J. ROBERT FOLCHETTI & ASSOCIATES, LLC
CIVIL/ENVIRONMENTAL ENGINEERS

January 22, 2021

TOWN OF CARMEL

PUTNAM COUNTY, NEW YORK

CARMEL WATER DISTRICT NO. 2 WATER MAIN LINING PROJECT

CONTRACT C265

ADDENDUM No. 2

TO ALL PROSPECTIVE BIDDERS:

This addendum is issued this day in conformance with Article 7 of the Instruction to Bidders, included in the Contract Documents. The information contained in this addendum is intended to clarify, supersede, replace, or supplement the Contract Documents as specified herewith, and shall be made an integral part of the Contract. This Addendum must be attached to each bidders Contract Documents and submitted along with his bid. This addendum has been prepared to modify information contained in the Contract Documents.

▫ **31 SODOM ROAD**
BREWSTER, NY 10509
Tel. 845-363-1560
Fax 845-279-2062
www.jrfa.com

TOWN OF CARMEL
WATER DISTRICT NO. 2
WATERMAIN LINING REPLACEMENT PROJECT

ADDENDUM NO. 2

TABLE OF CONTENTS

Town of Carmel
Carmel Water District No. 2 Water Main Lining Project
Contract C265
Contact Person: John E. Folchetti, P.E.

ENGINEER'S NOTES: This Addendum No.2 is being issued to notify prospective bidders of the pre-bid meeting date change and in response to Request for Information submitted by prospective bidders as follows:

The Pre-Bid Zoom Meeting originally scheduled for January 26, 2021 at 10am has been re-scheduled for February 2, 2021 at 10am. The meeting will be recorded and roll will be called to ensure attendance by prospective bidders. Prospective Bidders are to join the February 2, 2021 ZOOM meeting from a computer, tablet, or smartphone through the following link:

Join Zoom Meeting
https://us02web.zoom.us/j/83539390178?pwd=N0pSSk9Ic1JVcVNNdVRDb3h4cHpWQT09

Meeting ID: 835 3939 0178
Passcode: W4UAC2

Request for Information:

1. a. *Please confirm the existing diameter on Sheet 20. The drawing says the main is 10"*

   Watermains in Old Route 6 are reportedly 6" diameter. The drawing will be revised when the construction set is issued.

   b. *Please confirm the diameter of the water main on sheet 21. It is not noted.*

   Town records show this to be 8" diameter.

   c. *What is the right of way on sheet 21? There is approximately 2,400' to be lined. We will require access into this area to excavate approximately 5 access pits.*

   The ROW is assumed to be 20 feet wide.

   d. *On Sheet 5 (typical locations) When installing new valve EV1, can the location be moved to the Tee by SMTV1?*

   Yes.

2. a. *Will the bid opening be via ZOOM or in person?*

   The bid opening is currently scheduled to be conducted in person on February 16. If required by Covid-19 criteria, it will be adjusted.

   b. *Is the restoration of bypass trenches (paving) Paid under restoration items?*

   All asphalt restoration of excavations is paid under Item 5.

c. *The county requires 2" surface course, but pay items for asphalt only have item 5B, 1 ½" asphalt surface course.*

Item 5B has been revised to reflect 2" asphalt surface course. Bidders are advised to replace the entire bid form with the revised bid form attached hereto.

d. *If obstructions are encountered, how are they paid?*

Obstructions will have to be excavated and identified. Excavation for such obstructions will be paid under the test pit tem. Revised test pit quantities are reflected in the revised bid form. Any bends or other fittings that require replacement will be paid under the fitting item.

e. *Are hydrant tees to be replaced? Also, valve, hydrant, and hydrant lead?*

No.

f. *For the Lining inspection excavations, you require one per 2000'. Will these be paid under the test pit item?*

No. With the specific exception of test pits, all excavation & backfill associated with lining installation is paid under Item 1A. See Contract Specification 1C1.4.A.1.

g. *In lieu of the 5% retainage being held a year, will they accept a bond, or a retainage just on the pavement value?*

No, the Town does not waive retainage.

h. *1A3 and 1E7 require the contractor to name a NY State Licensed surveyor for documentation. As the project is to rehabilitate in place an existing water main, will this requirement be waived? Will the owner accept redline as builts by the contractor?*

A land surveyor is not required. Red-line asbuilts are not acceptable.

i. *1C2, 1.4A.1. cementitious lining states …service lateral restoration… The service laterals will receive Blow back to remove the cement in the corporation after lining, but no other work is planned to renew the services. Is this correct?*

Service lines must be returned to full service by whatever means is necessary.

j. *When closing excavations for access for cleaning and lining, is the pipe paid under the various pipe items? under 1C2, 1.4 A. 2.b says the lengths of pipe necessary to make the required connections at the inverts shown. Also under B, 2 b states "the contractor shall provide the length of pipe necessary to make the required connections at the penetrations made for all lining work". My question is, do we get paid for the closure pipes in access pits for the cleaning and lining- valve installations etc.*

Yes. Items B1 and B2 are intended to pay for the materials, equipment and labor required for closing the cuts into the main necessitated by cleaning and lining operations.

k. *What is the existing line pressure?*

Per the Town's Operator, results of pressure readings at the following locations are as shown:

Sheet 5 Kelly Ridge near 20/22 Kelly Ridge: 50 Psi
Sheet 6 St. Michaels Terrace near 37/39 Saint Michaels: 75 Psi
Sheet 8 Everett Road near 40/42 Everett: 40 Psi
Sheet 10 Vink Drive & Fair Street: 110 Psi
Sheet 11 Fair Street & Waring Drive: 145 Psi
Sheet 12 Fair Street & DeColores Drive: 125 Psi
Sheet 5 & 13 Fair Street & Kelly Ridge Road: 100 Psi
Sheet 19 Route 52 & Vink Drive: 95 Psi

Other pressure readings will be provided when available.

l. *Does the entire Spec book be submitted as the bid?*

Yes.

m. *Sheet 24 has a detail for Asphalt overlay, yet there is no pay item for milling and overlay. Is milling required?*

Milling is not required. This detail will be removed from the construction set.

n. *Specifications 212-1 says within 30 days of lining perform paving, yet section 212-3 says backfill must be in place a minimum of 30 days before paving. Please clarify.*

The minimum is 30 days. Bidders are advised to replace the Specification Section 2I2 with the revised Specification Section 2I2R attached hereto.

o. *Will the curb stop be worked prior to construction to make sure that they hold water so the mains can be lined in the dry, and can Be used for water blow backs? The curb stop is preferred to the operating of a valve inside the homes. If the curb stop is inoperative, will the contractor be required to replace and how will we be reimbursed?*

The contractor will be responsible for exercising curbs stops prior to installing temporary water service. A pay item has been added to allow the contractor to replace inoperable curb stops. See the revised Bid Form and the revised Specification 1CR, Measurement and Payment attached hereto.

p. *For excavations that are off road (by the water tank), can the excavated materials be reused, rather than haul in virgin materials.*

Yes.

q. *What restoration of the area behind the water tank will be required? Tree replacement, soil stabilization, etc*

Restoration includes at a minimum backfill, seeding, and haying and stabilization. See Contract Specification 1C1.4N.

r. *What is the depth of the existing water main*

It varies. They typical minimum depth is 4' cover.

s. *Section 15A1, 3.4 testing of mains require a pressure test of 1 ½ times the existing working pressure. As we are rehabilitating an aged water system, with existing house service, valves and hydrants, the requirement should be to test OUR work to the existing pressure.*

Specification Section 15A1 applies to the installation of new mains. Specification Section 15B4 applies to relined water mains. There is no pressure testing required for placing relined mains back in service.

t. *Please clarify if fittings to be installed (tees, bends) are to be PVC or Ductile Iron*

Fittings are to be Ductile Iron.

3. *a.* *Sheet 5 - Everett, What is the pipe size from Krv-1-Smtv-1?*

Town records show this to be 6" diameter.

b. *Sheet 5 - Hillside, What is the limit of cleaning and lining work?*

The full extent of the watermain as shown.

c. *Sheet 6 - St. Michaels, 8" asbestos pipe is indicated. From what stations is it located?*

The AC main extends from St. Michaels Terrace northwest towards Fair Street. It is not to be worked on unless ordered by Engineer.

d. *Sheet 10 - Fair, What diameter main is feeding Carmel High School?*

Town records show this to be 6" diameter.

e. *Sheet 10 - Vink, Is this street a dead end and how far is the nearest fire hydrant?*

Vink is not a dead end street. Refer to sheet 19 for hydrant location.

f. *Sheet 11 - Waring, How far is the nearest fire hydrant?*

As identified in Note 3, the nearest hydrant is 410 lf from Fair Street.

g. *Sheet 12 - Coldres Dr, Is this street back fed?*

No.

i. *Sheet 13 - Glenna, How far is the nearest fire hydrant?*

As identified in Note 3, the nearest hydrant is 450 lf from Fair Street.

j. *Sheet 20 - Old Route 6, Is Route 6 a state hwy & do we need K Crete Backfill?*

Route 6 is a State highway. Old Route 6 is owned by the Town. There is no work in NYS State Route 6.

k. *Sheet 20 - Old Route 6, Any time restrictions for working hours?*

As specified in the Section G12, 1.2E of the contract documents, working hours are 7am - 5 pm, Monday through Friday, unless different hours are approved by the Town.

l. *Sheet 20 - Old Route 6, What diameter are the water services on Route 6?*

See response to Question 1a above.

m. *Sheet 20 - Day, Is this street back fed and is Hyd 1 off of Day?*

Day Road is a dead end. Hydrant 1 is off Day Road.

n. *Sheet 20 - Day, What is the pipe diameter?*

Town records show this to be 8" diameter.

o. *Sheet 20 - Old Route 6, Is the main at Station 32+50 a lateral and is the diameter correct?*

Assuming the question is referring to the Everett Tank main that joins the Old Route 6 main at Station 22+50 (versus 32+50) the Town records indicate the diameter to be 8".

p. *Sheet 20 - Old Route 6, At Station 5+00 there is a sideline with Buildings off of it. Will they need to be connected to the bypass?*

The structure furthest from the road does not require temporary service; the structure closest to the road does require temporary service as shown on Sheet 20.

q. *Sheet 20 - Old Route 6, Is all the main on Rte 6 10" pipe?*

See Question 1A, there are reportedly no 10" mains.

r. *Sheet 20 - Old Route 6, there is no bid item for 10" cleaning & lining or for 10" gate valves.*

See Question 1A, there are reportedly no 10" mains.

s. *Sheet 21 - Everett Tank, Please provide a detail of the valve at the tank.*

A plan of the valving arrangement is attached.

t. *Sheet 21 - Everett Tank, Can this be shut down without temporary bypass?*

Yes.

u. *Sheet 21 - Everett Tank - What diameter is the pipe?*

See response to question 3o above.

v. *Sheet 21 - Everett Tank, Is there an access road over pipe?*

There is an access road leading from Everett Road to the tank that runs partially over the hill towards Old Route 6. The remainder of the easement is not cleared. See response to Question 4a below.

w. *Sheet 24 - There is a Mill and overlay detail. Is there any to be done on this project? If so, we need a bid item for mill and overlay.*

See response to Question 2m.

x. *Who will be performing the C test on the cement lined mains?*

Contractor will be performing C test on the cement lined mains.

y. *Bid items 1B1-1B4 contains 2,100 linear feet of new main install. This main installation is not shown on the contract drawings. Where is this pipe to be installed?*

See response to Question 2J.

