



**STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION**



**2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546**

Phone: 860-594-3128

October 21, 2015

Subject: Project No. 135-326
Replacement of MNRR Bridge over Atlantic Street-Phase 1 I-95 NB Exit 8 Ramp Bridge.

NOTICE TO CONTRACTORS:

This is to notify all concerned and especially the prospective bidders that the bid opening for the subject project is still scheduled for November 4, 2015 at 2:00 P.M. in the Conference Room of the Department of Transportation Administration Building, 2800 Berlin Turnpike, Newington, Connecticut.

Addendum No. 3 is attached and can also be obtained on the Statewide Contracting Portal at http://www.biznet.ct.gov/scp_search/BidResults.aspx?groupid=64

This addendum is necessary to add new special provisions, revise special provisions, delete special provisions, add new contract items, revise contract items, delete contract items, add new plan sheets, revise plan sheets and delete plan sheets.

Bid Proposal Forms (0135-0326.EBS file and amendment file 0135-0326.00# if applicable) are available for those bidders that have received approval from the Department to bid on the subject project.

Pre-Bid Questions and Answers: Questions pertaining to DOT advertised construction projects must be presented through the CTDOT Pre-Bid Q and A Website. The Department cannot guarantee that all questions will be answered prior to the bid date. **PLEASE NOTE - at 12:01 am, the day before the bid, the subject project(s) being bid will be removed from the Q and A Website, Projects Advertised Section, at which time questions can no longer be submitted through the Q and A Website. At this time, the Q and A for those projects will be considered final, unless otherwise stated and/or the bid is postponed to a future date and time to allow for further questions and answers to be posted.**

Harold J. Emond

For: Gregory D. Straka
Contracts Manager
Division of Contracts Administration

OCTOBER 21, 2015
REPLACEMENT OF MNRR BRIDGE OVER ATLANTIC STREET – PHASE 1
I-95 NB EXIT 8 RAMP BRIDGE

STATE PROJECT NO. 135-326
TOWN OF STAMFORD

ADDENDUM NO. 3

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. 27, 29, 30, 31, 34, 40, 43, and 44.

SPECIAL PROVISIONS
NEW SPECIAL PROVISIONS

The following Special Provisions are hereby added to the Contract:

- ITEM NO. 0202100A – ROCK EXCAVATION
- ITEM NO. 0205002A – ROCK-IN-TRENCH EXCAVATION 0’ – 4’ DEEP
- ITEM NO. 0205004A – ROCK-IN-TRENCH EXCAVATION 0’ – 10’ DEEP
- ITEM NO. 0205006A – ROCK-IN-TRENCH EXCAVATION 0’ – 15’ DEEP
- ITEM NO. 0207150A – LIGHTWEIGHT FILL

REVISED SPECIAL PROVISIONS

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

- ITEM NO. 0100500A – CONSTRUCTION COMMUNICATION EQUIPMENT
- ITEM NO. 1300015A – ROCK-IN-TRENCH EXCAVATION 0’ – 10’ DEEP (WATER MAIN)
- ITEM NO. 1400004A – ROCK-IN-TRENCH EXCAVATION 0’ – 10’ DEEP (SANITARY SEWER)
- ITEM NO. 1400006A – ROCK-IN-TRENCH EXCAVATION 0’ – 15’ DEEP (SANITARY SEWER)
- ITEM NO. 1400008A – ROCK-IN-TRENCH EXCAVATION 0’ – 20’ DEEP (SANITARY SEWER)

DELETED SPECIAL PROVISION

The following Special Provision is hereby deleted in its entirety:

- ITEM NO. 0973723A – WORKSITE TRAFFIC SUPERVISOR

CONTRACT ITEMS

NEW CONTRACT ITEMS

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QUANTITY</u>
0207150A	LIGHTWEIGHT FILL	C.Y.	310
0701190	OBSTRUCTIONS	HR.	30

REVISED CONTRACT ITEMS

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
0202529	CUT BITUMINOUS CONCRETE PAVEMENT	3,219 L.F.	3,919 L.F.
0701330	PERMANENT CASING (2.0' DIAMETER)	325 L.F.	425 L.F.

DELETED CONTRACT ITEMS

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
0973723A	WORKSITE TRAFFIC SUPERVISOR	30 MO.	0 MO.

