BID RESPONSE LABEL

Proposals sent by U.S. Mail should be addressed to Director of General Services, Town of Manchester, 494 Main Street, P.O. Box 191, Manchester, CT 06045-0191. Proposals hand delivered by Federal Express, United Parcel Service or other persons shall be delivered to Director of General Services, Town of Manchester, 494 Main Street, Manchester, CT 06040. The appropriate pre-addressed label below must be affixed to the envelope containing your proposal.

THIS LABEL FOR USE WITH UNITED STATES POSTAL SERVICE DELIVERY

BID NO. 19/20-56 TO BE OPENED:

MORSE ROAD AND SALEM ROAD (DATE): FEBRUARY 6, 2020

INFRASTRUCTURE IMPROVEMENTS (TIME): 2:00 P.M.

TO: DIRECTOR OF GENERAL SERVICES
TOWN OF MANCHESTER
LINCOLN CENTER
494 MAIN STREET
P.O. BOX 191
MANCHESTER, CT 06045-0191

THIS LABEL FOR USE WITH HAND DELIVERY (I.E., FED EX, UNITED PARCEL SERVICE)

BID NO. 19/20-56 TO BE OPENED:

MORSE ROAD AND SALEM ROAD (DATE): FEBRUARY 6, 2020

INFRASTRUCTURE IMPROVEMENTS (TIME): 2:00 P.M.

TO: DIRECTOR OF GENERAL SERVICES
TOWN OF MANCHESTER
LINCOLN CENTER
494 MAIN STREET
MANCHESTER, CT 06040

CONTRACT DOCUMENTS
FOR

MORSE ROAD AND SALEM ROAD INFRASTRUCTURE IMPROVEMENTS

BID NO. 19/20-56

TOWN OF MANCHESTER
GENERAL SERVICES DEPARTMENT
494 MAIN STREET
P.O. BOX 191
MANCHESTER, CT 06045-0191

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BIDDING REQUIREMENTS

INVITATION TO BID
FOR
MORSE ROAD AND SALEM ROAD INFRASTRUCTURE IMPROVEMENTS

BID NO. 19/20-56

Work under this contract includes water main replacement, concrete sidewalk replacement and road reconstruction on Morse Road and Salem Road in Manchester. It includes other appurtenant work such as storm drainage construction, resetting of structures, restoration of lawn areas and traffic control.

Sealed Bids will be received at the office of the Director of General Services, Lincoln Center, 494 Main Street, Manchester, Connecticut 06040 for the project **"MORSE ROAD AND SALEM ROAD INFRASTRUCTURE IMPROVEMENTS"** until **2:00 P.M. on FEBRUARY 6, 2020** at which time and place said bids will be opened publicly and read aloud. Bids may be hand delivered to the above address or directed by U.S. Mail to said office at Town of Manchester, Lincoln Center, 494 Main Street, P.O. Box 191, Manchester, CT 06045-0191.

The Contract Drawings and Specifications (i.e., documents) may be examined at the office of the Director of General Services, Lincoln Center, 494 Main Street, P.O. Box 191, Manchester, Connecticut 06045-0191. Paper sets of the documents can be obtained upon payment of a non-refundable fee of $10.00/set in cash or check, made payable to the Town of Manchester. Paper sets of the documents will be mailed to prospective bidders upon request and receipt of a separate check for $10.00 made payable to the Town of Manchester, which will not be refunded. Contract documents may also be downloaded from the Town of Manchester website at http://generalservices1.townofmanchester.org/index.cfm/bids/.

Bid security in the form of a bid bond, payable to the Town of Manchester, is required in the sum of 5 percent (5%) of the total bid. Bid security shall be subject to the conditions set forth in the Standard Instructions to Bidders.

No bidder may withdraw his bid for a period of sixty (60) days after the date of bid opening.

The Town reserves the right to waive any informality or to reject any or all bids, should it be deemed to be in the public interest to do so, and to reserve any and/or all other rights as detailed in the Contract Documents.

The Town of Manchester is an equal opportunity employer, and requires an affirmative action policy for all of its Contractors and Vendors as a condition of doing business with the Town, as per Federal Executive Order 11246.

All bidders are requested to note that the award of this Contract is subject to the following conditions and contingencies:

1. The approval of such governmental agencies as may be required by law.
2. The appropriation of adequate funds by the proper agencies.

RULES AND REGULATIONS FOR COMPETITIVE BIDDING

These rules and regulations have been adopted by the Board of Directors of the Town of Manchester pursuant to Section 5-22 of the Town Charter. They are standard for all competitive bidding proposals issued by the Town of Manchester, Connecticut for contracts of all types where labor, materials and necessary equipment to complete work is to be furnished to the Town, where the Town is to purchase supplies, materials and equipment, where the Town is to sell surplus materials and equipment, or where the Town is to sell real estate. These rules and regulations shall be binding upon all prospective bidders and the Town of Manchester.

GENERAL RULES

1. The Director of General Services may delete or modify any of the instructions to bidders herein for a particular proposal, indicating such change in the appropriate section of the bid documents. The Director of General Services may insert special instructions in any special contracts which are subject to competitive bidding.

2. The attached proposal is signed by the bidder with full knowledge of, and agreement with, the general specifications, conditions and requirements of this bid.

3. Where appropriate, return copy of proposal on the enclosed form.

4. Submit proposal in an envelope marked with the Bidder's name and address on the upper left-hand corner.

5. Proposals sent by U.S. Mail should be addressed to Director of General Services, Town of Manchester, 494 Main Street, P.O. Box 191, Manchester, CT 06045-0191. Proposals hand delivered by Federal Express, UPS or other persons shall be delivered to Director of General Services, Town of Manchester, 494 Main Street, Manchester, CT 06040. The enclosed pre-addressed label must be affixed to the envelope containing your proposal.

6. Proposals received later than time and date specified will not be considered. Amendments to, or withdrawals of bids received later than the time and date set for bid opening will not be considered.
7. All bids shall be opened publicly and read aloud. Bidders may be present at the opening of bids. All bids shall be tabulated and copies of said tabulation shall be made available to Bidders upon their request.

8. All deliveries of commodities or services hereunder shall comply in every respect with all applicable laws of the Federal Government and/or State of Connecticut. Purchases made by the Town of Manchester are exempt from payment of Federal Excise Taxes and the Connecticut Sales Tax, and such taxes must not be included in bid prices. Federal Excise Tax exemption certificates, if requested, will be furnished.

9. The Bidder, where applicable, shall insert the price per stated unit and extend a total price for each item. In the event there is a discrepancy between the unit price and the extension, the unit price will govern.

10. Bidders shall, where applicable, submit terms for payment in spaces provided in the proposal form,

showing the amount of cash discount which shall apply to bid prices when paid within the stated number of days in the proposal.

11. All inquiries shall be submitted in writing within the time limitations specified in the bid documents, and shall be directed to the General Services Office, Town of Manchester, 494 Main Street, P.O. Box 191, Manchester, CT 06045-0191, telephone 860-647-3031, fax 860-647-5206. All information given by the Town, except by written addenda, shall be informal and shall not be binding upon the Town, nor shall it furnish a basis for legal action by any Bidder or prospective Bidder against the Town.