4. a. *We are concerned with the lining from the tank to old route 6.*
The grade, growth, and amount of equipment that is required to Line the water main causes concern.

The first 400' from the water tank towards old route 6 to a access pit, has growth and a slight grade, the second 400' has ruts, requires clearing, and is a steeper grade. Then the next 600' is fairly flat and open, then the last 600' is a steep hill with overgrowth. An access pit would be required behind Putnam Auto, on the hill side of the Putnam Path, and then the last excavation at the Tee on Old route 6.
We would need winches, dozers and excavators to get the equipment staged at the 4 pits behind the tank, water for lining, and hauling in the required sand and Cement.

An alternative method would be to install a Primus Liner (we are a certified Installer as are other Lining contractors). The Primus liner would give you a rehabilitated water main. It is NSF approved, has no VOC's and can be installed in the 2000' run required, with a pit at the tank and a pit at the Tee on Old route 6.
The Liner would save on additional costs to get equipment in, save on 4 excavations, and offer a rehabilitated main instead of just water quality that Cement Lining offers.

At this point we do not know the diameter of the existing main from the tank, and the Drawing for Old Route 6 indicates a 10" Main there.

The Town will consider the use of the Primus Liner. See revised Bid Form, and revised Specification Sections 1CR and 15B4R.

5. a. *Please clarify*
Hooking up the temporary services is to be done at the sill cock. Then the curb stop will be opened by city personnel, then when we do blow backs we must enter homes and operate a valve at the meter using water blow backs. When the service is hooked up to the sill cock, our personnel must enter the homes and trace the pipe to ensure no leaks, and that the service is hooked up correctly.

I would recommend dropping the meter, and hooking up the blow back hose inside the home with the hose the running to the outside through a dryer vent, a window etc.
Then after lining we can blow back the service this way.

Otherwise if the residents are not home we would not be able to blow back the service resulting in a plugged service that would require excavation.

Also a water blow back has the chance of damaging the lining in the main, where air has less impact on the fresh lining.

Provision for replacing non-operable curb stops has been added and the requirement to blowback from inside the dwelling has been removed. See revised bid Form, and revised Specification Sections 1CR and 15B4R.

6. a. *Sheet 25, construction sequence note 5, please confirm the lining stations*

Sheet 25 is the thrust block detail sheet; it does not contain any construction sequence notes. Please clarify what sheet you are referring to.

b. *Confirm the diameter on Everett street, sheet 7 states 6", Sheet 8 states 8", or identify where the transition is*

The exact location of the transition is not known. The test pits called out on the plans are intended to identify this location.

c. *Are tee replacements incidental to the work?*

Yes.

7. a. *What are the size of the temporary services pay item 1D2?*

Per Item 1D2, "Temporary ¾" diameter water service", the size of the temporary services in Pay Item 1D2 is 3/4".

b. *There may be some large fire services- possibly on Vink Drive, will these be paid under item 1D2?*

Temporary service will be 4" mains with ¾" connections. The only service that will not be 3/4" is the school service, as identified in Note 3.1 on Sheet 10 See Question & response to *d*. below.

c. *Some services appear to have two service lines to the structure, see sheet 10, between stations 0+00 to 8+50. Will both lines to the structure require temporary service?*

Every unit receives a service line.

d. *Sheet 10 at the Carmel High school refers to sequence note 3.1, which I do not see. What is the size of the service to the school?*

Construction Sequence Note 3.1 is located directly below Construction Sequence note 3. It is indented and reads: "Provide 4" temporary service connection vice typical 3/4" connection. See detail."

8. a. *The access pits for cleaning and lining are approximately 5' wide x 7' long. When we install a bend, valve, or tee, we would use megalugs. Would you also require thrust blocks? Also, The detail on sheet 25 have restraint length tables that would require substantial additional excavation, even though the earth is undisturbed past the access pit. Will the restraint then be limited to within the access pits.*

Thrust blocks or additional restrained joint length will not be required where megalugs are installed.

b. *Couplings are required to have stainless steel bolts and also harnessing. Please confirm these requirements. Other items-megalugs/fittings do not require the stainless steel bolts.*

Stainless steel bolts will be required for couplings & harnesses.

c. *Can the phases be lengthened? You are limiting the construction to approximately 1000' sections. Can we have multiple phases on bypass simultaneously? The pre-lining valves can be installed after areas are cleaned and lined. If the contractor is held to the 18 phases, the contract duration needs to be extended.*

Phasing is shown for convenience of presentation. Refer to Specification 15B4R Section 1.3A. The Contractor's Performance Statement of Work should address how you intend to execute the project within the time identified for completion. If that includes merging sections in order to pursue the work efficiently, the Town will certainly consider that.

d. *There are no specific details for the installation of Bends, pipe, or storm drain requirements. There are approximately 100 excavations that will be 7' long requiring 5' of pipe at each one. That would justify 500 LF of piping, yet pay items have 1800' of pipe. Also there are no details for bends to be installed, drawings would indicate approximately 12 each 45 degree bends, but pay items have 48 bends. There are also no details showing storm drain installation, but there are 400' of storm drain in the pay items. There is a detail for storm drain installation, it refers to County paving on sheet 24, but there is no list for planned installations.*

Piping footage required may exceed the 5 feet presented as necessary to repair the estimated 100 excavations. Piping will be paid as installed at the unit price bid. The same applies to bends; they will be installed where required and paid as installed. Storm drain is included in the bid in order to be able to repair/replace any storm drains that may be necessitated by construction activities.

e. *There are two creeks/culverts on Fair street that the water main will cross, can you verify if the water main is straight above the waterway, or are there bends or excavations required to go under it. At one location a test pit is indicated. If bends are encountered there or elsewhere that would require additional excavations, how would these obstructions be paid for?*

Test pits are intended to verify how the main crosses the culverts. The test pit quantity has been increased to address this contingency. See revised bid form.

9. a. *On the municipal streets, can we backfill with stone to below grade, and place 5 ½" asphalt base top, after 30 days dig out 1 ½" and place 1 ½" of top asphalt?*

This approach is currently under review.

b. *Are the work hours on the county roads the same as municipal roads?*

Yes.

c. *What is the cost for the Carmel road opening permit including administrative and inspection cost?*

As this is a Town project, the requirement for the permit is waived.

d. *How are lump sum items paid?- in one billing or over the project life as submitted on the project schedule?*

Across the life of the project.

e. *If the Loop detector on Vink Street is damaged, is the contractor responsible for the repair?*

Yes.

10. a. *Contract Drawings - Sheet 5*
Is the intent to also replace Valves BDV-2 and KRV-3?

Yes.

Is the intent to also replace TEE fitting in addition to Valves EV-3, EV-4, BDV-1?

Not unless necessary.

b. *Contract Drawings - Sheet 6*
Construction sequence, note 2: Valve SMT-4 to be replaced – where is that valve on drawings?

SMT 4 is called out near the intersection of St Michael's Terrace East & Everett Road.

Please provide the size and type of the existing water main to be cleaned and lined on St. Michaels Terrace?

As shown in the callout immediately to the right of the Construction Sequence notes, the diameter is 8". All lines proposed for lining are either cast or ductile iron.

c. *Contract Drawings - Sheet 7*
Is the intent to also replace Valve EV-2?

Yes.

d. *Contract Drawings - Sheet 11*
The proposed test pit is at the tee connection- is the intent to replace the Tee fitting?

Not unless necessary.

e. *Contract Drawings - Sheet 16*
Is the intent to replace the Tee fitting where Valves PTRV-1, Test Pit, and Valve LKV-1 are located?

Not unless necessary.

f. *Contract Drawings - Sheet 18*
Cleaning / Lining terminates at STA 44+00 – what about the remaining 62 feet?

The remaining 62 feet consists of recently installed PVC pipe.

g. *Contract Drawings - Sheet 20*
Is the intent to replace Tee fitting where valves O6V-3 O6V-5 and O6V-4 are located?

Not unless necessary.

Construction Sequence: #5 states to Clean and Line from STA 0+00 to STA 42+00. However, the last isolation valve - O6V-6, is at STA 28+80. Is the intent to stop cleaning/lining at STA 28+80 or at STA 42+00?

Cleaning/lining will stop at Station 28+80. The revision to the drawing will be issued with the construction set.

h. *Contract Drawings - Sheet 21*
Construction Sequence #3 states to clean and line from valve EV-7 to valve O6V-3; however, valve O6V-3 is not shown on prints. Should it be valve O6V-4 instead?

Line to O6V-4. The revision to the drawing will be issued with the construction set.

Is the intent to clean and line through valves EV-8, EV-10, EV-9, and EV-11? Please provide a detailed drawing of the pipe configuration near the tank.

The Everett Road Tank is now scheduled for replacement and will be re-piped. Plan to clean/line from EV-7 to EV-8, and from EV-11-O6V-4. The revision to the drawing will be issued with the construction set. The piping arrangement near the tank is attached.

11. *a.* *Will you be sending a Zoom Invite for the prebid to all bidders?*

Yes

b. *I tried to access the link you sent in the addendum, it says the meeting does not exist. That could be due to me checking now.*

Agreed.

c. *Please clarify: When hooking up to the sill cocks:*
Are the sill cocks frost proof, or will they let water into the homes?

The Town does not possess this information for every dwelling.

d. *Are there check valves on the line with the sill cock inside the homes?*

The Town does not possess this information for every dwelling.