PLANS

NEW PLANS

The following Plan Sheets are hereby added to the Contract:

03.030-1.A3, 03.038-1.A3, and 03.044-1.A3

REVISED PLANS

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

03.006.A3, 03.008.A3, 03.024-1.A3, and 03.046.A3

DELETED PLANS

The following Plan Sheets are hereby deleted in their entirety:

03.030, 03.038, and 03.044

The Detailed Estimate Sheets do not reflect these changes.

The Bid Proposal Form has been revised to 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.

ITEM #0202100A – ROCK EXCAVATION

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

Article 2.02.01 – Description:

Add the following;

Rock Excavation, as called for in this project and specifications, is to be accomplished within a restrictive work area and with restrictive time constraints.

Rock Excavation shall include furnishing all labor, equipment, materials and services and performing operations required to fragment rock utilizing controlled blasting techniques such that damage is prevented to adjacent structures, utilities, and property such that resulting ground vibrations are maintained below the specified maximum levels.

The Contractor shall conduct blast monitoring of every blast round required to excavate rock during the conduct of construction utilizing monitoring procedures and equipment specified in this Section.

Prior to and after completion of any blasting operations, the Contractor shall conduct condition surveys on all adjacent facilities within the ROW and on all adjacent private facilities who allow entry of the contractor for the taking of the condition survey.

Subarticle 2.02.03 – Construction Methods:

Add the following;

Submittals:

Advance Submittals: The Contractor shall submit the following information to the Engineer at least two (2) weeks prior to commencing drilling and blasting operations:

1. Sequence and schedule of blasting rounds, including the general method of developing the excavation, lift heights, starting locations and estimated start dates, and estimated progress rates.
2. Specifics of a typical production round and perimeter control to be implemented at the highest rock cut for each area of rock excavation.
3. For each of the typical blast rounds in 2. Above, include the following blast round details:
 - a. Diameter, spacing, burden, depth, tip elevation, and orientation of each blast hole for each round design.
 - b. Manufacturer and amount (in terms of weight and number of cartridges) of

explosives and distribution of charge to be used within each hole, on each delay, and the total for the blast.

c. Manufacturer and type of detonators; delay pattern wiring diagram for the round: type and capacity of firing source, size, type and location of safety switches and lightning gap.

d. Type and location of stemming to be used in holes.

e. Calculations of anticipated vibration levels at nearest adjacent structure.

4. Methods of matting or covering of the blast area to prevent flyrock and excessive air blast overpressure.

5. Written evidence of the licensing, experience and qualifications of the blaster(s) who will be directly responsible for the loading of each shot and for firing it.

6. Name and qualifications of the person(s) responsible for designing and directing the blasting.

7. Name and qualifications of the person(s) responsible for monitoring and reporting blast vibrations.

8. Details of an audible advance signal system to be employed at the job site.

9. Instrumentation that the Contractor proposes to use to monitor vibrations and airblast overpressure levels complete with performance specifications.

10. Recent calibration certificate(s) for the proposed blast monitoring instrumentation.

11. Copy of the blasting permit(s) obtained to conduct blasting on the site.

12. Copies of all Pre-blast condition surveys performed.

Progress Submittals:

Within 24 hours following each blast, the Contractor shall submit to the Engineer, a Blast Monitoring Report. Each Blast Monitoring Report shall include the following applicable items:

1. Blast round data, as indicated above.
2. Blast Monitoring Location Plan, indicating the location from the blast to monitoring locations.

3. Vibration and airblast overpressure data from each seismograph, including a copy of the strip chart (or other permanent record of velocity/time waveform) with calibration and monitoring record marked with the date, time and location of the blast.

Review by the Engineer of blast designs and techniques shall not relieve the Contractor of responsibility for the accuracy, adequacy and safety of the blasting, exercising proper supervision and field judgment and producing the results within the blasting limits required by these Specifications.

Personnel Requirements:

Persons responsible for blasting shall be licensed blasters in the State of Connecticut and shall have had acceptable experience in similar excavations in rock and controlled blasting techniques.

Blast monitoring shall be conducted by persons trained in the use of a seismograph and records shall be analyzed and results reported by persons familiar with analyzing and reporting the frequency content of a seismograph record.

Peak Particle Velocity (PPV) Limits:

The Contractor shall conduct all blasting activity in such a manner that the maximum peak particle velocity does not exceed the following limits:

<u>Distance from Blast to Structure</u>	<u>Max. PPV mm/sec (in/sec)</u>
<45.7m (<150 ft)	50.8 (2.0)
45.7m - 91.4m (150 ft - 300 ft)	31.8 (1.25)
>91.4m (>300 ft)	12.7 (0.5)

Blast Vibration Monitoring:

The Contractor shall monitor peak particle velocities resulting from each blast, at a location adjacent to the nearest structure from the blast.