12. A. The Town reserves the right to reject any and all bids, to waive technical defects and to make such awards including accepting a bid, although not the low bid, as it deems in its sole discretion to be in the best interest of the Town. The Town reserves the right to reject any bid if the Bidder, any officer of the Bidder, or any other company owned in whole or in part by an officer(s) of the Bidder, is delinquent in the payment of any taxes or fees owed to the Town. The Town reserves the right to require a disclosure statement from the Bidder listing the name(s) of all officers of the company.

    B. In the event the Town determines that a contractor is delinquent in any payment due the Town, then the Town may offset the delinquent amount due to the Town against the sums owed the contractor.

13. The Town of Manchester may make such investigation as deemed necessary to determine the ability of the Bidder to discharge a contract. The Bidder shall furnish the Town with all such information and data as may be required for that purpose. The Town reserves the right to reject any bid if the Bidder fails to satisfactorily convince the Town that he is properly qualified by experience and facilities to carry out the obligations of the contract and to satisfactorily complete the work called for herein, or if the bid is conditional in nature.

14. Except where otherwise provided, a contract between the Town and a successful Bidder shall consist of the Invitation to Bid, Specifications, Plans, Bid, including Proposal Sheet, and Acceptance by the Town and these Rules and Regulations. Acceptance by the Town may be by purchase order for the portion of the work awarded a contractor.

15. All Invitations to Bid shall be publicly advertised on at least three (3) occasions in a newspaper having a general circulation within the Town of Manchester, Connecticut. The last advertising date shall be at least seven (7) calendar days before the date which is advertised for the opening of bids.

16. Copies of all bid documents shall be made available to all interested persons for a fee to be determined by the Director of General Services which fee will be refundable at the discretion of the Director of General Services upon return of said documents.

17. Alternate bids shall not be accepted unless otherwise specified in the bid documents.

18. Any act or acts of misrepresentation or collusion shall be a basis for disqualification of any bid or bids submitted by such persons guilty of said misrepresentation or collusion. In the event that the Town enters into a contract with any Bidder who is guilty of misrepresentation or collusion and such conduct is discovered after the execution of said contract, the Town may cancel said contract

without incurring liability, penalty or damages.

19. In the event that any Bidder wishes to protest the potential award of a bid or any procedure or act in the advertising or soliciting of bids, said Bidder must make said protest in writing which shall state the reason therefor and request a conference with respect thereto. Said protest must be received by the Town, Office of General Services, within five (5) business days after the mailing of Bid results or decisions.

20. A conference with respect to said protest shall be scheduled by the Director of General Services forthwith and shall be attended by him or his designee, and such other persons as the Director of General Services and the General Manager shall be required to attend. The subject matter of said conference shall be limited to the reasons for the protest specified in the written request for said conference. Said conference shall also include a discussion of all possibilities for a resolution of a dispute. The Town shall make a decision in writing within three (3) business days after said conference and forward the same to the protesting Bidder forthwith.

21. In the event that any protesting Bidder wishes to take legal action against the Town, he must first fully comply with all of these Rules and Regulations, including those which have been charged by the Director of General Services pursuant to paragraph 1 herein.

22. Except for special instructions inserted in special contracts by the Director of General Services pursuant to paragraph 1 herein, in the event of any conflicts between these Rules and Regulations and the terms and conditions of any bid document, these Rules and Regulations shall prevail.

23. All awards of Bids shall be made by the Director of General Services.

24. These Rules and Regulations, as revised, shall be effective as of June 23, 1993.

Revised:
April 14, 1981
March 13, 1984
August 1, 1989
June 23, 1993

STANDARD INSTRUCTIONS TO BIDDERS - CONSTRUCTION CONTRACTS

These instructions are standard for all proposals issued by the Town of Manchester, Connecticut, for construction contracts of all types where a contractor is to furnish labor, materials and necessary equipment to complete work as outlined in the Contract Drawings and Specifications. The Town of Manchester may add to, delete, supersede or modify any of the instructions herein for a particular contract by indicating such changes in the section entitled "Special Instructions to Bidders."

1. Deposit on Contract and Drawings

   A non-refundable fee of $10.00 in cash or check payable to the Town of Manchester, Connecticut, shall be required on each paper set of Contract Drawings and Specifications taken.

2. Preparation of Bid

   Each bid must be submitted on the Form of General Bid. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures. The bid must be submitted in a sealed envelope with the Bidder's name and address on the upper left-hand corner. Proposals sent by U.S. Mail should be addressed to Director of General Services, Town of Manchester, 494 Main Street, P.O. Box 191, Manchester, CT 06045-0191. Proposals hand delivered by Federal Express, UPS or other persons shall be delivered to Director of General Services, Town of Manchester, 494 Main Street, Manchester, CT 06040. The enclosed pre-addressed label must be affixed to the envelope containing your proposal.

3. Conditions of Work

   Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material, equipment, tools, labor and incidentals necessary to carry out the provisions of this Contract. Insofar as possible the Contractor, in carrying out his Work, must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.

4. Information Not Guaranteed

   All information given in the Contract Drawings and Specifications, or in the other documents relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures are from the best sources at present available to the Town. All such information is furnished only for the information and convenience of bidders and is not guaranteed.

   It is agreed and understood that the Town does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes, or other structures encountered during construction will be the same as those indicated in the Contract Drawings and Specifications or in the other documents. It is further agreed and understood that no bidder or contractor shall use or be entitled to use any of the information made available to him, or obtained in any examination made by him, in any manner as a basis of or ground for any claim or demand against the Town, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other conditions, natural phenomena,

existing pipes or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

5. Laws and Regulations

The bidder's attention is directed to the fact that all applicable Federal and State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

6. Obligation of Bidder

At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Contract Drawings and Specifications (including all addenda). The failure or omission of any bidder to examine any form, instrument, or document shall, in no way, relieve any bidder from any obligation in respect to his bid.

7. Wage Rates

Enclosed in this contract document is the schedule of prevailing wage rate determinations for classifications of laborers, mechanics or workers who are performing work on this project pursuant to Section 31-53, as amended of the Connecticut General Statutes. "The wages paid on an hourly basis to any mechanic, laborer or workman employed upon the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such employee to any employee welfare fund, as defined in subsection (h) of this section, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such employees to any such employee welfare fund shall pay to each employee as part of his wages the amount of payment or contribution for his classification on each pay day".

The enclosed rates and footnotes are the minimum rates to be paid to workers in these classifications. These rates are subject to an annual adjustment each July 1st as required by Section 31-55a of the Connecticut General Statutes. It is the contractor's responsibility to obtain the annual adjusted prevailing wage increases directly from the Department of Labor's web page at www.ct.gov/dol or by contacting the Connecticut Department of Labor Unit Wage and Workplace Standards Division at 860-263-6790.

Upon award of any contract subject to the provisions of this section, the Contractor to whom such contract is awarded shall certify, under oath to the Labor Commissioner, the pay scale to be used by such Contractor and any of his subcontractors for work to be performed under such contract. Additionally, each employer subject to the prevailing wage law must file certified payrolls with the contracting agent including information, including but not limited to, employee names; occupations; hours worked; rates paid; and the employers compliance with various provisions of law.