PAYMENT ITEM NO.	PAYMENT ITEM DESCRIPTION & UNIT PRICE (IN WORDS)	ESTIMATED QUANTITY UNIT	UNIT PRICE (IN FIGURES)	TOTAL AMOUNT
1A	**CEMENTITIOUS LINING**			
1A1	6"' DIA. CEMENTITOUS LINING DOLLARS AND_____CENTS	11,000 LF		
1A2	8" DIA. CEMENTITIOUS LINING DOLLARS AND_____CENTS	12,800 LF		
1B	**BURIED PIPING**			
1B1	6" DR 14 PVC WATERMAIN DOLLARS AND_____CENTS	700 LF		
1B2	8" DR 14 PVC WATERMAIN DOLLARS AND_____CENTS	1000 LF		
1B3	12" HDPE STORMWATER PIPE DOLLARS AND_____CENTS	200 LF		
1B4	15" HDPE STORMWATER PIPE DOLLARS AND_____CENTS	200 LF		
1C	**VALVES AND FITTINGS**			
1C1	6" GATE VALVE PRE-LINING INSTALLATION DOLLARS AND_____CENTS	16 EA		
1C2	8" GATE VALVE PRE-LINING INSTALLATION DOLLARS AND_____CENTS	12 EA		
1C3	6" GATE VALVE POST-LINING INSTALLATION DOLLARS AND_____CENTS	10 EA		

PAYMENT ITEM NO.	PAYMENT ITEM DESCRIPTION & UNIT PRICE (IN WORDS)	ESTIMATED QUANTITY UNIT	UNIT PRICE (IN FIGURES)	TOTAL AMOUNT
1C4	8" GATE VALVE POST-LINING INSTALLATION DOLLARS AND_____CENTS	10 EA		
1C5	6" BENDS DOLLARS AND_____CENTS	24 EA		
1C6	8" BENDS DOLLARS AND_____CENTS	24 EA		
1C7	3/4"CURB STOP REPLACEMENT DOLLARS AND_____CENTS	40 EA		
1D	**TEMPORARY WATER SUPPLY**			
1D1	TEMPORARY 4" DIA. WATERMAIN DOLLARS AND_____CENTS	49,000 LF		
1D2	TEMPORARY 3/4" DIA. WATER SERVICE DOLLARS AND_____CENTS	280 EA		
1E	PIPE CLEANING DOLLARS AND_____CENTS	24,000 LF		
1F1	PRE-LINING CCTV PIPELINE INSPECTION DOLLARS AND_____CENTS	24,000 LF		
1F2	POST-LINING CCTV PIPELINE INSPECTION DOLLARS AND_____CENTS	24,000 LF		
2	LOCATION OF EXISTING UTILITIES DOLLARS AND_____CENTS	LS		
3	TEST PITS DOLLARS AND_____CENTS	75 EA		

PAYMENT ITEM NO.	PAYMENT ITEM DESCRIPTION & UNIT PRICE (IN WORDS)	ESTIMATED QUANTITY UNIT	UNIT PRICE (IN FIGURES)	TOTAL AMOUNT
4	**CAST-IN-PLACE CONCRETE**			
4A	CLASS "B" CONCRETE DOLLARS AND_____CENTS	100 CY		
4B	CONCRETE SIDEWALKS DOLLARS AND_____CENTS	50 SF		
4C	CONCRETE CURBS DOLLARS AND_____CENTS	100 LF		
4D	K-CRETE BACKFILL DOLLARS AND_____CENTS	50 CY		
5	**ASPHALT PAVEMENT**			
5A	4" ASPHALT BINDER COURSE DOLLARS AND_____CENTS	500 SY		
5B	2" ASPHALT TOP COURSE DOLLARS AND_____CENTS	500 SY		
5C	ASPHALT CONCRETE CURB DOLLARS AND_____CENTS	500 LF		
6	MAINTENANCE AND PROTECTION OF TRAFFIC DOLLARS AND_____CENTS	L.S.		
7	INSTALLATION AND MAINTENANCE OF TEMPORARY EROSION AND SEDIMENT CONTROL PRACTICES DOLLARS AND_____CENTS	LS		
8	VEGETATED SURFACE RESTORATION DOLLARS AND CENTS	50 SY		

PAYMENT ITEM NO.	PAYMENT ITEM DESCRIPTION & UNIT PRICE (IN WORDS)	ESTIMATED QUANTITY UNIT	UNIT PRICE (IN FIGURES)	TOTAL AMOUNT
	EXTRA ITEMS			
9	EXTRA EARTH EXCAVATION DOLLARS AND_____CENTS	50 CY		
10	EXTRA FOUNDATION STONE DOLLARS AND_____CENTS	100 CY		
11	EXTRA SELECT BACKFILL DOLLARS AND_____CENTS	100 CY		
12	EXTRA TRACKING PAD DOLLARS AND_____CENTS	100 SY		
	ALTERNATE			
13	8" FLEXIBLE MULTI-LAYER PRESSURE LINER DOLLARS AND_____CENTS	2100 LF		
	GRAND TOTAL			

SECTION 1C

MEASUREMENT AND PAYMENT

1.1 DESCRIPTION

A. The items listed below beginning with Article 1.4, refer to and are the same pay items listed in the Bid Form. They constitute all of the pay items for the completion of the Work. No direct or separate payment will be made for providing: miscellaneous temporary or accessory work, service, CONTRACTOR's or ENGINEER's field offices, layout surveys, job signs, testing, safety devices, approval and record drawings, water supplies, power, heat, removal of waste, watchmen, taxes, bonds, insurance, mobilization and demobilization, photographs, and all other requirements of the General Conditions, Supplementary Conditions, General Requirements, and all other sections of the Project Manual. Compensation for all such services, things and materials shall be included in the prices stipulated for the lump sum and unit price pay items listed herein.

B. Each lump sum and unit bid price will be deemed to include an amount considered by the CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

C. Where a payment item number has different types of materials or work included, the item number will be followed by a letter. The payment item number may be further defined by adding a number after the letter to indicate a particular work category such as depth or size of materials.

1.2 ENGINEER'S ESTIMATE OF QUANTITIES

A. The ENGINEER's estimated quantities for unit bid prices, as listed in the Bid Form are approximate only and are included solely for the purpose of comparison of Bids. The OWNER does not expressly or by implication agree that the nature of the materials encountered below the surface of the ground or the actual quantities of material encountered or required will correspond therewith, and reserves the right to increase or decrease any quantity or to eliminate any quantity as deemed necessary. The CONTRACTOR will not be entitled to any adjustment in a unit bid price as a result of any elimination or any change in an estimated quantity and agrees to accept the aforesaid unit bid prices as complete and total compensation for any additions or deductions as a result of more accurate measurement, changes or alteration in the Work ordered by the OWNER, or any other reason, and for use in the computation of the value of the Work performed for progress payment.

1.3 RELATED PROVISIONS SPECIFIED ELSEWHERE

A. Payments to CONTRACTOR: Refer to the General Conditions, Supplementary Conditions and the Contract Agreement.

B. Changes in Contract Price: Refer to the General Conditions.

C. All sections of the Contract Manual.

1.4 WATERMAIN LINING PROJECT - CONTRACT C265

A. Payment Item 1A – Cementitious Lining:

1. Work Included. Payment Item 1A includes all subdivisions of Item 1A shown on the Bid Form including Items 1A1 through 1A2. Item 1A shall include all the requirements for furnishing and installing all cementitious lining, all cleaning and disinfection, proper disposal of highly chlorinated water, service lateral restoration, other necessary appurtenances, excavation and backfill, temporary pavement restoration, labor, materials and equipment necessary to install liner as specified and as contained in the following divisions and sections of the Contract Documents:
   a. Division 1, General Requirements, all Sections except the following:
      1G13, Maintenance and Protection of Traffic
   b. Division 2, Sitework, all Sections except the following:
      2I2, Restoration of Paved Surfaces
      2K, Vegetative Surface Restoration
      2P, Environmental Protection and Erosion and Sediment Control
   c. Division 15, Piping:
      All Division 15 piping work required for furnishing and installing cementitious lining not specifically included under other payment items of this Contract.
2. Measurement:
   a. The quantity of cementitious lining which will be included under Item 1A will be the actual number of linear feet of cementitious lining furnished and installed.
   b. The lengths of cementitious lining indicated by the stationing shown on the Drawings are approximate. The CONTRACTOR shall provide the lengths of pipe necessary to make the required connections at the inverts shown.
   c. The length shall be measured along the horizontal projection of the centerline of the pipe as installed from the point of beginning to the point of ending.

3. Payment: The unit prices contained in the Bid for Item 1A will be full compensation for furnishing and installing all cementitious lining complete as shown and specified and not specifically included for payment under other items.

B. Payment Item 1B - Buried Piping:

1. Work Included. Payment Item 1B includes all subdivisions of Item 1B shown on the Bid Form including Items 1B1 through 1B4. Item 1B shall include all the requirements for furnishing, installing, and backfilling all buried piping, fittings, valves and appurtenances, and for abandonment, removal, and disposal of existing system components contained in the following divisions and sections of the Contract Documents.

   a. Division 1, General Requirements, all Sections except the following:
      1G13, Maintenance and Protection of Traffic

   b. Division 2, Site Work required for the installation of buried piping, including the following:
      Section 2B, Clearing
      Section 2C, Abandonments, Demolitions and Removal
      Section 2D1, Excavation, Trenching and Backfill

   c. Division 3, Concrete:
      All Division 3 Concrete work required for the installation of buried piping not specifically included in other Payment Items of this Contract.

   d. Division 15, Piping:
      All Division 15 piping work required for furnishing and installing buried piping not specifically included under other payment items of this Contract.

2. Measurement:

   a. The quantity of underground piping which will be included under Item 1B will be the actual number of linear feet of buried piping furnished and installed.

   b. The lengths of pipe indicated by the stationing shown on the Drawings are approximate. The CONTRACTOR shall provide the lengths of pipe necessary to make the required connections at the penetrations made for all lining work as shown.

   c. The length shall be measured along the horizontal projection of the centerline of the pipe as installed from the point of beginning to the point of ending.

3. Payment: The unit prices contained in the Bid for Item 1B will be full compensation for furnishing and installing all Buried Piping, and appurtenances, complete as shown and specified and not specifically included for payment under other items.