All instrumentation proposed for use on the project shall have been calibrated within the previous six (6) months to a standard which is traceable to the National Bureau of Standards. Characteristics of required instrumentation are listed below:

Measure the three (3) mutually perpendicular components of particle velocity in

directions vertical, radial, and perpendicular to the vibration source. Measure and display the maximum peak particle velocity component and airblast overpressure. These readings must be displayed and be able to be read in the field, immediately after each blast.

Furnish a permanent time history record of particle velocity and airblast overpressure waveforms.

Compliance with the peak particle velocity limits as set forth in this specification shall not relieve the Contractor of responsibility for damage resulting from its blasting operation.

General Blasting Procedures:

The time during which explosives may be used is must be in compliance with lane closure allowances as put forth in Section 1.08 - Prosecution and Progress. In addition, the use of explosives is restricted to daylight hours. In order to minimize traffic disruptions, the Contractor shall schedule blasting such that any two successive blasts detonated anywhere on the project are separated by at least 2 hours. The Contractor's blasting operations shall be performed using extreme care to minimize the inconvenience and interruption to traffic and damage to the pavement, structures, guardrail, median fence and surrounding areas.

Immediately after blasting, the Contractor shall have sufficient equipment available at the site to clear the pavement of blast rock as noted below. The Contractor shall also use, as required, a mechanical sweeper to control dust and small stones.

The Contractor shall advise the Engineer at least two working days in advance of the dates on which he proposed to perform blasting operations, giving the approximate hour, for the Engineer's approval.

The Contractor will notify the Engineer by noon of the day prior to any day he plans not to blast where the weekly schedule shows a day of blasting. This does not include changes due to weather or unexpected equipment breakdowns.

If at any time the Engineer determines that the Contractor's rock excavation program does not comply with the requirements of this specification, the Engineer may direct the Contractor to halt all rock excavation activities and have the Contractor submit a revised rock excavation procedure for review and approval by the Engineer.

ITEM #0205002A – ROCK-IN-TRENCH EXCAVATION 0’-4’ DEEP
ITEM #0205004A – ROCK-IN-TRENCH EXCAVATION 0’-10’ DEEP
ITEM #0205006A – ROCK-IN-TRENCH EXCAVATION 0’-15’ DEEP

Subarticle 2.05.01 - Description:

Add the following after the second paragraph;

Rock-in-Trench Excavation, as called for in this project and specifications, is to be accomplished within a restrictive work area and with restrictive time constraints.

Rock-in-Trench Excavation shall include furnishing all labor, equipment, materials and services and performing operations required to fragment rock utilizing controlled blasting techniques such that damage is prevented to adjacent structures, utilities, and property such that resulting ground vibrations are maintained below the specified maximum levels.

The Contractor shall conduct blast monitoring of every blast round required to excavate rock during the conduct of construction utilizing monitoring procedures and equipment specified in this Section.

Prior to and after completion of any blasting operations, the Contractor shall conduct condition surveys on all adjacent facilities within the ROW and on all adjacent private facilities who allow entry of the contractor for the taking of the condition survey.

Subarticle 2.05.03 – Construction Methods:

Add the following to the end of the subarticle;

Submittals:

Advance Submittals: The Contractor shall submit the following information to the Engineer at least two (2) weeks prior to commencing drilling and blasting operations:

1. Sequence and schedule of blasting rounds, including the general method of developing the excavation, lift heights, starting locations and estimated start dates, and estimated progress rates.
2. Specifics of a typical production round and perimeter control to be implemented at the highest rock cut for each area of rock excavation.
3. For each of the typical blast rounds in 2. Above, include the following blast round details:
 - a. Diameter, spacing, burden, depth, tip elevation, and orientation of each blast hole for each round design.