8. Addenda and Interpretations

No interpretation of the meaning of the Contract Drawings and Specifications or other pre-bid documents will be made to any bidder orally. All information given to bidders other than by means of the Contract Drawings and Specifications, or by addenda, as described below, is given informally and shall not be used as the basis of a claim against the Town.

Every request for such interpretation should be addressed to the General Services Office by fax (860) 647-5206 or email gensvcs@manchesterct.gov at least seven (7) days prior to the date fixed for the opening of bids Any and all such interpretations and any supplemental instructions will be in the form of written addenda. For bidders who have purchased paper sets of contract documents from the General Services Department, addenda will be by sent by email, facsimile transmission (FAX), or by first class mail, at the respective email, fax numbers and addresses furnished for such purposes. The addenda will also be posted on the Town's website under the "Bid Requests" link. **For bidders who download the contract documents or obtain the documents from a source other than the General Services Department, it shall be the bidder's responsibility to check the General Services website and obtain all addenda prior to submitting a bid.**

No addendum will be issued less than three (3) days prior to the date fixed for the opening of bids. Bidders shall acknowledge receipt of the addendum by faxing back acknowledgement to the Town of Manchester at 860-647-5206 or email gensvcs@manchesterct.gov. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the Contract Documents.

9. Bid Security

Each bid must be accompanied by a bid bond or bank check, payable to the Town of Manchester for five percent (5%) of the total bid. In the event of a base bid/alternate bid situation, the bid bond will be for five percent (5%) of the base bid. The bond must be furnished by a surety company satisfactory to the Town and must be a corporate surety licensed to sign surety bonds in the State of Connecticut. The Town of Manchester will not be liable for the accrual of any interest on any certified check submitted. Cashiers' checks made payable to the Town of Manchester will be accepted.

10. Security for Faithful Performance

Simultaneously with his delivery of the executed Contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this Contract and for the payment of all persons performing labor and materials under this Contract. The Performance Bond and the Labor and Materials Bond shall be equal to one hundred percent (100%) of the contract price and shall be furnished within ten (10) business days of the Notice of Award or prior to the start of Work, whichever comes first. The surety on such bond or bonds shall be a duly authorized surety company qualified to do business under the laws of the State of Connecticut and satisfactory to the Town.

11. Power of Attorney

Attorneys-in-fact who sign contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

12. Comparison of Bids

Bids will be compared on the basis of the quantities and unit prices stated in the Form of General Bid.

In the event that there is a discrepancy in the Form of General Bid between the unit prices and the extended amount, the unit prices shall govern and the extended amount will be corrected.

The Town agrees to examine and consider each Form of General Bid submitted in consideration of the bidder's agreements, as herein-above set forth and as set forth in the Form of General Bid.

13. Right To Reject Bid

The Town may consider informal any bid not prepared and submitted in accordance with the provisions hereof, and may waive any informalities or reject any and all bids, should the Town deem it to be in the public interest to do so.

The Town may also reject bids, which in its sole judgment, are either incomplete, conditional, obscure or not responsive, or which contain additions not called for, erasures not properly initialed, alterations, or similar irregularities, or the Town may waive such omissions, conditions or irregularities.

The Town reserves the right to reject all or any part of an unbalanced bid, to eliminate any item or part of an item or increase or decrease quantities as it deems to be in its best interest or may be necessary due to budgetary limitations.

14. Qualifications of Bidder

The Town may make such investigations as it deems necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Town all such information and data for this purpose as the Town may request. The Town reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Town that such bidder is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein, by the date indicated therein for completion. Conditional bids will not be accepted.

15. Ability and Experience of Bidder

No award will be made to any bidder who cannot satisfy the Town that he has sufficient ability and experience in this class of Work and sufficient capital and plant to enable him to prosecute and complete the Work successfully within the time named. The Town's decision or judgment on these matters shall be final, conclusive, and binding. The Town may make such investigations as it deems necessary, and the Bidder shall furnish to the Town, under oath if so required, all such information and data for this purpose as the Town may request.

The following objective criteria will be used for evaluating the qualifications of bidders:

The Bidder shall:

a) Have on its payroll or must be able to prove that it customarily employs supervisory personnel of the type qualified to perform the kind of work called for in the bid specifications.

b) Must show or be able to demonstrate (if requested) to the satisfaction of the awarding authority that it possesses the ability and capacity to successfully complete the project through the satisfactory past performance of work of a similar size, scope and comparable dollar value to that of the subject project. The bidder shall have maintained the level of performances on such similar work continuously during the past three years and if the bidder does not have such three years as called for, then it must include in the Bidders Qualifications all acts which demonstrate the bidder's ability and capacity to perform the work.

c) Own or possess rented or leased equipment of the type customarily required by contractors in the performance of contract work and that such equipment, if needed, is available for the job bid on.

d) Have purchased materials over the past three years from suppliers who customarily sell same in quantity to contractors.

e) Be financially responsible to perform the work bid on.

f) Be able to furnish references from architects, engineers or owners indicating that it has satisfactorily completed contract work of the nature bid on and in a timely manner, complete with exoneration evidence delays were evident.

g) Have adequate physical facilities in which and from which the work can be performed.

h) Have a record of harmonious relationships with subcontractors on prior State and/or Municipal projects or other projects where the bidder may be requested to demonstrate such harmonious relationships to the satisfaction of the awarding authority. Prompt payment to subcontractors is one factor to be considered by the awarding authority.

i) Have had a good track record of past performance on State and/or Municipal projects as concerns the quantity, timeliness, costs, cooperation and harmonious working relationship.

j) Not have been cited for three or more willful or serious violations of an OSHA or of any standard, order or regulations promulgated pursuant to such Act, during the three-year period preceding the bid, which violations were cited in accordance with the provisions of any State Occupational Safety and Health Act or the Occupational Safety and Health Act of 1970 and which were not abated within the time fixed by the citation; which citation has not been set aside following appeal to the appropriate agency or court having jurisdiction.

k) Not have received any criminal convictions related to the injury or death of any employee in the three-year period preceding the bid.

16. Equal Opportunity

The Town of Manchester is an equal opportunity employer, and requires an affirmative action policy for all of its contractors and vendors as a condition of doing business with the Town, as per Federal Executive Order 11246. By signing the Form of General Bid, all vendors and contractors agree to this condition of doing business with the Town and, should the Town choose to audit their compliance, the vendor agrees to cooperate fully.

17. Generic Term - AA-EEO

The Town is an Affirmative Action - Equal Opportunity Employer. The use of the term "he" referring to Contractor is for convenience only and shall be deemed to include, when used in this document, women-business enterprises, (WBE), corporations, partnerships and sole proprietorships.

18. Non Resident Contractor Bonds and Deposits

In accordance with Connecticut Statutes Section §12-430(7)c, the Town is required to report names of nonresident (out of state) Contractors to the State of Connecticut, Department of Revenue Services (DRS) to ensure that all applicable business taxes are being paid by Contractors. **Upon award of contract in excess of $250,000, all nonresident contractors must furnish proof to the Town that they have obtained current status as a "verified contractor" with DRS.**

An "unverified Contractor" with DRS must file a surety bond with DRS in an amount equal to 5% of the contract price. DRS has issued **form AU-964**, Surety Bond and Release, which must be used to post that bond.