C. Payment Item 1C - Valves and Fittings:

1. Work Included. Payment Item 1C includes all subdivisions of Item 1C shown on the Bid Form including Items 1C1 through 1C6. Item 1C shall include all the requirements for furnishing, installing, and backfilling all buried valves, fittings, and appurtenances, and for abandonment, removal, and disposal of existing system components contained in the following divisions and sections of the Contract Documents.
   a. Division 1, General Requirements, all Sections except the following:
      1G13, Maintenance and Protection of Traffic
   b. Division 2, Site Work required for the installation of buried piping, including the following:
      Section 2B, Clearing
      Section 2C, Abandonments, Demolitions and Removal
      Section 2D1, Excavation, Trenching and Backfill
   c. Division 3, Concrete:
      All Division 3 Concrete work required for the installation of buried piping not specifically included in other Payment Items of this Contract.
   d. Division 15, Piping: All Division 15 piping work required for furnishing and installing valves, fittings, and appurtenances not specifically included under other payment items of this Contract.
2. Payment: The unit prices contained in the Bid for Item 1C will be full compensation for furnishing and installing all valves, fittings and appurtenances, complete as shown and specified and not specifically included for payment under other items.

D. Payment Item 1C7 – ¾" Curbstop Replacement

1. Work Included: Payment Item 1C7 includes all Work necessary to install curb valves and curb boxes as shown and specified. Item 1C7 shall include all the requirements for furnishing, excavating, installing, and backfilling all curb valves and curb boxes contained in the following divisions and sections of the Contract Documents.
   a. Division 1, General Requirements, all Sections except the following:
      1G13, Maintenance and Protection of Traffic
   b. Division 2, Site Work required for the installation of buried piping, including the following:
      Section 2C, Abandonment, Demolition and Removal
      Section 2D1, Excavation, Trenching and Backfill
   c. Division 15, Piping:
      All Division 15 piping work required for furnishing and installing curb valves and curb boxes not specifically included under other payment items.
2. Payment: The unit prices contained in the Bid for Item 1C7 will be full compensation for furnishing and installing all curb valves, curb boxes, and

associated piping, complete as shown and specified and not specifically included for payment under other items.

E. Payment Item 1D - Temporary Water Supply:

1. Work Included: Payment Item 1D includes all subdivisions of Item 1D shown on the Bid Form including Items 1D1 through 1D2. Item 1D shall include all the requirements for furnishing and installing all temporary piping, fittings, valves, connections, and appurtenances to provide temporary potable water service as contained in the following divisions and sections of the Contract Documents.

   a. Division 1, General Requirements, all Sections except the following:
      1G13, Maintenance and Protection of Traffic

   b. Division 2, Site Work required for the installation of temporary piping, including the following:
      Section 2B, Clearing
      Section 2C, Abandonments, Demolitions and Removal
      Section 2D1, Excavation, Trenching and Backfill

   c. Division 3, Concrete:
      All Division 3 Concrete work required for the installation of temporary water supply not specifically included in other Payment Items of this Contract.

   d. Division 15, Piping:
      All Division 15 piping work required for furnishing and installing temporary water service piping not specifically included under other payment items of this Contract.

2. Measurement:

   a. The quantity of temporary piping will be included under Item 1D will be the actual number of linear feet of water service piping furnished and installed.

   b. Payment Item 1D1 - Temporary 4" Dia. water main shall include furnishing and installing 4" Dia. DR 18 PVC water pipe and shall include all pipe and fittings, excavation, connections to existing water mains, valves at each connection to existing water mains, above ground piping installation with restrained joints, blocking and thrust blocks to prevent movement, disinfection, maintenance of water service, removal of system at completion and all other work required to provide a complete above ground water service system where shown on the Contract Drawings or where ordered to be installed by the ENGINEER. Temporary water service system not to be installed when freezing temperatures are anticipated.

   c. Payment Item 1D2 - Temporary 3/4" Dia. water service shall include all work to install temporary water service pipe, including the temporary tap connection to the temporary watermain, connection to the building either at the hose bib or inside as required, any excavation and transition fittings required to connect

to existing water service pipes, disinfecting, maintenance of water service, removal of system at completion, and all other work required to provide temporary water service where shown on the Contract Drawings or where ordered to be installed by the ENGINEER.

3. Payment: The unit prices contained in the Bid for Item 1D will be full compensation for furnishing and installing all Temporary Water Supply, and appurtenances, complete as shown and specified and not specifically included for payment under other items.

F. Payment Item 1E - Pipe Cleaning:
   1. Work Included: Item 1E shall include all the requirements for cleaning pipes.
   2. Measurement:
      a. The quantity of pipe cleaning that will be included under Item 1E will be the actual number of linear feet of water service piping cleaned.
   3. Payment: The unit prices contained in the Bid for Item 1E will be full compensation for pipe cleaning as shown and specified and not specifically included for payment under other items.

G. Payment Item 1F1 - Pre-Lining CCTV Pipeline Inspection:
   1. Work Included. Payment Item 1F1 shall include all the requirements for televising and reporting on the condition of water mains before lining as shown and specified.
   2. Measurement: Pre-Lining CCTV Pipeline Inspection shall be measured in actual linear feet of satisfactory visual inspection completed and reported on as shown and specified. CCTV pre-lining inspection shall be measured along the length of the centerline of the inspected sanitary sewer.
   3. Payment: The unit price bid for Item 1F1 will be full compensation for providing closed circuit TV inspection pre-lining inspection reports on the results thereof.

H. Payment Item 1F2 - Post-Lining CCTV Pipeline Inspection:
   1. Work Included. Payment Item 1F2 shall include all the requirements for televising and reporting on the condition of water mains after lining as shown and specified.
   2. Measurement: Post-Lining CCTV Pipeline Inspection shall be measured in actual linear feet of satisfactory visual inspection completed and reported on as shown and specified. CCTV post-lining inspection shall be measured along the length of the centerline of the inspected sanitary sewer.
   3. Payment: The unit price bid for Item 1F2 will be full compensation for providing closed circuit TV inspection post-lining inspection reports on the results thereof.

I. Payment Item 2 - Location of Existing Utilities

1. Work Included: Payment Item 2 shall include for payment all labor, materials, tools, and equipment necessary to locate water mains, sewer mains, and service connections as shown and specified in accordance with Sections 1A2 and 15A1.
    a. The CONTRACTOR is responsible for locating the existing potable water mains and sewer service lines in the Contract Area. The CONTRACTOR shall coordinate mark-out activities with the Town. Use state-of-the-art technology subsurface detection equipment, as necessary, to locate existing underground potable watermains and services. Location of existing water services shall include the locating of the existing curb stop valve and box.
    b. CONTRACTOR shall maintain watermain mark-out locations for the duration of the Contract. Location of existing watermains and services shall be accurately indicated on the Contract As-Built Drawings.
2. Payment: The lump sum price bid for Payment Item 2, Location of Existing Utilities will be full compensation for all labor, tools, materials and equipment used in locating all water and sewer utilities in the Contract Work area.

J. Payment Item 3: Test Pits

1. Work Included: Payment Item 3 shall include for payment all labor, materials, tools and equipment necessary to excavate, backfill and restore test pits as shown and specified in accordance with all regulatory rules and permits.
2. Payments: The prices bid for test pits will be full compensation for all labor, tools, materials and equipment used for excavating, backfilling and restoring test pits as shown or as ordered by ENGINEER.

K. Payment Item 4 - Cast-In-Place Concrete:

1. Work Included: Payment Item 4 includes all subdivisions of Item 4 shown on the Bid Form including Items 4A through 4D.
    a. Payment Item 4A - Class “B” Concrete
        1. Measurement: The quantity of Class “B” concrete, which will be included under this item, will be the volume of Class “B” concrete in cubic yards actually furnished and placed as shown and specified in the Contract Documents, and which is ordered by the ENGINEER in writing. Payment Item 4A shall also include all labor, materials and equipment to replace unreinforced masonry retaining and decorative walls. Class “B” concrete will be measured for payment on the basis of lines and grades ordered or as the volume in place between the limits ordered by the ENGINEER. Class “B” shall meet the requirements of Section 3B.

2. Payment: The unit price bid per cubic yard for Item 4A will be full compensation for providing all Class "B" concrete complete as shown and specified in the Contract Documents, and not specifically included for payment under other items.

b. Payment Item 4B: Concrete Sidewalks

1. Work Included: Payment Item 4B shall include for payment all labor, materials, equipment, tools and incidentals required to furnish and install all cement concrete pavement, metal reinforcement and longitudinal joint ties as shown and specified and in accordance with Section 3B, except where specifically included under other items of this Contract.

a. This item shall include but not be limited to the following:

1) Excavation and removal of existing sidewalks including subbase material, or temporary asphalt concrete material. Include cost to sawcut existing material to produce neat, square patching. Existing material to be disposed of offsite.
2) Grading and compaction preparation of subbase surface.
3) Drilling and grouting longitudinal joint ties.
4) Furnishing and installing metal reinforcement.
5) Forming, placing, vibrating, and curing concrete.
6) Testing.
7) Installation and removal of steel protection plates.

2. Measurement of in-place quantities shall be made by the ENGINEER. The CONTRACTOR may, at his own expense, verify the quantities.

a. The length of the sidewalk replacement section shall be measured along the horizontal projection of the center line of the installed sidewalk.

b. The width of the section shall be in accordance with the dimensions shown on the Contract Drawings. No additional payment shall be made for concrete sidewalk, which is necessary to be performed, due to disturbance by the

CONTRACTOR, but which is outside the payment dimensions indicated by the Contract Documents.

3. Payments: The unit price contained in the Bid per square foot will be full compensation for furnishing and installing all concrete sidewalks complete as shown and specified.

c. Payment Item 4C: Concrete Curbs

1. Work Included: This Item shall include for payment all labor, equipment, materials, tools and incidentals required to furnish and install all concrete curbs as shown and specified in accordance with the Contract Documents.

a. This Item shall include but not be limited to the following:

1) Demolition, excavation and removal of existing concrete curbing, including any saw cutting as necessary.

2) Grading and compaction preparation of subbase surface.

3) Rebar.

4) Form, place, finish, and cure concrete.

5) Testing.

2. Measurement of in-place quantities shall be made by the ENGINEER. The CONTRACTOR may at his own expense verify the quantities.

a. The width and height of the concrete curbs shall be in accordance with the dimensions shown on the Contract Drawings.

b. The length of the curb replacement section shall be measured along the horizontal projection of the center line of the curb.