- b. Manufacturer and amount (in terms of weight and number of cartridges) of explosives and distribution of charge to be used within each hole, on each delay, and the total for the blast.
 - c. Manufacturer and type of detonators; delay pattern wiring diagram for the round: type and capacity of firing source, size, type and location of safety switches and lightning gap.
 - d. Type and location of stemming to be used in holes.
 - e. Calculations of anticipated vibration levels at nearest adjacent structure.
4. Methods of matting or covering of the blast area to prevent flyrock and excessive air blast overpressure.
 5. Written evidence of the licensing, experience and qualifications of the blaster(s) who will be directly responsible for the loading of each shot and for firing it.
 6. Name and qualifications of the person(s) responsible for designing and directing the blasting.
 7. Name and qualifications of the person(s) responsible for monitoring and reporting blast vibrations.
 8. Details of an audible advance signal system to be employed at the job site.
 9. Instrumentation that the Contractor proposes to use to monitor vibrations and airblast overpressure levels complete with performance specifications.
 10. Recent calibration certificate(s) for the proposed blast monitoring instrumentation.
 11. Copy of the blasting permit(s) obtained to conduct blasting on the site.
 12. Copies of all Pre-blast condition surveys performed.

Progress Submittals:

Within 24 hours following each blast, the Contractor shall submit to the Engineer, a Blast Monitoring Report. Each Blast Monitoring Report shall include the following applicable items:

1. Blast round data, as indicated above.
2. Blast Monitoring Location Plan, indicating the location from the blast to monitoring

locations.

3. Vibration and airblast overpressure data from each seismograph, including a copy of the strip chart (or other permanent record of velocity/time waveform) with calibration and monitoring record marked with the date, time and location of the blast.

Review by the Engineer of blast designs and techniques shall not relieve the Contractor of responsibility for the accuracy, adequacy and safety of the blasting, exercising proper supervision and field judgment and producing the results within the blasting limits required by these Specifications.

Personnel Requirements:

Persons responsible for blasting shall be licensed blasters in the State of Connecticut and shall have had acceptable experience in similar excavations in rock and controlled blasting techniques.

Blast monitoring shall be conducted by persons trained in the use of a seismograph and records shall be analyzed and results reported by persons familiar with analyzing and reporting the frequency content of a seismograph record.

Peak Particle Velocity (PPV) Limits:

The Contractor shall conduct all blasting activity in such a manner that the maximum peak particle velocity does not exceed the following limits:

<u>Distance from Blast to Structure</u>	<u>Max. PPV mm/sec (in/sec)</u>
<45.7m (<150 ft)	50.8 (2.0)
45.7m - 91.4m (150 ft - 300 ft)	31.8 (1.25)
>91.4m (>300 ft)	12.7 (0.5)

Blast Vibration Monitoring:

The Contractor shall monitor peak particle velocities resulting from each blast, at a location adjacent to the nearest structure from the blast.

All instrumentation proposed for use on the project shall have been calibrated within the previous six (6) months to a standard which is traceable to the National Bureau of Standards. Characteristics of required instrumentation are listed below:

Measure the three (3) mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source. Measure and display the maximum peak particle velocity component and airblast overpressure. These readings must be displayed and be able to be read in the field, immediately after each blast.

Furnish a permanent time history record of particle velocity and airblast overpressure waveforms.

Compliance with the peak particle velocity limits as set forth in this specification shall not relieve the Contractor of responsibility for damage resulting from its blasting operation.

General Blasting Procedures:

The time during which explosives may be used is must be in compliance with lane closure allowances as put forth in Section 1.08 - Prosecution and Progress. In addition, the use of explosives is restricted to daylight hours. In order to minimize traffic disruptions, the Contractor shall schedule blasting such that any two successive blasts detonated anywhere on the project are separated by at least 2 hours. The Contractor's blasting operations shall be performed using extreme care to minimize the inconvenience and interruption to traffic and damage to the pavement, structures, guardrail, median fence and surrounding areas.

Immediately after blasting, the Contractor shall have sufficient equipment available at the site to clear the pavement of blast rock as noted below. The Contractor shall also use, as required, a mechanical sweeper to control dust and small stones.

The Contractor shall advise the Engineer at least two working days in advance of the dates on which he proposed to perform blasting operations, giving the approximate hour, for the Engineer's approval.

The Contractor will notify the Engineer by noon of the day prior to any day he plans not to blast where the weekly schedule shows a day of blasting. This does not include changes due to weather or unexpected equipment breakdowns.

If at any time the Engineer determines that the Contractor's rock excavation program does not comply with the requirements of this specification, the Engineer may direct the Contractor to halt all rock excavation activities and have the Contractor submit a revised rock excavation procedure for review and approval by the Engineer.

ITEM # 0207150A – LIGHTWEIGHT FILL

Description: Work under this item shall consist of the furnishing and placement of lightweight fill as backfill in trench excavations where peat is encountered, in accordance with the plans. This work shall be performed as hereinafter specified, to the dimensions indicated on the plans, or as directed by the Engineer.