Upon submission of the bond to DRS, the Contractor must promptly furnish to the Town a copy of the **Certificate of Compliance** issued by the DRS. If the non-resident contractor fails to submit the bond to DRS and to provide to the Town a **Certificate of Compliance**, the Town is required to withhold 5% of the total contract value and deposit it with DRS.

If you have any questions regarding these requirements, contact the State Department of Revenue Services at telephone number (860) 541-7538 or visit their website at www.ct.gov/drs to obtain necessary publications, forms or information.

SPECIAL INSTRUCTIONS TO BIDDERS

These special instructions are supplemental to the section entitled "Standard Instructions to Bidders-Construction Contracts" and are applicable for this particular construction contract only.

1. Receipt and Opening of Bids

The Town of Manchester, Connecticut, herein called the Town, acting by and through its General Manager will receive sealed Bids for the project **"MORSE ROAD AND SALEM ROAD INFRASTRUCTURE IMPROVEMENTS".** Bids by U.S. Mail shall be directed to the office of Director of General Services, Lincoln Center, 494 Main Street, P.O. Box 191, Manchester, CT 06045-0191. Bids will be received at the office of the Director of General Services, Lincoln Center, 494 Main Street, Manchester, Connecticut 06040, **until 2:00 P.M. on FEBRUARY 6, 2020** at which time and place said bids will be publicly opened and read aloud.

Bids may be submitted prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered.

2. Time for Completion - Liquidated Damages

The Bidder is made aware that the Notice to Proceed will be issued within **TEN (10) CALENDAR DAYS** after award of the Contract. The Bidder hereby agrees to commence Work under this Contract immediately after receiving written Notice to Proceed from the Town, and to complete all work within **EIGHTY (80) WORKING DAYS** thereafter, excluding the winter shutdown period between November 15th and April 1st (refer to associated Appendix with the Construction Workday Calendar for additional information).

The Bidder further agrees to pay as liquidated damages, the sum of **FIVE HUNDRED DOLLARS ($500.00)** for each consecutive calendar day beyond the date of completion. Liquidated damages are not intended as a penalty but rather shall be construed as a best estimate of damages which the Town will suffer due to a Bidder's refusal, failure or neglect to perform pursuant to his Bid and Contract Documents, if his Bid is accepted by the Town.

STANDARD INSURANCE AND INDEMNIFICATION REQUIREMENTS FOR BIDS, PERMITS AND THE USE OF TOWN FACILITIES

I. GENERAL CONDITIONS:

Within ten (10) business days of the award or notice, or prior to the start of work, whichever comes first, the contractor/insured will provide, pay for, and maintain in full force and affect the insurance outlined here for coverage's at not less than the prescribed minimum limits of liability. Such coverage is to remain in force during the life of the contract and for such additional time as may be required, and will cover the contractor/ insured's activities, those of any and all subcontractors, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. Any failure to comply with reporting requirements and provisions of the policies shall not affect coverage provided to Town, its officers, officials, agents or employees.

A. Certificates of Insurance: The contractor/insured will give the owner a certificate of insurance completed by a duly authorized representative of their insurer certifying that at least the minimum coverage's required here are in effect and specifying that the liability coverage's are written on an occurrence form and that the coverage's will not be canceled, non-renewed, or materially changed by endorsement or through issuance of other policy(ies) of insurance without sixty (60) days advance written notice to the General Services Department. Failure of the owner to demand such certificate or other evidence of full compliance with these insurance requirements or failure of the owner to identify a deficiency from evidence provided will not be construed as a waiver of the contractor/insured's obligation to maintain such insurance. Any failure to comply with reporting requirements and provisions of the policies shall not affect coverage provided to Town, its officers, officials, agents or employees.

B. Insurer Qualification: All insurance will be provided through companies authorized to do business in the State of Connecticut and considered acceptable by the owner.

C. Additional Insured: The policy or policies providing insurance as required, with the exception of professional liability and workers' compensation, will defend and include the owner and owner's architects, directors, officers, representatives, agents, and employees as additional insureds on a primary and noncontributory basis for work performed under or incidental to this contract.

D. Retroactive Date and Extended Reporting Period: Coverage, whether written on a claims made or occurrence basis, shall be maintained without interruption from the date of commencement of the Work until date of final payment and then extended for an additional three (3) years from date of final payment.

   If any insurance required here is to be issued or renewed on a Claims Made form as opposed to an Occurrence form, the retroactive Date for coverage will be no later than the commencement date of the project. The Claims Made form will have an Extended Reporting Period of three years from the date of project completion. All Claims made policies cancelled or non-renewed and not replaced by a subsequent claims made policy will have an Extended Reporting period of three years from the date of cancellation or non-renewal.

E. Subcontractors' Insurance: The contractor/insured will require each subcontractor hired by and/or employed by contractor/insured to purchase and maintain insurance of the types specified below. When requested by the owner, the contractor/insured will furnish copies of certificates of insurance evidencing coverage for each subcontractor.

F. Waiver of Subrogation: The contractor/subcontractor will purchase required insurance policies that shall be endorsed with a waiver of subrogation and all rights of recovery in favor of the Town, its officers, officials, agents and employees. The contractor/insured will require of subcontractors, by appropriate written agreements, similar waivers each in favor of all parties enumerated in this section.

G. Hold Harmless: The contractor/insured shall defend, indemnify and hold harmless the owner, officers, officials, agents and employees, and if applicable, the engineer and their agents and employees from and against all claims, damages, losses and expenses, including attorney's fees of counsel selected by the owner, arising out of or resulting from the performance of the work and /or the supplying of materials, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom, and (b) is caused in whole or in part by any negligent act or omission of the contractor/ insured, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not they are caused in part by a party indemnified hereunder.

II. INSURANCE LIMITS AND COVERAGE:

A. To the extent applicable, the amounts and types of insurance will conform to the minimum terms, conditions and coverage's of Insurance Services Office (ISO) policies, forms, and endorsements.

B. If the contractor/insured has self-insured retention's or deductibles under any of the following minimum required coverage's, the contractor/insured must identify on the certificate of insurance the nature and amount of such self-insured retention's or deductibles and provide satisfactory evidence of financial responsibility for such obligations. All self-insured retention's or deductibles will be the contractor/insured's sole responsibility.

C. Workers' Compensation Insurance: With respect to all operations the Contractor performs and all those performed for it by subcontractors, the Contractor shall carry, and require each subcontractor to carry, Workers' Compensation insurance as required by the laws of the State of Connecticut.

Employer's Liability insurance shall be provided in amounts not less than:

- $500,000 per accident for bodily injury by accident;
- $500,000 policy limit by disease; and
- $500,000 per employee for bodily injury by disease

D. Commercial General Liability Insurance: With respect to the operations the Contractor performs and also those performed for it by subcontractors, the Contractor shall carry, and require each subcontractor to carry, Commercial General Liability insurance, including Contractual Liability, Products and Completed Operations, Broad Form Property Damage and Independent Contractors. See chart below for applicable minimum coverage amounts.

