorination valve and blow-off shall be installed according to the details and to the satisfaction of the Engineer. To properly receive the air valve or other assembly the ductile iron pipe shall be drilled and tapped. All tapped holes for corporation stops shall be tapped Mueller Thread.

All tapped holes in ductile iron pipe shall be cleaned by running the correct size tap into the hole immediately prior to installing the corporation.

Gate valve boxes shall be set plumb and centered on the fitting, etc. Earth fill shall be carefully tamped around the gate box to a distance of 4 feet on all sides of the box or to the undistributed trench face, if less than 4 feet.

Excavation and refill shall conform to the requirements under other applicable Contract Sections.

12-Inch and Smaller Gate Valves:

Quality Assurance: All gate valves, accessories and gate boxes shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured.

A certified statement that inspection and all of the specified tests have been made and met shall also be submitted.

All gate valves, accessories and gate boxes shall be subject to inspection by the Engineer after delivery to the job site and may also be subject to inspection at the foundry by a representative of the FTDWD.

In addition the FTDWD reserves the right to have any or all materials inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the FTDWD 's expense.

A certified statement that inspection and all of the specified tests have been made and met shall also be submitted.

Gate Valve: The gate valve shall conform to ANSI/AWWA C500, ANSI/AWWA C509 and the following additional requirements:

1. Valve shall be double disc or resilient seated.

2. Bolts and nuts for connecting O-ring seal plates and bonnet to body shall either be copper-silicon alloy or stainless steel.

3. Valve shall be furnished with O-ring seals utilizing two O-rings, consistent with appropriate specifications.

4. Valve shall have mechanical joint ends, unless otherwise specifically indicated, which shall conform to ANSI/AWWA C111/A21.11. All joint accessories shall be furnished with each valve.

5. Direction to open shall be right-hand.

6. Operating nut shall be 2" square.

Gate Valve Box: The gate valve box shall conform to the following requirements:

1. Cast iron shall conform to ASTM A48, Class 25.

2. Top section shall be of the top flange design and shall have no bead on the bottom.

3. The word "WATER" shall be cast with raised letters in the center of the cover.

4. Base section shall be of the Dwyer design which centers the operating nut for positive access to the valve.

5. For specific gate box details, see the FTDWD Details.

Extension Stem: The extension stem shall be fabricated from steel conforming to ASTM A 36. Galvanizing shall conform to the latest edition of ASTM A 123.

Inspection Before Installation: The gate valve, gate box, etc. shall be subject to a careful inspection before being installed. The valve shall be run through a full open-close cycle to insure proper operation.

Installation of Gate Valve: The gate valve shall be installed according to the details shown and to the satisfaction of the Engineer.

All debris and foreign material shall be cleared from valve openings and seats. All mechanisms shall be checked and all nuts and bolts checked for tightness.

The valve box shall be set plumb and centered directly over the operating nut of the valves. Earth fill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box or to the undisturbed trench face, if less than 4 feet.

Where and as shown on the Contract Drawings, or ordered, a valve extension stem shall be installed. An extension stem will be ordered when the valve-operating nut is more than 4.5 feet below finished grade.

Excavation and refill shall conform to the requirements under other applicable Contract Sections.

Blow-Off Assembly:
Quality Assurance: All blow-off assemblies including gate valves and fittings shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured.

All blow-off assemblies including valves and fittings shall be subject to inspection by the Engineer after delivery to the job site and may also be subject to inspection at the foundry by a representative of the FTDWD.

In addition, the FTDWD reserves the right to have any or all blow-off assemblies including valves, fittings and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or the tests shall be at the FTDWD 's expense.

A certified statement that inspection and all of the specified tests have been made and met shall also be submitted.

Inspection Before Installation: Blow-off assemblies including gate valves, pipe, fittings, gate boxes, etc. shall be subject to a careful inspection before being installed. Valves shall be run through a full open-close cycle to insure proper operation.

Installation of Blow-off Assemblies: Blow-off assemblies including piping, gate valves, fittings, etc. shall be installed according to the details shown and to the satisfaction of the Engineer.

All debris and foreign material shall be cleared from valve openings. The blow-off assembly shall be set plumb. Blow-off assemblies and connecting pipe shall have at least the same depth of cover as the distributing main.

Special trench refill shall be placed over the pipe and fittings from the bottom of the trench to 2 feet above the top of the pipe and fittings.

Ductile iron pipe and harnessing shall be installed in accord with the specifications.

The utility identification tape shall be placed approximately two (2) feet above the top of the pipe.

Gate valves and gate boxes shall be installed in accord with the specifications.

Three-quarter inch (3/4") crushed stone, special trench refill and concrete shall be placed in accord with the specifications.

Excavation and refill shall conform to the requirements under other applicable Contract Sections. Temporary and permanent paved and unpaved surface restoration shall conform to the requirements under other applicable Contract Sections.

Method of Measurement: This work will be measured for payment as follows:

"12" High Density Polyethylene Pipe Installed on Bridge (Water Main)" which is considered to be the portion of pipe supported on the bridge. No measurement shall be taken as the work shall be paid for on a Lump Sum basis. For payment limits, the change between buried installation and installation on the bridge shall be considered to occur at the back face (roadway approach side) of the concrete thrust block.

Gravel fill from the bottom of the trench to the level 24-inches above the top of the pipe will not be measured for payment, but will be included in the cost of the pipe.

Basis of Payment: This work will be paid for at the contract lump sum price for "FURNISHING AND INSTALLING 12" WATER MAIN ON BRIDGE", complete and in place. The price shall also include the cost of digging test pits; transporting the materials; clearing, trenching; disposing of excavated materials, removing and disposing of the present water pipes and any appurtenances as needed; furnishing and installing the pipelines complete as shown on plans or as directed, with lacing and harnessing where required, including fittings, pressure reducing valves, bends, restraint, filter fabric, bank gravel, sand, blow off assemblies,

gate/butterfly valves, air valves, sterilization fittings, tapping sleeves, tapping gates, RCP sleeve, gate boxes, tees, thrust blocks, anchors, expansion fittings, polystyrene, utility identification tape refilling trenches; furnishing the additional materials; temporary and permanent resurfacing; grading; sheeting; bracing; pumping and all incidental work, except as otherwise herein provided for. No claim will be allowed because the number of pipes and joints may be greater than estimated by the Contractor. The price shall also include all material, transportation, labor, including labor required to assist the FTDWD during the testing, and equipment necessary to construct the pipelines in accord with the Contract Drawings, the Specifications and the requirements of the Engineer there under.

The cost of all excavation, disposing of excavated material, except that which is suitable for refilling, and furnishing other materials for refilling, unless otherwise specified, will be considered as having been included in the lump sum price.

The cost of temporary surface restoration shall be covered under Item #1301765A – FURNISHING AND INSTALLING 12" WATER MAIN. The cost of the all necessary supports, hardware and appurtenant work for the support of the water main on the bridge shall be covered under Item #1300061 – WATER MAIN SUPPORT SYSTEM.

No direct payment will be made for any work done or materials used in making the pipeline tight.

Pay Item	Pay Unit
FURNISHING AND INSTALLING 12" WATER MAIN ON BRIDGE	L.S.