Materials: Lightweight aggregate for geotechnical fill shall be expanded shale lightweight aggregate or approved equal meeting ASTM C 330. No by-product slags, cinders or by-products of coal combustion shall be permitted. Grading shall conform to ASTM C 330 – 3/4 inch x No. 4. Lightweight aggregate shall have proven record of durability as determined by ASTM C-88 and ASTM C-131, and be non-corrosive, as determined by CAL DOT 422. The Lightweight aggregate shall have the following properties:

Gradation	
Sieve	ASTM C 330 Requirement
1-inch	100
3/4 in	90-100
3/8 in	10-50
No. 4	0-15

Physical Properties			
Property		Test Method	Requirement
Density	Minimum	ASTM D 4254	40 lb/ft ³
	Maximum	ASTM D 4253	60 lb/ft ³
Soundness (MgSO ₄ - 5 cycles)		ASTM C-88	< 30%
Abrasive Resistance		ASTM C-131	40%
In-situ Phi (F) Angle		ASTM D-4030	40°

Electrochemical Properties		
Property	Test Method	Requirement
Resistivity	CTM 643	> 3000 ohm-cm
pH	CTM 643	5 - 10
Chloride Content	CTM 422	< 100 mg/kg
Sulfate Content	CTM 417	< 200 mg/kg

The following information shall be furnished by the Contractor prior to the start of construction:

1. Submit lightweight fill product data sheet and certification from the Manufacturer that the lightweight fill product supplied meets the requirements of this Section.

Construction Methods: When applicable, except as noted below, lightweight fill placement shall conform to the requirements of Section 2.05.03 of the Standard Specifications, Form 816.

Lightweight aggregate shall be compacted in place during construction using a plate compactor or another approved method of compaction, sized to compact adequately without causing significant particle breakage. Place and compact the aggregate in 12-inch loose lifts with sufficient passes of compaction equipment, unless otherwise directed by the Engineer. Additional passes of compaction shall be performed, if required, until all measurable compaction has been achieved. The Lightweight aggregate shall not be over-compacted. Construction equipment, other than for compaction, shall not operate on the exposed fill.

Method of Measurement: The work will be measured for payment by the cubic yards of lightweight fill placed and accepted.

Basis of Payment: The work will be paid for at the contract unit price per cubic yard for "Lightweight Fill" which price shall include furnishing all materials, preparing and placing these materials, all labor, equipment, tools, and incidentals necessary to complete the item.

Pay Item	Pay Unit
Lightweight Fill	c.y.

ITEM #0100500A - CONSTRUCTION COMMUNICATION EQUIPMENT

Description: Under this item, the Contractor shall provide authorized communication equipment for use by the inspection personnel. This item shall include all necessary equipment, accessories, material and labor to put the system into operation. Provisions shall also be made to maintain all provided communication equipment and any additional communication equipment assigned to the project, as directed by the Engineer.

Materials: The equipment for this item shall conform to the following: Wireless Communications capable of communicating digitally between units. In addition, the phones shall have the ability to send and receive Text and Numeric messaging, voice mail, caller ID and call waiting.

The Engineer will provide the Contractor with the quantities of the communication equipment needed. .

Construction Methods: The Contractor, upon receipt of the specifications from the Engineer shall submit three (3) proposals for each item specified. The three proposals may be for either rental or purchase, of new or reconditioned radio equipment. The Engineer will inform the Contractor of his selection.

Method of Measurement: The measurement for payment of Construction Communication Equipment shall be provided for under Article 1.09.04 Extra and Cost Plus work. The sum of money shown on the estimate and in the itemized proposal as “Estimated Cost” for this work will be considered the bid price even though payment will be made only for actual cost of equipment, material, accessories and labor.

Upon completion of the project, all purchased Construction Communication Equipment shall become property of the Department.

Basis of Payment: The item “Construction Communication Equipment” shall be paid as cost plus work in accordance with Article 1.09.04—Extra and Cost-Plus Work.

Payment shall include all authorized materials, equipment, labor and maintenance thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Construction Communication Equipment	EST

ITEM #1300015A – ROCK-IN-TRENCH EXCAVATION 0’ – 10’ DEEP (WATER MAIN)

Description:

Work under this section shall consist of the excavation of rock from water main trenches. This work is more fully detailed in Item 3 of the Aquarion Technical Specifications included as part of the Item 1301860 – Installation of Water Main and Appurtenances.

Rock-in-Trench Excavation, as called for in this project and specifications, is to be accomplished within a restrictive work area and with restrictive time constraints.