Contract Amount ($)	Minimum Single Occurrence Amount ($)	Minimum Annual Aggregate Amount ($)
0 - 2,000,000	1,000,000	2,000,000
2,000,001 - 10,000,000	2,000,000	4,000,000
> 10,000,000	4,000,000	8,000,000

Notes:

- If underground work is to be undertaken, each policy shall have coverage for and exclusions removed for "Explosion, Collapse and Underground" ("XCU").
- Should blasting be required, all necessary permits for the use of explosives shall be obtained by the contractor/insured or insured from the Fire Marshall.

E. Automobile Liability Insurance: The Contractor shall obtain automobile liability insurance covering the operation of all motor vehicles, including those hired or borrowed, that are used in connection with the Project for all damages arising out of bodily injury to or death of all persons and/or injury to or destruction of property; in any one accident or occurrence. This policy shall not be subject to an annual aggregate limitation. See chart above for applicable minimum coverage amounts.

F. Owner's and Contractor's Protective Liability Insurance for and in the Name of the Town and/or State: With respect to the Contractor's Project operations and also those of its subcontractors, the Contractor shall carry, for and on behalf of the Town and/or State for each accident or occurrence resulting in damages from bodily injury to or death of persons and/or injury to or destruction of property. See chart below for applicable minimum coverage amounts.

Contract Amount ($)	Minimum Single Occurrence Amount ($)	Minimum Annual Aggregate Amount ($)
0 – 20,000,000	1,000,000	2,000,000
20,000,001 – 50,000,000	2,000,000	4,000,000
> 50,000,000	4,000,000	8,000,000

G. Excess Coverage: Contractor shall purchase and maintain excess or umbrella liability insurance with a limit of not less than $5,000,000, covering all lines of insurance required by this contract.

BID FORMS

All of the following documents contained within this section must be completed by the prospective bidder and returned with the bid.

- Form of General Bid (Page BR-15)
- Bid Proposal Sheets (Pages BR-16 to BR-18)
- Qualifications of Bidder Form (Pages BR-19 to BR-23)
- Bid Bond (To be supplied by Bidder)

FORM OF GENERAL BID

BID NO. 19/20-56

Town of Manchester
Director of General Services
Lincoln Center
494 Main Street
P.O. Box 191
Manchester, CT 06045-0191

Attn. Maureen Goulet, Director of General Services

Having carefully examined the Invitation to Bid, Rules and Regulations for Competitive Bidding, Standard Instructions to Bidders, Special Instructions to Bidders, Insurance and Indemnification Requirements, Form of General Bid, General Conditions, Special Provisions, Technical Specifications, Appendices, Contract Drawings and Exhibits for the furnishing of all materials, equipment, tools, labor and incidentals necessary to complete the Work known as **"MORSE ROAD AND SALEM ROAD INFRASTRUCTURE IMPROVEMENTS",** as well as having carefully examined the site and having satisfied himself as to conditions affecting the proposed Work and all Addenda issued by the Town prior to the date of opening of Bids, the undersigned proposes to complete all Work on the Contract Drawings and as described in the Contract Specifications, for the lump sum and unit prices for the Work, in place, for the following items and quantities.

Bidder acknowledges receipt of the following addenda:

No._____, dated_____, 20__

No._____, dated_____, 20__

No._____, dated_____, 20__

No._____, dated_____, 20__

Contractor Name (Printed)

TOWN OF MANCHESTER BID PROPOSAL SHEET

MORSE ROAD AND SALEM ROAD INFRASTRUCTURE IMPROVEMENTS

BID NO. 19/20-56

Bidders must fill in "Bid Unit Price" and "Extended Amount" for each bid item. Extend all prices to two decimals.

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	BID UNIT PRICE	EXTENDED AMOUNT
1	CUT BITUMINOUS CONCRTE PAVEMENT	LF	120	$	$
2	REMOVE BITUMINOUS CONCRETE PAVEMENT (0"-6")	SY	6,200	$	$
3	EARTH EXCAVATION	CY	100*	$	$
4	TEST PIT EXCAVATION	CY	10*	$	$
5	ROCK IN TRENCH EXCAVATION	CY	10*	$	$
6	GRANULAR FILL	CY	10*	$	$
7	PROCESSED AGGREGATE BASE	CY	100*	$	$
8	FORMATION OF SUBGRADE	SY	6,200	$	$
9	HMA S0.5	TON	560	$	$
10	HMA S1.0	TON	1,120	$	$
11	PERMANENT PAVEMENT REPAIR	SY	55	$	$
12	ASPHALT ADJUSTMENT COST	EST	N/A	$ 5,000.00	$ 5,000.00
13	4" CONCRETE SIDEWALK	SF	500	$	$
14	5" CONCRETE SIDEWALK	SF	6,350	$	$
15	5" CONCRETE SIDEWALK AND CURB MONOLITHIC	SF	7,000	$	$
16	6" REINFORCED CONCRETE SIDEWALK	SF	1,300	$	$
17	6" CONCRETE SIDEWALK RAMP	SF	750	$	$
18	6" CONCRETE DRIVEWAY APRON	SF	1,900	$	$
19	BITUMINOUS CONCRETE DRIVEWAY	SY	160	$	$
20	EXTRUDED CONCRETE CURB	LF	1,900	$	$
21	12" DUCTILE IRON PIPE (STORM)	LF	80	$	$
22	15" R.C.P.	LF	22	$	$
23	ABANDON PIPE	LF	100	$	$
24	TYPE "C" CATCH BASIN WITH CONCRETE CURB INLET	EA	7	$	$

* Indeterminate quantity for bidding purposes only

TOWN OF MANCHESTER BID PROPOSAL SHEET
MORSE ROAD AND SALEM ROAD INFRASTRUCTURE IMPROVEMENTS
BID NO. 19/20-

Bidders must fill in "Bid Unit Price" and "Extended Amount" for each bid item. Extend all prices to two decimals.

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	BID UNIT PRICE	EXTENDED AMOUNT
25	RESET TYPE "C" CATCH BASIN TOP (NEW TOP)	EA	4	$	$
26	STORM MANHOLE	EA	2	$	$
27	REMOVE DRAINAGE STRUCTURE	EA	7	$	$
28	RESET MANHOLE (STORM)	EA	3	$	$
29	RESET MANHOLE (SANITARY SEWER)	EA	7	$	$
30	48" SANITARY MANHOLE (0'-10' DEEP)	EA	2	$	$
31	8" DUCTILE IRON PIPE	LF	2,150	$	$
32	8" – 1/8 DUCTILE IRON BEND	EA	14	$	$
33	8" – 1/16 DUCTILE IRON BEND	EA	5	$	$
34	8" GATE VALVE	EA	11	$	$
35	8" x 8" DUCTILE IRON TEE	EA	4	$	$
36	8" x 6" DUCTILE IRON REDUCER	EA	5	$	$
37	1" COPPER SERVICE	EA	21	$	$
38	RECONNECT COPPER SERVICE	EA	13	$	$
39	HYDRANT ASSEMBLY (NEW MAIN)	EA	3	$	$
40	REMOVE HYDRANT ASSEMBLY	EA	2	$	$
41	REPLACE HYDRANT ASSEMBLY	EA	1	$	$
42	2" WATER BYPASS PIPING	LF	500*	$	$
43	SILT SACK	EA	10	$	$
44	RESTORATION OF LAWN AREAS	SY	1,800	$	$
45	MAINTENANCE AND PROTECTION OF TRAFFIC	DAY	60	$	$
46	TRAFFICPERONS (UNIFORMED FLAGGERS)	HRS	800	$	$

* Indeterminate quantity for bidding purposes only

TOTAL OF ALL BID ITEMS: $_____

A. The undersigned understands that there may be changes, omissions, or modification in the work, and that appropriate adjustments will be made to the Contract price in accordance with the Contract Documents.The undersigned understands that the Owner reserves the right to accept or reject any or all bids, and to waive all formalities, any irregularities, and accept the Bid deemed to be in the Owner's best interest.