3. Payments: The unit price contained in the Bid per linear foot will be full compensation for furnishing and installing all concrete curbs complete as shown and specified.

d. Payment Item 4D - K-Crete Backfill:

1. Measurement: The quantity of K-Crete concrete backfill, which will be included under Item 4D, will be the volume of K-Crete in cubic yards actually furnished and placed as shown in the Contract Drawings and Contract Specifications. No K-Crete placed in structures or elsewhere, which is paid for under other items, will be paid for under this Item.

2. Payment: The unit price bid per cubic yard for Item 4D will be full compensation for providing all K-Crete backfill complete as ordered by the ENGINEER, and not specifically included for payment under other items.

L. Payment Item 5: Asphalt Pavement

1. Work included: Payment Item 5 includes all subdivisions of Item 5 shown on the Bid Form including Items 5A through 5C. Payment Item 5 shall include for payment all labor, materials, tools and incidentals required to furnish and install all hot mix asphalt concrete pavement and curbing as shown and specified and in accordance with Section 2I2, except where specifically included under other items of this Contract.
   a. This item shall include but not be limited to the following:
      1) Excavation and removal of temporary pavement including K-Crete, subbase material, or temporary asphalt concrete material. Include cost to sawcut existing pavement to produce neat, square patching. Temporary asphalt concrete material to be disposed of offsite. Subbase material to be stockpiled at a location designated by the OWNER, or if the OWNER requests, disposed of offsite.
      2) Grading and compaction preparation of subbase surface.
      3) Placing and compaction binder and surface courses of hot mix, hot laid bituminous pavement.
      4) Forming and installation of hot mix, and hot laid asphalt curb.
      5) Pavement marking, as necessary, to replace the existing pavement markings.
      6) Testing.
2. Measurement of in-place quantities shall be made by the ENGINEER. The CONTRACTOR may, at his own expense, verify the quantities.
   a. The length of the pavement replacement section shall be measured along the horizontal projection of the center line of the pipeline trench.
   b. The width of the paved section shall be in accordance with the dimensions shown on the Contract Drawings. No additional payment shall be made for asphalt concrete pavement restoration, which is necessary to be performed, due to disturbance by the CONTRACTOR, but which is outside the payment dimensions indicated by the Contract Documents.
   c. The length of the asphalt curb replacement shall be measured along the actual length of the asphalt curb installed.
3. Payment: The unit price contained in the Bid per square yard for asphalt concrete pavement will be full compensation for furnishing and installing all hot mix, hot laid asphalt concrete pavement, complete and as shown and specified and not specifically included under other items. The unit price contained in the Bid, per linear foot, will be full compensation for furnishing and installing all the asphalt curb.

M. Payment 6: Maintenance and Protection of Traffic

1. Work Included: This item shall include for payment all labor, materials, tools and equipment necessary for the safe and adequate maintenance and protection of traffic, except those specifically included under other items of this Contract.
    a. This item shall include furnishing, placing, moving and removing signs, barricades, lighting, drums, cones, temporary culverts and approaches, road plates, watchmen, traffic control men, temporary pavement markings, and temporary control devices as necessary.
2. Payment:
    a. The lump sum price Bid for maintenance and protection of traffic will be full compensation for furnishing, placing, moving and removing all maintenance and protection of traffic devices, in accordance with Specification Section 1G13 of this Contract and not specifically included under other items.
    b. The CONTRACTOR is advised that failure to conform fully and strictly to each and every provision of this specification, and to the underlying Highway Work Permit, will result in a loss of one full day's payment for maintenance of traffic for each and every day of failure to comply.
        1) The amount of non-payment calendar days will be determined by dividing the lump sum amount Bid for this item, by the number of days between the Notice to Proceed and the contractual completion date with no consideration to any extension of Contract Time.

N. Payment Item 7 - Installation and Maintenance of Temporary Erosion and Sediment Control Practices

1. Work Included: This item shall include for payment all labor, materials, tools, and equipment necessary to provide, maintain, and replace, as necessary or directed, all environmental protection and erosion and sediment control as shown and specified, and in accordance with all regulatory rules and permits.
2. Payment: The lump sum Bid for Payment Item 7 will be full compensation for all labor, tools, materials, and equipment used for providing and maintaining temporary environmental protection and erosion and sediment control practices.

O. Payment Item 8: Vegetated Surface Restoration

1. Work included: This item shall include for payment all labor, materials, tools and incidentals required to furnish, install and restore all vegetated surfaces as shown and specified in accordance with Section 2K and 2P except that specifically included under other items of this Contract.
    a. Item 8 shall include but not be limited to the following:
        1) Furnishing topsoil from on site stock piles or from offsite sources, spreading topsoil, preparation of seedbed, seeding

and planting of lawn, grassed, and ground covered areas, mulching, and maintaining of all restored vegetated surfaces.

2) Furnishing, installing and maintaining jute matting as shown on the Contract Drawings and as ordered by the ENGINEER.

2. Measurement of in place quantities shall be made by the ENGINEER. The CONTRACTOR may at his own expense verify the quantities.
   a. The length of the replacement section shall be measured along the horizontal projection of the center line of the pipeline trench.
   b. The width of the restored section shall be measured at right angles to the center line of the pipe and shall be limited in width by the edge of the right of way or permanent plus temporary easement as applicable, or the width shall be measured 12½ feet on either side of the center line of pipes for a total not to exceed 25 feet in width.
3. Payment: The unit price contained in the Bid per square yard will be full compensation for furnishing, installing and maintaining all vegetated surface restoration and jute matting complete as shown and specified and not specifically included under other items.

P. Payment Item 9 - Extra Earth Excavation

1. Measurement: This item shall include extra excavation of all materials regardless of type, character, composition, moisture content or condition thereof. Extra earth excavation, which will be included under Item 9, will be measured for payment on the basis of the lines and grades ordered by the ENGINEER, or as the volume within the limits described below, whichever is applicable. Extra earth excavation shall be Work in addition to that shown on the Drawings or included in the Contract Documents and which is ordered by the ENGINEER in writing. Extra earth excavation shall include the applicable requirements of Section 2B-Clearing, Section 2C-Abandonment, Demolition and Removal, Section 2D1-Excavation, Trenching and Backfill including: site preparation; excavating; storage of materials; installation and removal of all necessary bracing, shoring, and sheeting; drainage and dewatering; satisfactory disposal of surplus and/or unacceptable materials; restoration of existing facilities and site; environmental protection and erosion and sediment control; installation and removal of temporary fencing; and all miscellaneous and appurtenant Work. The cost of installing all unclassified backfill material to replace the extra excavated material including refurnishing of all unclassified backfill is included in Item 11.
   a. For extra excavation for pipes, the volume of the trench which will be paid for will be that contained in a prism with sides as shown in the Contract Drawings with widths measured from the outside diameter of the pipe laid therein, exclusive of bells, branches, hubs, spurs or concrete cradles, and a depth from the surface of the ground, at the centerline of pipe, to the bottom of the excavation.

Enlargements of the trench, authorized by the ENGINEER where necessary to facilitate the support of existing structures, or for other reasons, will be measured for payment to the limits excavated in accordance with orders. The length shall be equal to the laid length of pipe, measured horizontally along the centerline.

b. All extra excavation for structures or facilities other than pipe will be measured for payment from the subgrade directed for such excavation and, unless otherwise shown or directed, to vertical planes one foot outside the foundation limits of the structure to be built therein.

c. Measurement of the actual quantities of materials will be made by the ENGINEER. The CONTRACTOR may, at his expense, verify the quantities.

2. Payment: The unit price per cubic yard for Item 9, Extra Excavation will be full compensation for providing all extra earth excavation complete as shown and specified and as ordered in writing by the ENGINEER, and not specifically included under other items or Contracts.

Q. Payment Item 10 - Extra Foundation Stone

1. Measurement: The quantity of extra foundation stone, which will be included under this item, will be the computed number of cubic yards placed in addition to that shown or included in the Contract Documents, and which are ordered by the ENGINEER. No payment will be made for extra foundation stone which is used for refill when excavation is carried below the grades shown, specified or ordered, or for that used for controlling ground water. Extra foundation stone will be measured for payment as the compacted volume in place between the limits directed by the ENGINEER to replace unsuitable material, to improve pipe bedding, to increase the load carrying capacity of pipe, and to serve as foundation support for structures, less any amount credited to the OWNER where the foundation stone base is omitted. All foundation stone shall be wrapped in filter fabric as detailed in the Contract Drawings. Extra foundation stone shall include supplying, hauling from on or offsite locations, placing, grading and compacting the material, as well as supplying, placing and wrapping the stone in filter fabric. Extra foundation stone and filter fabric materials shall meet the requirements of Section 2D1.

2. Payment: The unit price bid per cubic yard for Item 10 will be full compensation for providing all extra foundation stone and filter fabric complete as ordered in writing by the ENGINEER, and not specifically included for payment under other items.

R. Payment Item 11 - Extra Select Backfill

1. Measurement: The quantity of extra select backfill, which will be included under Item 11, will be the computed number of cubic yards placed in addition to that shown or included in the Contract Documents, and which are ordered by the ENGINEER. No payment will be made for extra select backfill which is used for refill when excavation is carried

below the grades shown, specified or ordered. Extra select backfill will be measured for payment as the compacted volume in place between the limits directed by the ENGINEER less any amount credited to the OWNER where the extra select backfill is omitted. Item 11 shall include supplying, hauling, from on or offsite sources, placing, grading and compacting the material. Materials shall meet the requirements of Section 2D1.

2. Payment: The unit price bid per cubic yard for Item 11 will be full compensation for providing all extra select backfill complete as ordered in writing by the ENGINEER, and not specifically included for payment under other items.

S. Payment Item 12 - Extra Tracking Pad

1. Measurement: The quantity of extra tracking pad, which will be included under this item, will be volume of tracking pad in square yards actually furnished and placed in addition to that shown or included in the Contract Documents, and which is ordered by the ENGINEER. No tracking pad which is paid for under other items will be paid for under this item. Extra tracking pad will be measured for payment on the basis of lines and grades ordered by the ENGINEER. Extra tracking pad shall meet the requirements of Section 2D1.
2. Payment: The unit price bid per square yard for Item 12 will be full compensation for providing all extra tracking pad complete as ordered in writing by the ENGINEER, and not specifically included for payment under other items.