Rock-in-Trench Excavation shall include furnishing all labor, equipment, materials and services and performing operations required to fragment rock utilizing controlled blasting techniques such that damage is prevented to adjacent structures, utilities, and property such that resulting ground vibrations are maintained below the specified maximum levels.

The Contractor shall conduct blast monitoring of every blast round required to excavate rock during the conduct of construction utilizing monitoring procedures and equipment specified in this Section.

Prior to and after completion of any blasting operations, the Contractor shall conduct condition surveys on all adjacent facilities within the ROW and on all adjacent private facilities who allow entry of the contractor for the taking of the condition survey.

Construction Methods:

Add the following to the end of the subarticle;

Submittals:

Advance Submittals: The Contractor shall submit the following information to the Engineer at least two (2) weeks prior to commencing drilling and blasting operations:

1. Sequence and schedule of blasting rounds, including the general method of developing the excavation, lift heights, starting locations and estimated start dates, and estimated progress rates.
2. Specifics of a typical production round and perimeter control to be implemented at the highest rock cut for each area of rock excavation.
3. For each of the typical blast rounds in 2. Above, include the following blast round details:
 - a. Diameter, spacing, burden, depth, tip elevation, and orientation of each blast hole for each round design.

- b. Manufacturer and amount (in terms of weight and number of cartridges) of explosives and distribution of charge to be used within each hole, on each delay, and the total for the blast.
 - c. Manufacturer and type of detonators; delay pattern wiring diagram for the round: type and capacity of firing source, size, type and location of safety switches and lightning gap.
 - d. Type and location of stemming to be used in holes.
 - e. Calculations of anticipated vibration levels at nearest adjacent structure.
4. Methods of matting or covering of the blast area to prevent flyrock and excessive air blast overpressure.
 5. Written evidence of the licensing, experience and qualifications of the blaster(s) who will be directly responsible for the loading of each shot and for firing it.
 6. Name and qualifications of the person(s) responsible for designing and directing the blasting.
 7. Name and qualifications of the person(s) responsible for monitoring and reporting blast vibrations.
 8. Details of an audible advance signal system to be employed at the job site.
 9. Instrumentation that the Contractor proposes to use to monitor vibrations and airblast overpressure levels complete with performance specifications.
 10. Recent calibration certificate(s) for the proposed blast monitoring instrumentation.
 11. Copy of the blasting permit(s) obtained to conduct blasting on the site.
 12. Copies of all Pre-blast condition surveys performed.

Progress Submittals:

Within 24 hours following each blast, the Contractor shall submit to the Engineer, a Blast Monitoring Report. Each Blast Monitoring Report shall include the following applicable items:

1. Blast round data, as indicated above.
2. Blast Monitoring Location Plan, indicating the location from the blast to monitoring

locations.

3. Vibration and airblast overpressure data from each seismograph, including a copy of the strip chart (or other permanent record of velocity/time waveform) with calibration and monitoring record marked with the date, time and location of the blast.

Review by the Engineer of blast designs and techniques shall not relieve the Contractor of responsibility for the accuracy, adequacy and safety of the blasting, exercising proper supervision and field judgment and producing the results within the blasting limits required by these Specifications.

Personnel Requirements:

Persons responsible for blasting shall be licensed blasters in the State of Connecticut and shall have had acceptable experience in similar excavations in rock and controlled blasting techniques.

Blast monitoring shall be conducted by persons trained in the use of a seismograph and records shall be analyzed and results reported by persons familiar with analyzing and reporting the frequency content of a seismograph record.

Peak Particle Velocity (PPV) Limits:

The Contractor shall conduct all blasting activity in such a manner that the maximum peak particle velocity does not exceed the following limits:

<u>Distance from Blast to Structure</u>	<u>Max. PPV mm/sec (in/sec)</u>
<45.7m (<150 ft)	50.8 (2.0)
45.7m - 91.4m (150 ft - 300 ft)	31.8 (1.25)
>91.4m (>300 ft)	12.7 (0.5)

Blast Vibration Monitoring:

The Contractor shall monitor peak particle velocities resulting from each blast, at a location adjacent to the nearest structure from the blast.

All instrumentation proposed for use on the project shall have been calibrated within the previous six (6) months to a standard which is traceable to the National Bureau of Standards. Characteristics of required instrumentation are listed below:

Measure the three (3) mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source. Measure and display the maximum peak particle velocity component and airblast overpressure. These readings must be displayed and be able to be read in the field, immediately after each blast.