B. Bid prices shall not include any sales, excise or other taxes for which the Owner is not liable. Town of Manchester is the awarding authority. The bid award is anticipated in **FEBRUARY 2020**. The Bidder agrees to hold the above pricing for sixty (60) days.

C. The Bid security in the sum of: **5% OF TOTAL BID** is to become the property of the Town in the event the above forms are not executed within the time set forth above, as liquidated damages, and not as a penalty for the delay and additional expense to the Town caused thereby.

Respectfully Submitted By:

(Signature) _____

Name (Please Print): _____

Title: _____

SEAL
(If Bid is by a Corporation)

Company: _____

Business Address: _____

_____

Business Phone: (__) _____

Business Fax: (__) _____

Email Address: _____

QUALIFICATIONS OF BIDDER

The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the Contract Documents, including Plans and Specifications. PLEASE PRINT OR TYPE THE FOLLOWING INFORMATION:

Project Name Morse Road and Salem Road Infrastructure Improvements

Bidder's Name _____

Bidder's Address _____

When Organized _____

1. How many years has Bidder been engaged in the contracting business under present firm name?

   _____

1a. Former firm names (if applicable). List previous names.

_____

_____

_____

2. The names and addresses of all persons interested in the bid (if made by a partnership or corporation) as Principals, are as follows (attach supplementary list if necessary):

_____

_____

_____

_____

_____

3. The Bidder is requested to state in Table 1 (see following page) a minimum of three (3) projects of similar nature to the project described herein, that the Bidder has completed, with name, address, and telephone number of a reference for each project.

TABLE 1

Project Name and Description	Project Duration	Total Project Cost	Value of Work Performed by Your Company	Project Reference Name, Address and Phone
	From To			
	From To			
	From To			
	From To			
	From To			
	From To			

4. List projects presently under contract by the Bidder, dollar volume of the contract, percent and estimated time of completion:

_____

_____

_____

_____

_____

5. Has the Bidder ever failed to complete work awarded; and if so, state where and why:

_____

_____

_____

_____

_____

6. If the Bidder has worked under the direction of a Consulting Engineer, list recent projects with name, address and telephone number of the Consultant:

_____

_____

_____

_____

_____

7. Does the Bidder plan to sublet any part of this work; and if so, give details: including name, address, phone number, contact person and list of references for each subcontractor.

_____

_____

_____

_____

_____

8. List equipment the Bidder owns that is available for this project:

_____

_____

_____

_____

_____

9. List equipment the Bidder plans to rent or purchase for this project:

_____

_____

_____

_____

_____

10. List name, address, and telephone number for the following:

Surety: _____

_____

Bank: _____

_____

Major Material Supplier:_____

_____

11. List Key Personnel to be employed for this project:_____

_____

_____

_____

_____

12. Remarks:_____

_____

_____

_____

_____

Respectfully Submitted:

By:_____

_____

_____

_____

SEAL
(If Bid is by a Corporation)

CONTRACT AWARD FORMS

Upon receipt of bid acceptance, all of the following documents contained within this section must be completed by the awarded bidder and returned within ten (10) calendar days. Failure to complete and return any of the documents will be cause for forfeiture of the bid security.

- Contract (Page BR-24 to BR-27)
- Certificate of Insurance (To be provided by Contractor)
- Performance Bond (Pages BR-28 to BR-29)
- Labor and Material Payment Bond (Pages BR-30 to BR-31)
- Contractor's Wage Certification Form (Page BR-32)

CONTRACT

THIS Contract, made this _____ day of _____, 20__, by and between the Town of Manchester, a municipality located within the County of Hartford in the State of Connecticut, acting through its General Manager, hereinafter called "TOWN," and hereinafter termed the "CONTRACTOR."

WITNESSETH: That the parties to this Agreement each in consideration of the Agreements on the part of the other herein contained have agreed, and by these presents do hereby agree, the TOWN for itself, and the CONTRACTOR for himself and his heirs, executors, administrators, successors and assigns, as follows:

A. That the Contract Documents consist of this Contract, together with all attachments including, but not limited to, the Legal and Procedural Documents, General Conditions, Technical Specifications, Contract Drawings, Exhibits and Addenda issued before execution of the Contract, for the Contract, all of which are included as if fully set forth herein;

B. That the CONTRACTOR has informed himself fully in regard to all conditions pertaining to the place where the Work is to be done and other circumstances affecting the Work;

C. That the CONTRACTOR has obtained all the information he needed to enable him to estimate fully and fairly the costs of the Work herein contemplated;

D. That the CONTRACTOR shall furnish all plant, labor, materials, supplies, tools, equipment, other facilities and things necessary for or incidental to properly construct the following:

_____

_____

_____

for the TOWN, in accordance with this Contract, and completing everything required of him under this Contract not later than the time stipulated in the Special Instructions to Bidders and the Form of General Bid.

E. The CONTRACTOR hereby agrees to commence the work under this Contract on the date to be specified in written Notice to Proceed from the TOWN.

F. The TOWN shall pay and the CONTRACTOR shall receive as full compensation for fulfilling everything required of the CONTRACTOR under this Contract, the unit prices and lump sums recorded in the Bid, a copy of which is appended to and is made a part of this CONTRACT.

G. That the quantities shown in the Bid are approximate only and are solely for the purpose of facilitating the comparison of Bids, that the TOWN shall not be held responsible if these quantities are not even approximately correct, that for all Work upon which unit prices are quoted the CONTRACTOR'S compensation shall be computed upon the Work actually

performed, measured by the units of measurement specified, whether greater or less than the quantities as shown in the Bid, and that the unit prices set against the several items cover all incidental services required of the CONTRACTOR under the Contract.

That the CONTRACTOR shall give to the TOWN as liquidated damages, not as a penalty, the sum, if any, as specified in the Special Instruction to Bidders, for each day required by the CONTRACTOR to complete the Work of the Contract beyond the time herein stipulated.

IN WITNESS WHEREOF, the parties to these present have executed this CONTRACT in the year and day first above mentioned.

_____
(TOWN)

(SEAL) By: _____

_____
(TITLE)

_____
(CONTRACTOR)

(SEAL) By: _____

_____
(TITLE)

IMPORTANT: Execute Acknowledgement of Officer or Agent of Contractor who signs this document (use proper form next page).

CONTRACT

(ACKNOWLEDGEMENT OF PRINCIPAL, IF A CORPORATION)

State of _____)
) SS:
County of _____)

On This _____ Day of _____, 20__, before me personally came and appeared _____to me known, who, being by me duly sworn, did depose and say that s/he resides at _____ and that s/he is the _____ of _____, the Corporation described in and which executed the foregoing instrument; that s/he knows the seal of said Corporation; that one of the impressions affixed to said instrument is an impression of such seal; that it was so affixed by order of the Directors of said Corporation, and that s/he signed his/her name thereto by like order.