T. Payment Item 13 - Flexible Multi-Layer Pressure Liner (FMPL):

1. Work Included. Payment Item 13 shall include all the requirements for furnishing and installing all Flexible Multi-Layer Pressure Liner (FMPL), including, but not limited to, all cleaning and disinfection, proper disposal of highly chlorinated water, service lateral restoration, connectors, flanges, terminators, excavation and backfill, temporary pavement restoration, labor, materials and equipment, and all other appurtenant materials and equipment necessary to install liner as specified and as contained in the following divisions and sections of the Contract Documents:
   a. Division 1, General Requirements, all Sections except the following:
      1G13, Maintenance and Protection of Traffic
   b. Division 15, Piping:
      All Division 15 piping work required for furnishing and installing Flexible Multi-Layer Pressure Liner (FMPL) not specifically included under other payment items of this Contract.
2. Measurement:
   a. The quantity of Flexible Multi-Layer Pressure Liner (FMPL) which will be included under Item 13 will be the actual number of linear feet of Flexible Multi-Layer Pressure Liner (FMPL): furnished and installed.

b. The lengths of Flexible Multi-Layer Pressure Liner (FMPL) indicated by the stationing shown on the Drawings are approximate. The CONTRACTOR shall provide the lengths of pipe necessary to make the required connections at the inverts shown.

c. The length shall be measured along the horizontal projection of the centerline of the pipe as installed from the point of beginning to the point of ending.

3. Payment: The unit prices contained in the Bid for Item 13 will be full compensation for furnishing and installing all Flexible Multi-Layer Pressure Liner (FMPL) complete as shown and specified and not specifically included for payment under other items.

++END OF SECTION++

SECTION 2I2

RESTORATION OF PAVED SURFACES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. The CONTRACTOR shall provide all labor, materials, equipment and incidentals required to restore paved surfaces as shown, and specified, or ordered in writing by the ENGINEER.
2. Restoration shall include but not be restricted to:
   a. Preparation of subgrade.
   b. Subbase material.
   c. Sawcutting existing pavement.
   d. Base, binder and surface courses, as shown, of hot mix, hot laid bituminous pavement.
   e. Testing.
   f. Pavement marking.
   g. Cold milling pavement.
3. The CONTRACTOR shall secure all permits necessary for work in New York State and County Rights-of-Way, unless otherwise specified.
   a. Paving in NYSDOT or County rights-of-way may be subject to specifications more stringent or in addition to these specifications, as required by the agency having jurisdiction.
   b. The CONTRACTOR shall be responsible for obtaining and complying with any such additional or more stringent specifications.
4. The CONTRACTOR shall schedule his activities so that paving work is completed in the construction season prior to onset of unacceptable weather conditions as defined by the Highway Agency having jurisdiction.
   a. Immediate restoration of the pipe trench upon completion of pipe installation shall be in accordance with Section 1G13, Paragraph 1.7.
   b. A minimum of thirty (30) days after the completion of pipe lining and return of lined section to service, CONTRACTOR shall excavate excess material to the approved subbase elevation, repair subbase elevation and restore pavement as shown on the Contract Drawings.
   c. Where ordered in writing temporary pavement consisting of cold mix bituminous material shall be placed to match the existing pavement grade and maintained until replaced. When the

conditions for placing permanent bituminous pavement become acceptable the permanent pavement shall be placed as herein specified.

5. Existing pavement destroyed or damaged by the CONTRACTOR's activities outside the limits shown shall be replaced with the specified materials to the thickness shown at no expense to the OWNER.

B. Related Sections:
   1. Division 2, Site Work.
   2. Division 3, Concrete.

1.2 QUALITY ASSURANCE

A. Testing Laboratory:
   1. The CONTRACTOR shall provide a testing laboratory, as specified in Section 1F1.

B. Reference Standards: Comply with the applicable provisions and recommendations of the following, unless otherwise shown or specified:
   1. Standard Specifications of the State of New York Department of Transportation, hereinafter referred to as NYSDOT Specifications.
   2. Standards of Highway agencies having jurisdiction.
   3. Provide at least one person who shall be present at all times during the execution of this portion of the Work and who shall be thoroughly qualified and experienced in the placing of the type of pavements specified and who shall direct all work performed under this Section.
   4. Source Quality Control:
      a. The asphalt plant shall be approved by the ENGINEER.
      b. All materials and the asphalt plant shall be available for inspections and tests by the ENGINEER.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the mix formula proposed giving complete data on materials, including source, location, percentages, temperatures, and all other pertinent information.

B. Submit for approval, the name, address and telephone number of the asphalt plant proposed for use and a certification that the plant conforms to the requirements of these Specifications.

1.4 JOB CONDITIONS

A. Weather Limitations: Comply with weather limitations in the NYSDOT Specifications for the placement of hot mix and hot laid asphalt concrete pavement:

B. Work in Rights-of-Way
   1. Determine and comply with the requirements of the Highway Department of Jurisdiction and secure all necessary permits.
   2. Permanent pavement shall not be placed until the compacted backfill has been in place for a minimum of 30 days. Approved compacted subbase shall be placed upon completion of pipe laying, to match the grade of the surrounding pavement and maintained until the permanent pavement has been placed.
   3. Temporary pavement
      a. Where ordered in writing by the ENGINEER, and as requested by the Highway Department of Jurisdiction, the compacted subbase material shall be replaced with an approved temporary cold mix.
      b. After receipt of written approval from the Highway Department of Jurisdiction, the temporary pavement shall be removed and the permanent pavement placed in accordance with these specifications and as shown.
         1) Temporary asphalt pavement shall be disposed of off site.
         2) Temporary subbase material shall be stockpiled at a location to be designated by the OWNER.
      c. The CONTRACTOR shall maintain the temporary pavement in satisfactory condition and at the proper grade until the permanent pavement has been placed.

C. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope for each course during construction operations.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery and placing equipment shall conform to the NYSDOT Standard Specifications. The CONTRACTOR is advised that length of haul, manner of haul, temperature of asphalt, and similar criteria, have a direct bearing on the quality and acceptability of the finished pavements. These and all other criteria shall be properly controlled such that the job mix of bituminous concrete when placed, is identical to that specified, approved, and as it left the asphalt plant. Segregation of aggregates, whether caused by hauling operations, improper mixing at the asphalt plant, or for other reasons, will result in rejection of the pavement. Clusters and pockets of aggregate in the finished pavement surface, with voids surrounding the aggregates, are unacceptable and will be rejected.

PART 2 - PRODUCTS

2.1 PAVEMENT THICKNESS

A. Pavement thickness shall be as shown on the Contract Drawings and meet the requirements of the Highway agency having jurisdiction. Where the requirements are conflicting, the most stringent requirements shall apply.

B. Where no thickness is shown or specified the replacement pavement shall equal the thickness of the existing.

C. In unpaved shoulder areas, in Rights-of-Way where asphalt concrete is not required, the top six (6) inches should be subbase material compacted of a minimum of 95 percent (95%) of standard proctor density.

D. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope for each course during construction operations.

2.2 MATERIALS

A. Aggregate, mineral filler, bitumen, and prime coat shall be in accordance with the NYSDOT Specifications.

B. Subbase material shall meet the requirements of Section 2D1.

2.3 BITUMINOUS-AGGREGATE MIXTURES

A. Mix Criteria:

1. Provide plant mix formulas as follow:

a. Binder Course: NYSDOT Item 403.13 (Type 3)

Sieve Designation (Screen Size)	Percent Passing
1½ inch	100
1 inch	95-100
½ inch	70-90
1/8 inch	32-62
No. 40	8-27
No. 80	4-16
No. 200	2-8
Asphalt Content (percent)	4.5-6.5

b. Surface Course: NYSDOT 403.18 (Type 7)

Sieve Designation (Screen Size)	Percent Passing
½ inch	100
¼ inch	95-100
1/8 inch	45-70
No. 20	15-40
No. 40	8-27
No. 80	4-16
No. 200	2-6
Asphalt Content (percent)	6.0-8.0

c. Tack Coat: NYSDOT Item 407-2

d. Where County or Town pavement mix specifications differ from those specified, the County or Town specification shall govern.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the subbase on which bituminous concrete shall be installed. Notify the ENGINEER, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the ENGINEER.

1. Compaction and testing shall meet the applicable requirements of Section 2D1.

3.2 PRIME COAT

A. Apply tack coat (asphalt emulsion) to pavement and sub-base, in accordance with the requirements of the NYSDOT Specifications at 0.05 gal/sq. ft.

1. Coat manhole and catch basin frames with oil, and do not tack coat these surfaces.

3.3 PAVEMENT INSTALLATION

A. Preparing the mixtures, paving equipment, placing the mixes, and compacting the mixes shall be done in accordance with the NYSDOT Specifications.

B. Preparing the mixtures includes the plant equipment, stockpiling, heating, aggregate processing, mixing of aggregate and bituminous material, and transporting to job site.

C. Paving equipment includes bituminous pavers, rolling equipment and hand tools.

D. Placing the mixes includes paver placing, hand placing, spreading, tamping and jointing.

E. Compacting the mixes includes breakdown rolling, second rolling and finish rolling.

3.4 PAVEMENT QUALITY REQUIREMENTS

A. General: In addition to other specified conditions, comply with the following minimum requirements:
   1. Provide final surfaces of uniform texture, conforming to required grades and cross sections.

B. Density:
   1. Compare density of in-place material against laboratory specimen or certificates on same bituminous concrete mixture.
   2. Minimum acceptable density of in-place course material will be 90 percent (90%) of the recorded laboratory specimen or certificate density.

C. Thickness: In-place compacted thicknesses shall average not less than the thicknesses specified.

3.5 PATCHING

A. As directed by the ENGINEER, remove and replace all defective areas. Saw cut-out such areas and fill with fresh bituminous concrete. Compact to the required density.

3.6 CLEANING AND PROTECTION

A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled bituminous materials and all foreign matter.

B. Protect newly finished pavement until it has become properly hardened by cooling.

C. Cover openings of drainage structures until paving is complete.

3.7 MARKING PAVEMENT

A. Restored pavement marking shall conform to NYSDOT Specification Section 640-Reflectorized Pavement Markings, and match existing markings in all respects.

B. Cleaning:
   1. Sweep surface with power broom supplemented by hand brooms, to remove loose material and dirt.
   2. Do not begin marking bituminous concrete pavement until approved by the ENGINEER.

C. Application:
   1. Using atomizing spray mechanical equipment, provide uniform straight edges in two separate coats. Apply in accordance with the paint manufacturer's recommended rates.