Furnish a permanent time history record of particle velocity and airblast overpressure waveforms.

Compliance with the peak particle velocity limits as set forth in this specification shall not relieve the Contractor of responsibility for damage resulting from its blasting operation.

General Blasting Procedures:

The time during which explosives may be used is must be in compliance with lane closure allowances as put forth in Section 1.08 - Prosecution and Progress. In addition, the use of explosives is restricted to daylight hours. In order to minimize traffic disruptions, the Contractor shall schedule blasting such that any two successive blasts detonated anywhere on the project are separated by at least 2 hours. The Contractor's blasting operations shall be performed using extreme care to minimize the inconvenience and interruption to traffic and damage to the pavement, structures, guardrail, median fence and surrounding areas.

Immediately after blasting, the Contractor shall have sufficient equipment available at the site to clear the pavement of blast rock as noted below. The Contractor shall also use, as required, a mechanical sweeper to control dust and small stones.

The Contractor shall advise the Engineer at least two working days in advance of the dates on which he proposed to perform blasting operations, giving the approximate hour, for the Engineer's approval.

The Contractor will notify the Engineer by noon of the day prior to any day he plans not to blast where the weekly schedule shows a day of blasting. This does not include changes due to weather or unexpected equipment breakdowns.

If at any time the Engineer determines that the Contractor's rock excavation program does not comply with the requirements of this specification, the Engineer may direct the Contractor to halt all rock excavation activities and have the Contractor submit a revised rock excavation procedure for review and approval by the Engineer.

Method of Measurement:

This work shall be measured for payment by the cubic yard including disposal. Backfilling and borrow material required to replace the rock will not be measured for payment.

Basis of Payment:

Payment for this work will be paid for by the cubic yard including excavation and all materials, equipment, tools, labor and work incidental thereto including disposal.

Pay Item

Rock-in-Trench Excavation 0' – 10' Deep (Water Main)

Pay Unit

C.Y.

**ITEM 1400004A - ROCK IN TRENCH EXCAVATION 0'-10' DEEP
(SANITARY SEWER)**

**ITEM 1400006A - ROCK IN TRENCH EXCAVATION 0'-15' DEEP
(SANITARY SEWER)**

**ITEM 1400008A - ROCK IN TRENCH EXCAVATION 0'-20' DEEP
(SANITARY SEWER)**

The work shall conform to Section 2.04.

Subarticle 2.04.01 - Description:

Add the following;

Rock-in-Trench Excavation, as called for in this project and specifications, is to be accomplished within a restrictive work area and with restrictive time constraints.

Rock-in-Trench Excavation shall include furnishing all labor, equipment, materials and services and performing operations required to fragment rock utilizing controlled blasting techniques such that damage is prevented to adjacent structures, utilities, and property such that resulting ground vibrations are maintained below the specified maximum levels.

The Contractor shall conduct blast monitoring of every blast round required to excavate rock during the conduct of construction utilizing monitoring procedures and equipment specified in this Section.

Prior to and after completion of any blasting operations, the Contractor shall conduct condition surveys on all adjacent facilities within the ROW and on all adjacent private facilities who allow entry of the contractor for the taking of the condition survey.

Subarticle 2.04.03 – Construction Methods:

Add the following;

Submittals:

Advance Submittals: The Contractor shall submit the following information to the Engineer at least two (2) weeks prior to commencing drilling and blasting operations:

1. Sequence and schedule of blasting rounds, including the general method of developing the excavation, lift heights, starting locations and estimated start dates, and estimated progress rates.

ITEM 1400004A, ITEM 1400006A
ITEM 1400008A

2. Specifics of a typical production round and perimeter control to be implemented at the highest rock cut for each area of rock excavation.
3. For each of the typical blast rounds in 2. Above, include the following blast round details:
 - a. Diameter, spacing, burden, depth, tip elevation, and orientation of each blast hole for each round design.
 - b. Manufacturer and amount (in terms of weight and number of cartridges) of explosives and distribution of charge to be used within each hole, on each delay, and the total for the blast.
 - c. Manufacturer and type of detonators; delay pattern wiring diagram for the round: type and capacity of firing source, size, type and location of safety switches and lightning gap.
 - d. Type and location of stemming to be used in holes.
 - e. Calculations of anticipated vibration levels at nearest adjacent structure.
4. Methods of matting or covering of the blast area to prevent flyrock and excessive air blast overpressure.
5. Written evidence of the licensing, experience and qualifications of the blaster(s) who will be directly responsible for the loading of each shot and for firing it.
6. Name and qualifications of the person(s) responsible for designing and directing the blasting.
7. Name and qualifications of the person(s) responsible for monitoring and reporting blast vibrations.
8. Details of an audible advance signal system to be employed at the job site.
9. Instrumentation that the Contractor proposes to use to monitor vibrations and airblast overpressure levels complete with performance specifications.
10. Recent calibration certificate(s) for the proposed blast monitoring instrumentation.
11. Copy of the blasting permit(s) obtained to conduct blasting on the site.
12. Copies of all Pre-blast condition surveys performed.