(SEAL) _____
NOTARY PUBLIC

CONTRACT

(ACKNOWLEDGEMENT OF PRINCIPAL, IF A PARTNERSHIP)

State of _____)
) SS:
County of _____)

On this _____ Day of _____, 20__, before me personally came and appeared_____ to me known, and known to me to be, one of the members of the firm of _____, described in and who executed the same as and for the act and deed of said firm.

(SEAL) _____
NOTARY PUBLIC

* * * * * * * *

CONTRACT

(ACKNOWLEDGEMENT OF PRINCIPAL, IF AN INDIVIDUAL)

State of _____)
) SS:
County of _____)

On this _____Day of _____, 20__, before me personally came and appeared_____ to me known, and to me to be the person described in and who executed the foregoing instrument and acknowledged that he executed the same.

(SEAL) _____
NOTARY PUBLIC

PERFORMANCE BOND

Bond No._____

KNOW ALL MEN BY THESE PRESENTS:

THAT _____as Principal,

Hereinafter called "PRINCIPAL," and _____

_____ as Surety, hereinafter called "SURETY," are held and firmly bound unto the Town of Manchester, Connecticut, as Obligee, hereinafter called "TOWN," in the amount of Dollars, ($ _____), for the payment whereof PRINCIPAL and SURETY bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, PRINCIPAL has by written Contract dated _____ entered into a Contract with TOWN for _____

_____

which Contract is by reference made a part hereof, and is hereinafter referred to as the "CONTRACT."

NOW, THEREFORE, the condition of this obligation is such that, if PRINCIPAL shall promptly and faithfully perform said CONTRACT, and shall certify in writing that all wages paid under said CONTRACT to any mechanic, laborer or workman were equal to the rates of wages customary or then prevailing for the same trade or occupation in the Town of Manchester, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

Whenever PRINCIPAL shall be, and declared by the TOWN to be in default under the CONTRACT, the TOWN having performed its obligations thereunder, the SURETY may promptly remedy the default, or shall promptly:

1. Complete the CONTRACT in accordance with its terms and conditions; or

2. Obtain a bid or bids for submission to the TOWN for completing the CONTRACT in accordance with its terms and conditions, and upon determination by the TOWN and SURETY of the lowest possible bidder, arrange for a CONTRACT between such bidder and the TOWN, and make available as work progresses (even though there should be a default or a succession of defaults under the CONTRACT or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract Price; but not exceeding, including other costs and damages for which the SURETY may be liable hereunder, the amount set forth in the first paragraph hereof. The term, "Balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by the TOWN to PRINCIPAL under the

CONTRACT and any amendments thereto, less the amount properly paid by the TOWN to the PRINCIPAL.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the TOWN named herein or the heirs, executors, administrators or successors of TOWN.

Signed and sealed this _____ day of _____, A.D., 20__.

In the Presence of:

_____ _____(SEAL)
(PRINCIPAL)

_____ By:_____

_____ _____
(SURETY)

By: _____

LABOR AND MATERIAL PAYMENT BOND

Bond No._____

Note: This bond is issued simultaneously with another bond in favor of the Town of Manchester, Connecticut conditioned for the full and faithful performance of the Contract.

KNOW ALL MEN BY THESE PRESENTS:

THAT _____ as Principal, hereinafter called "PRINCIPAL," and as Surety, hereinafter called "SURETY," are held and firmly bound unto the Town of Manchester, Connecticut, as Obligee, hereinafter called "TOWN," for the use and benefit of claimants as herein below defined, in the amount of _____ Dollars ($_____), for the payment whereof PRINCIPAL and SURETY bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, PRINCIPAL has by written Contract dated _____ entered into a Contract with Town for

made a part hereof, and is hereinafter referred to as the "CONTRACT."

NOW, THEREFORE, the condition of this obligation is such, that if the said PRINCIPAL shall pay for all labor and materials furnished to himself or his Subcontractors for use in the prosecution of the Work, and used therein, then, this obligation to be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Sections 49-41, 49-41a, 49-41b, 49-42 and 49-43 of the General Statutes (C.G.S.A. and Supp. 1989) of the State of Connecticut and any other applicable laws, and the rights and liabilities hereunder shall be determined and limited by said sections and said other applicable laws, to the same extent as if they were copied at length herein.

Signed and sealed this _____ day of _____, A.D., 20__.

In the Presence of:

_____ _____(SEAL)
(PRINCIPAL)

_____ By: _____

_____ _____
(SURETY)

_____ By:_____

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM

I, _____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

_____
Street

_____
City

and all of its subcontractors will pay all workers on the

_____
Project Name and Number

_____
Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

_____
Signed

Subscribed and sworn to before me this _____ day of _____, _____

_____
Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

SECTION 2

GENERAL CONDITIONS
FOR ALL PROJECTS

ARTICLE 1 - DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents, the following terms shall have the meanings, which shall be applicable to both the singular and plural thereof:

Bid	The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
Bidder	Any person, firm or corporation submitting a Bid for the Work.
Bonds	Bid, performance, labor and materials payment bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.
Change Order	A written order to the Contractor signed by the Director of Public Works of the Town or his duly authorized agent authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time issued after execution of the Contract.
Contract	The written Contract between the Town of Manchester (hereinafter referred to as "the Town") and the Contractor covering the Work to be performed, including the Contractor's Bid and the bonds.
Contract Date	The date on which the Contractor is directed to commence work, as indicated in the written Notice to Proceed.
Contract Documents	The signed Contract, executed bid bond, performance bond, labor and materials payment bond, Notice of Award, Notice to Proceed, Contract Drawings and Specifications, and Modifications.
Contract Drawings	The drawings and plans which show the character and scope of the Work to be performed and which have been prepared and/or approved by the Engineer and are referred to in the Contract Documents.
Contract Price	The total monies payable to the Contractor under the Contract Documents.
Contract Specifications	The Invitation to Bid, Rules and Regulations for Competitive Bidding, Standard and Special Instructions to Bidders, Insurance and Indemnification Form, Form of General Bid, Qualifications of Bidders, Contract, Addenda (whether issued prior to the opening of Bids or the execution of the Agreement), Performance Bond Form, Labor and Materials Payment Bond Form, General Conditions, Notice to Contractor, Technical Specifications, Appendices and Exhibits.

Contract Time	The number of working days stated in the Contract Documents for the completion of the Work.
Contractor	The person, firm or corporation with whom the Town has executed the Contract.
Day	A calendar day of twenty-four (24) hours measured from midnight to the next midnight.
Engineer	Wherever in the Contract Documents the word "Engineer" is used it shall be understood as referring to the Director of Public Works acting personally or through a duly authorized representative.
Field Modification	A directive, usually verbal, for a minor change or alteration in the Work that causes no increase in Contract Price or extension of Contract Time.
Field Directive	A written directive for a change or alteration in the Work that is the result of a difference in condition between that shown on the Contract Drawings and that found in the field. Each Field Directive will subsequently be reviewed to determine if a Change Order is warranted.
Furnish, Install, etc.	The terms "furnish," "install," "construct," "furnish and install," or any similar term contractions, unless specifically noted to the contrary, shall include all materials, equipment, tools, labor, light, power, transportation and any other incidentals required for the completion of the Work.
Inspector	The authorized representative of the Engineer or Town who is assigned to the Project or any parts thereof.
Modification	(1) A Field Modification; (2) A Field Directive; (3) A Change Order; (4) A written clarification or interpretation issued by the Engineer. A modification may only be issued after execution of the Contract.
Notice of Award	The written notice by the Town to the apparent successful Bidder stating that, upon compliance by him with the conditions stated therein within the time specified, the Town will execute and deliver the Contract to him.
Notice to Proceed	Written notification by the Town to the Contractor indicating the date on which the Contractor is expected to commence Work.