D. All pavement markings shall be restored by the CONTRACTOR, to the complete satisfaction of the agency having jurisdiction and these Specifications. In the event of a discrepancy the most stringent requirements apply.

++END OF SECTION++

SECTION 15B4

CLEANING AND LINING WATERMAINS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment and incidentals required to clean, install lining, restore services, test, and disinfect all watermains as shown, specified and required to complete the Work.
2. Cleaning and lining of watermains includes the following activities described under other Sections in these specifications but included under this Section unless specifically noted otherwise.
   a. Coordinating the construction.
   b. Cutting and patching.
   c. Connections to existing facilities.
   d. Transportation, storage and handling of equipment and materials.
   e. Abandonment, demolition and removal.
   f. Clearing.
   g. Excavation trenching and backfill.
   h. Disposal of excess material.
   i. Sheeting, shoring and bracing, timber and steel.
   j. Surface and ground water control.
   k. Class A and Class B concrete.
   l. All types and sizes of buried piping, unless specifically included under other Sections or contracts. These include, but are not limited to: ductile iron, copper and thermoplastic.
   m. Supports, restraints, and thrust blocks as required for all pressure pipe.
   n. Work on existing pipelines and structures.
   o. Testing.
   p. Cleaning.
   q. Pipe anchors and encasement.
   r. Installation of all joints, jointing and gasketing materials, specials, couplings, flexible couplings, mechanical couplings, adapters, harnessed and flanged adapters, sleeves, tie rods, closures, end caps, bulkheads, plugs, bolts, nuts, and all other Work required to complete the Work as shown or required.
3. All valves and specials shown or specified shall be incorporated into the piping systems as shown, specified, and as required.

4. Unless otherwise shown or specified, cleaning and lining watermains includes all Work shown on the Drawings or required for the complete installation of cementitious lining, as required to include reconnection of severed mains.
    a. The lengths of pipe indicated by the stationing shown on the Drawings are approximate. The CONTRACTOR shall line the lengths of pipe necessary to complete the Work. The CONTRACTOR shall notify the ENGINEER if the pipe cannot be lined.
    b. The CONTRACTOR shall be paid for the actual length of pipe lined at the accepted unit prices bid by the CONTRACTOR.
    c. The length shall be measured along the horizontal projection of the centerline of the pipe as installed from the point of beginning to the point of ending.

B. Coordination:
    1. Review installation procedures under other Sections and coordinate with the Work that is required under this Section.

C. Related Sections:
    1. Division 2, Site Work.
    2. Division 3, Concrete.
    3. Division 15, Piping.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
    1. Comply with applicable provisions of the following regulatory agencies:
        a. Putnam County Department of Health
        b. County and Town Highway Departments.
        c. Underwriters' Laboratories, Incorporated (UL and FM).
        d. Other authorities having jurisdiction.

B. Cleaning and Lining:
    1. Guarantee to restore cleaned and cement-mortar lined watermains to following minimum Hazen-Williams C Factor (C_{hw}) based on nominal pipe diameters with proper allowance being made for bends and fittings following accepted practice:

NOMINAL PIPE DIAMETER	GUARANTEED HAZEN-WILLIAMS C_{hw} FACTOR
3 inch and smaller	90
4 inch	90
6 inch	100
8 inch	110
10 inch	115
12 inch	120
14 inch	125
16 inch	125
20 inch	125
Above 20 inch	130

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ANSI/AWWA C602-17 Cement Mortar Lining of Water Pipelines In Place - 4 in. and larger.
2. ASTM D 2321, Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
3. ASTM C 1173 Standard Specification for Flexible Transition Couplings for Underground Piping Systems.
4. AWWA C111 (ANSI A21.11), Rubber Gasket-Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
5. AWWA M 23, PVC Piping.
6. GLUMRB, Recommended Standards for Water Works.
7. ANSI/NSF Standard 61
8. AWWA M28 Rehabilitation of Watermains.
9. ASTM C39 Concrete Cylinder Compression Testing

1.3 SUBMITTALS

A. Performance Work Statement (PWS) Submittal

1. The CONTRACTOR shall submit, to the OWNER, a Performance Work Statement (PWS) at the pre-construction meeting, which clearly defines the cementitious lining product delivery in conformance with the requirements of these Contract Documents. Unless otherwise directed by the OWNER, the PWS shall at a minimum contain the following:
   a. Clearly indicate that the proposed lining will conform to the project requirements as outlined in the Summary of Work and as delineated in these specifications.
   b. Where the scope of work is specifically delineated in the Contract Documents, a detailed installation plan describing all preparation Work, cleaning operations, pre-lining inspections, traffic control,

installation procedure, method of curing, service reconnection, quality control, Hazen-Williams C Factor testing to be performed, final test section procedure, warranties furnished and all else necessary and appropriate for a complete cementitious lining installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of the Contract.

c. CONTRACTOR's description of the proposed lining equipment and technology, including a detailed plan for identifying all active service connections, maintaining service during mainline installation, to each home connected to the section of pipe being lined, including temporary service.

d. A detailed Public Notification Plan shall be prepared and submitted including detailed staged notification to residences of temporary water installation, transition to and from, and Project Schedule by street and block.

B. Shop Drawings: Submit for approval the following:

1. Full details of pipe, fittings, specials, supports, and connections to existing pipes, equipment, and structures, including dimensions, sizes, classes, etc.
2. Typical joint and harnessing details.
3. Detailed descriptions of proposed field testing and disinfection including information and data pertaining to procedures and apparatus.
4. Method of covering access excavations during non-working periods.
5. Proposed method for disposal of debris and water used for cleaning.
6. Cement mortar lining mix data including dry weights of cement; sand; admixture name; type and quantity, if used; volume of water per cubic yard.
7. Flexible multi-layer pressure liner

C. Submit all data as may be required as conditions of any highway permits or environmental permits.

D. Test Reports: Submit copies of all test and proofing reports.

E. Certificates: Submit certificates of compliance with referenced standards.

F. Record Drawings: During progress of the Work, keep an up-to-date set of drawings showing field and Shop Drawing modifications. The drawings shall show all piping on plans and in sections, with all reference dimensions and elevations required for complete record drawings of the piping systems. All piping installed shall be shown on the record drawings. Coordinate with Section 1I2.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Ship cement to Contract site in full sacks and store so it is kept dry. Do not use cement from broken sacks for lining operations.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Pipe and Fittings: Follow Division 15.

B. Temporary Water Supply: Follow Section 15B5

C. Cleaning and Cementitious Lining: AWWA C602 except as modified herein.
   1. Sand: ASTM C144 and kept clean and free of foreign materials during transportation and storage on site.
   2. Cement: Type II, manufactured at facility certified for compliance with ANSI/NSF Standard 61, and in sacks bearing NSF approval stamp.
   3. Proportions of cement and sand in mortar: 1 part cement to 1 part sand.

D. Equipment:
   1. Cleaning:
      a. Drag cleaning, hydraulic jet, abrasive pig, metal scraping, or power boring type. Use of chain knocker with centering axle allowed if approved by ENGINEER.
   2. For placing cement mortar lining:
      a. Applicator head that in one course centrifugally projects mortar against surface of pipe sections and long radius bends, without injurious rebound, and with sufficient velocity to cause mortar to be densely packed and to adhere in place.
         1. Rate of travel of machine and rate of discharge of mortar against wall of pipe shall be entirely mechanically controlled to produce smooth, uniform thickness of lining throughout interior of pipe.
         2. Attachment with rotating or drag steel trowels follows applicator head and trowels cement mortar lining to a smooth, hard surface of uniform thickness.
         3. Operation of trowels: Continuous during application of cement mortar and forward movement of applicator head.
         4. Machine.
            a. Moves ahead of lining so nothing comes in contact with troweled surface until it has attained its final set.

b. Control of forward movement and mechanical placing of mortar: Assure uniform thickness of mortar lining following AWWA C602.

E. Flexible Multi-Layer Pressure Liner

1. The liner shall consist of a single flexible high-pressure hose.
   a. The inner layer of the hose shall be carrier media specific with a k value of 10 x 10^3 inch.
   b. The intermediate, load bearing layer shall be seamless Kevlar aramid fabric.
   c. The outer layer shall be of wear-resistant PE with an abrasion factor less than 7.32 x10^4 per cubic inch.
2. Liner installation shall be continuous until the complete length of the existing pipe between access points has been lined.
3. The liner shall be fixed diameter, leaving annular space between the liner and host pipe wall. The annulus is will remain.
4. Provide Primus Line as manufactured by Radlinger Group, or equal. Submit manufacturer's certification for installation.

PART 3 - EXECUTION

3.1 PREPARATION

A. Temporary Water Service System

1. Follow Section 15B5 and as specified herein.
   a. Provide check valves as close as possible to existing water source, for temporary service as approved by ENGINEER.
   b. No temporary water service is to be in use between November 15th and April 1st.

B. Access Openings.

1. Provide access at locations required to complete Work and as shown and approved by the ENGINEER.
2. Excavate, provide sheeting and shoring, dewater, and backfill where required.
3. Provide sediment control in accordance Section 2P.
4. Make access openings for pipe with space to admit and withdraw equipment with least delay and without causing damage to existing pipe.
5. After shutdown, dewater pipe and drain low spots. Provide measures as required to prevent water from entering Work sections and maintain dry conditions.

6. Remove pipe at access points by cutting with power operated pipe cutting machines, capable of making fast, true and smooth cuts so valves or pipe sections removed may be replaced in true alignment.
    a. Where difficulties due to obstructions make it impossible to use preceding method of cutting pipe, other methods may be used provided they meet ENGINEER's approval and same results are attained with no additional cost to the OWNER.
7. Measure outside diameter of cut pipes to properly determine class of pipe in each cut.
    a. Class of pipe will determine proper sized sleeves or couplings to be used in reconnection.
8. Replace exposed lead or poured joints with mechanical joint fittings or couplings at ENGINEER's direction.