Progress Submittals:

Within 24 hours following each blast, the Contractor shall submit to the Engineer, a Blast Monitoring Report. Each Blast Monitoring Report shall include the following applicable items:

1. Blast round data, as indicated above.
2. Blast Monitoring Location Plan, indicating the location from the blast to monitoring locations.
3. Vibration and airblast overpressure data from each seismograph, including a copy of the strip chart (or other permanent record of velocity/time waveform) with calibration and monitoring record marked with the date, time and location of the blast.

Review by the Engineer of blast designs and techniques shall not relieve the Contractor of responsibility for the accuracy, adequacy and safety of the blasting, exercising proper supervision and field judgment and producing the results within the blasting limits required by these Specifications.

Personnel Requirements:

Persons responsible for blasting shall be licensed blasters in the State of Connecticut and shall have had acceptable experience in similar excavations in rock and controlled blasting techniques.

Blast monitoring shall be conducted by persons trained in the use of a seismograph and records shall be analyzed and results reported by persons familiar with analyzing and reporting the frequency content of a seismograph record.

Peak Particle Velocity (PPV) Limits:

The Contractor shall conduct all blasting activity in such a manner that the maximum peak particle velocity does not exceed the following limits:

<u>Distance from Blast to Structure</u>	<u>Max. PPV mm/sec (in/sec)</u>
<45.7m (<150 ft)	50.8 (2.0)
45.7m - 91.4m (150 ft - 300 ft)	31.8 (1.25)
>91.4m (>300 ft)	12.7 (0.5)

Blast Vibration Monitoring:

The Contractor shall monitor peak particle velocities resulting from each blast, at a location adjacent to the nearest structure from the blast.

All instrumentation proposed for use on the project shall have been calibrated within the previous six (6) months to a standard which is traceable to the National Bureau of Standards. Characteristics of required instrumentation are listed below:

Measure the three (3) mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source. Measure and display the maximum peak particle velocity component and airblast overpressure. These readings must be displayed and be able to be read in the field, immediately after each blast.

Furnish a permanent time history record of particle velocity and airblast overpressure waveforms.

Compliance with the peak particle velocity limits as set forth in this specification shall not relieve the Contractor of responsibility for damage resulting from its blasting operation.

General Blasting Procedures:

The time during which explosives may be used is must be in compliance with lane closure allowances as put forth in Section 1.08 - Prosecution and Progress. In addition, the use of explosives is restricted to daylight hours. In order to minimize traffic disruptions, the Contractor shall schedule blasting such that any two successive blasts detonated anywhere on the project are separated by at least 2 hours. The Contractor's blasting operations shall be performed using extreme care to minimize the inconvenience and interruption to traffic and damage to the pavement, structures, guardrail, median fence and surrounding areas.

Immediately after blasting, the Contractor shall have sufficient equipment available at the site to clear the pavement of blast rock as noted below. The Contractor shall also use, as required, a mechanical sweeper to control dust and small stones.

The Contractor shall advise the Engineer at least two working days in advance of the dates on which he proposed to perform blasting operations, giving the approximate hour, for the Engineer's approval.

The Contractor will notify the Engineer by noon of the day prior to any day he plans not to blast where the weekly schedule shows a day of blasting. This does not include changes due to weather or unexpected equipment breakdowns.

If at any time the Engineer determines that the Contractor's rock excavation program does not comply with the requirements of this specification, the Engineer may direct the Contractor to halt all rock excavation activities and have the Contractor submit a revised rock excavation procedure for review and approval by the Engineer.

<u>Pay Item</u>	<u>Pay Unit</u>
Rock in Trench Excavation 0' – 10' Deep	CY
Rock in Trench Excavation 0' – 15' Deep	CY
Rock in Trench Excavation 0' – 20' Deep	CY

ITEM 1400004A, ITEM 1400006A
ITEM 1400008A