3.2 CLEANING AND LINING

A. Perform cleaning and lining following AWWA C602 and as specified herein.
    1. Cleaning:
        a. Clean interior surfaces of pipes and fittings to be lined by machine where practical and by hand where access by machine is not possible.
        b. Remove obstructions in pipeline that prohibit passage of cleaning or lining equipment.
        c. Remove loose scale, tuberculation, oil, grease, remains of old coating materials, and accumulations of debris.
        d. Remove accumulations of water on bottom of interior of pipe.
        e. Handle cleaning water in closed discharge hoses to prevent water and residue from causing damage.
        f. Dispose of residue from cleaning and other construction operations as well as water from dewatering operations, in a manner satisfactory to ENGINNER.
        g. Proof cleaned main with appropriate diameter pig. Provide proof results to Engineer prior to initiating lining procedure.
        h. Ensure all curb valves are operational prior to initiating lining procedure. Replace inoperable curb valves.
    2. Lining:
        a. Place lining with machines in 1 course as specified herein.
        b. Thickness of cement mortar lining shall be uniform and shall follow AWWA C602.
        c. Nominal lining thickness for all gray cast iron and ductile iron:

Pipe Diameter, in.	Lining Thickness, in.	Tolerance, in.
4-10	3/16	-1/16, +1/8
12-20	1/ 4	-1/16, +1/8

d. Correct lining not within this tolerance at ENGINEER's direction.

e. Place cement mortar lining so as not to seal or otherwise reduce effectiveness of existing air valves and blowoffs.

f. Perform cement mortar lining of sharp bends, fittings, and areas closely adjacent to valves or other points where machine access is impossible or impractical and correct defective areas by hand.

g. Hand mortar work: Equal to machine placed work and use same materials.
   1. If necessary, moisten pipe prior to placement of mortar.
   2. Use steel trowels except where curvature of bends prohibit their use.
   3. Complete handwork in section of pipeline with 24 hours after machine work in that section is complete.
   4. Provide smooth transition from handwork to machine-placed mortar.

h. Remove bends, fittings and pipe that cannot be lined by hand. Provide new bends, fittings and pipe.

i. Feather edges between newly lined areas and unlined areas.

j. Clean and line mains up to side valves and sections of pipe removed for access.

k. Remove cleaning debris and lining material from existing service connections on lined main.
   1. Clear service connections that are 2-inch or less in diameter and on pipes less than 24-inch diameter by backflushing with air or water within 2 hours of placing lining.
   2. On pipes 24-inch and larger, temporarily plug or cover service connections prior to lining, and remove plugs or covers after lining.
      a. Service connections may be flushed with ENGINEER's prior approval.
   3. Do not damage lining when clearing service connections.

l. Immediately after completing lining of length of pipe between access openings or at end of day's run, close that section of pipe at each end and cover access openings to prevent circulation of air to maintain moist condition.

m. With ENGINEER's approval, 24 hours after placing lining, fill section between bulkheads or gate valves with system water for curing lining.

n. Cure pipe lining for minimum of 48 hours before recharging and disinfecting.

B. Disinfection:

1. Disinfection of potable watermains and service connections shall be in strict accordance with AWWA C651 except the tablet method which is not acceptable.
   a. Hypochlorite shall be in accordance with AWWA B300.
   b. Bacteriological Tests shall be in accordance with Standard Methods for the Examination of Water and Wastewater, latest edition.
   c. Preventative measures shall be taken to keep pipe clean and dry during construction or repair.
   d. Chlorination shall be by the continuous flow method in strict accordance with AWWA C651.
   e. Notify the ENGINEER at least 48 hours in advance of a scheduled test so that the test may be witnessed.
2. Conditions of Chlorination:
   a. Flush piping minimum velocity 2.5 f/s.
   b. Chlorinate water entering pipe to a free residual of no less than 25 mg/L.
   c. Retain the chlorinated water in the main for no less than 24 hours.
   d. At the end of the 24 hours the water in the main shall have a free residual of no less than 10mg/L.
   e. After successful testing and the required retention period remove the chlorinated water from the pipe.
3. Sampling:
   a. Perform total coliform testing, in accordance with “Standard Methods”, on the samples collected at the points indicated in AWWA C651 sec. 7-1, 7-2, 7-3, and where directed by the ENGINEER.
   b. Collect samples in accordance with the “Standard Methods” and take care not to contaminate the samples. Submit results of total coliform testing to the ENGINEER.
   c. Collect samples after 24-hour disinfection period. Collect one sample per day on two consecutive days.
   d. Samples shall be tested for total coliform and heterotrophic plant count.
4. Rechlorination: In case of test failure, rechlorinate until acceptable in accordance with AWWA C651.
5. Disposal of Chlorinated Water:
   a. Neutralize heavily chlorinated water.

b. Dispose of the spent water in accordance with Federal, State and local regulations.
c. Do not discharge so as to cause damage to the environment. Refer to Section 2P.

C. Returning Lined Main to Service.
1. When disinfection is completed and line is approved for service, ENGINEER will notify CONTRACTOR to restore line to service.
a. Remove corporation stops used for disinfection and install plugs.
b. Coat plug assemblies.
c. After pipe access openings are closed and before backfill, fully recharge main and eliminate visible leakage.
2. After approval of ENGINEER.
a. Backfill excavated areas.
b. Reactivate house connections and remove temporary bypass piping system.
3. After permanent service is restored and temporary bypass piping is removed, restore disturbed areas.
a. Seed and sod following Section 2P.
b. Restore pavement following Section 2I2.
c. Dispose of valves and fire hydrants removed from lined section of watermain and not reused.

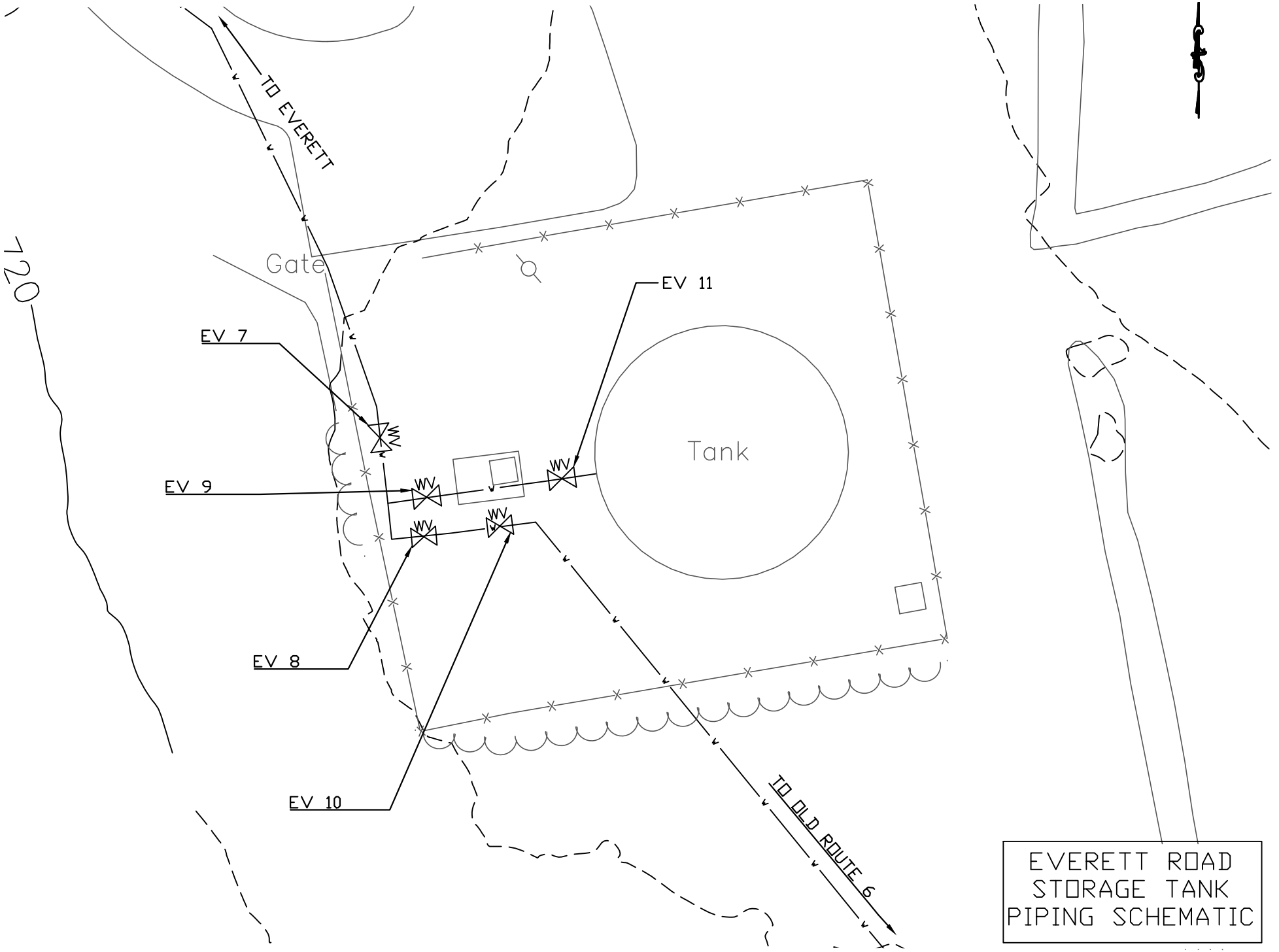
D. Field Quality Control
1. Inspection
a. Provide CCTV inspection of completed lining sections to ENGINEER.
b. Use equipment approved for use in potable water system.
c. Correct defective lining at ENGINEER's approval.
2. Cement Mortar Lining.
a. Test cement mortar tests samples in accordance with ASTM C39.
b. Samples shall attain a 28 day compressive strength of 4500 psi.
c. Lining that fails to meet compressive strength requirements shall be rejected.
3. Removal of Test Section
a. At ENGINEER's direction, excavate, cut and remove test section of pipe 3 feet long for applied cement lining thickness verification and inspections.
b. Provide one test section for every 2,000 feet (or part thereof) of pipe lined.
c. If thickness is not within specified requirements herein, proceed as follows:

1. Remove additional test sections within that 2000 foot run, As directed by ENGINEER, to determine the limits of non-compliant lining.
2. Correct lining thickness or re-line as directed by ENGINEER.

d. After inspection, reinstall removed pipe section utilizing sleeves.
e. Backfill excavation and repair paving as required.

4. Testing
   a. Test completed sections to determine Hazen-Williams C Factor.
   b. If Hazen-Williams C Factor (C_{hw}) determined by test is less than guaranteed minimum values herein, remand to ENGINEER for resolution.

++END OF SECTION++


TO EVERETT
Gate
720
EV 7
EV 11
Tank
EV 9
WV
EV 8
EV 10
TO OLD ROUTE 6
EVERETT ROAD
STORAGE TANK
PIPING SCHEMATIC