Project	The entire construction to be performed as provided in the Contract Documents.
Shop Drawings	All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a Subcontractor, Manufacturer, Supplier or Distributor and which illustrate the material, equipment or some portion of the Work.
Subcontractor	An individual, firm or corporation having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the site.
Substantial Completion	The date, as certified by the Engineer, when the construction of the Project or a specified part thereof is sufficiently completed in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it was intended.
Work	Any and all obligations, duties and responsibilities necessary to the successful completion of the Project assigned to or undertaken by the Contractor under the Contract Documents, including the furnishing of all materials, equipment, tools, labor and other incidentals necessary to complete the Work.

ARTICLE 2 - AVAILABILITY OF LANDS

2.1 RIGHTS-OF-WAY

As indicated in the Contract Documents, the Town will provide, not later than the date when needed by the Contractor, rights of way for access to the lands upon which the Work is to be done, and such other lands which are designated for the use of the Contractor. Easements for permanent structures or permanent changes in existing facilities will be secured and paid for by the Town, unless otherwise specified in the Contract Documents. If the Contractor believes that any delay in the Town's furnishing these lands or providing such easements entitle him to an extension of the Contract Time, he may make a claim therefore as provided hereafter.

Temporary rights of entry giving the Contractor the right to enter upon private property will be secured by the Town for any work on private property that is shown on the Plans.

2.2 MATERIALS AND EQUIPMENT STORAGE

The Contractor will not be allowed to store materials or equipment within Town right-of-way. The Contractor shall provide all additional lands and access thereto that may be required for the storage of materials and equipment. Evidence of agreement(s) with private property owner(s) for the storage of equipment and materials must be provided to the Town. In no case, even with the property owner's consent, will storage of materials or equipment be allowed where such storage will impact existing sightlines at intersecting roadways.

ARTICLE 3 - BONDING AND INSURANCE

3.1 BONDING

In addition to the Bid Bond required under the "Bidding Requirements" section of these Specifications, the Contractor shall furnish a Surety Bond acceptable to the Town in an amount at least equal to 100 percent of the Contract Price as security for the faithful performance of this Contract, and for payment of all persons performing labor under this Contract and furnishing materials in connection with this Contract. The surety on such Bond shall be a duly authorized surety company, satisfactory to the Town and authorized to do business in the State of Connecticut.

In addition, and not in lieu thereof, the Contractor, within thirty (30) days after payment to the Contractor in the manner provided for under this Contract, shall pay any amounts due any Subcontractor, whether for labor performed or materials furnished, when the labor or materials have been included in a requisition for payment submitted by the Contractor and paid by the Town [Conn. Gen. Stat. Sec. 49-41a(a)(1)].

The Contractor shall include in each of its Subcontracts under this Contract, a provision requiring each of the Contractor's Subcontractors to pay any amounts due any of the Contractor's Subcontractor's Subcontractors whether for labor performed or materials furnished, within thirty (30) days after such Subcontractor receives a payment from the Contractor which encompasses labor or material furnished by such Subcontractor [Conn. Gen. Stat. Sect. 49-41a(a)(2)].

3.2 INSURANCE

The Contractor shall furnish Certificates of Insurance in accordance with the provisions indicated under the "Standard Insurance and Indemnification Requirements for Bids, Permits and the Use of Any Town Facility" in the "Bidding Requirements" section of these Specifications.

Said policy may not be canceled or coverage reduced or terms altered in any manner detrimental to the coverage, except after delivery to the Town of written notice not less than sixty (60) days prior. No cancellation provisions in any such insurance policy shall be construed in derogation of the continuous duty of the Contractor to furnish insurance during the term of this Contract.

ARTICLE 4 – CLAIMS

4.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the contract. The term "Claim" also includes other disputes and matters in questions between the Town and Contractor arising out of or relating to the Contract. The responsibility to substantiate claims shall rest with the party making the Claim.

4.2 NOTICE OF CLAIMS

Claims by the Contractor must be initiated by written notice to the Engineer within fifteen (15) calendar days after occurrence of the event giving rise to such Claim or within fifteen (15) calendar days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

4.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing, Contractor shall proceed diligently with performance of the Contract and the Town shall continue to make payments in accordance with the Contract Documents.

4.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work.

4.5 CLAIMS FOR ADDITIONAL TIME

If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work as more fully described in the General Conditions. In the case of a continuing delay, only one Claim is necessary.

If abnormal weather conditions are the basis for a Claim for additional time, such Claim shall be documented by date substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

4.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Town waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes:

1. damages incurred by the Town for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
2. damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination. Nothing contained in this herein shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

ARTICLE 5 - CHANGES IN THE WORK

5.1 GENERAL

Without invalidating the Contract, the Town may, at any time or from time to time, order additions, deletions or revisions in the Work. These will be authorized by Field Modifications, Field Directives or Change Orders. Upon receipt of a Field Modification, Field Directive or Change Order, the Contractor will proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any Field Order or Change Order causes an increase in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made. If any Field Order or Change Order causes a decrease in the Contract Price, the Town shall be entitled to a credit as calculated by the provisions in this Section and may include a shortening of the Contract Time.

(a) The Engineer may authorize minor changes or alterations in the Work which do not involve extra cost or are not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Modification. If the Contractor believes that any minor change or alteration authorized by the Engineer entitled him to an increase in the Contract Price or an extension of Contract Time, he may make a Claim as provided in the General Conditions.

(b) Additional Work performed by the Contractor without authorization of a Field Modification, Field Directive or Change Order may not entitle him to an increase in the Contract Price or an extension of the Contract Time except in the case of an emergency or other extenuating circumstances as provided in these General Conditions. In emergencies or other extenuating circumstances, payment shall be handled on an individual basis, as determined by the Engineer, in accordance with these Contract Documents.

(c) It is the Contractor's responsibility to notify his Surety of any changes affecting the general scope of the Work, changes in the Contract Price or any other changes that require consent of the Surety. The Contractor will furnish proof of consent by the Surety to any such changes. The Contractor will indemnify and save harmless the Town from all damages, losses and expenses, including attorney's fees, incurred by the Town as a result of denial of liability or delay of performance by the Contractor's Surety with respect to any changes in the Work as herein provided.

Once the parties execute a Change Order with respect to any matter, the Contractor shall not be entitled to any change or any Claim for a change, schedule extension or variation or Modification of any other item that was included in such Change Order.

5.2 CHANGES TO CONTRACT TIME

The Contract Time may only be changed by a Change Order. . Any change in the Contract Time resulting from any such Claim shall be incorporated in a Change Order. In the event the Contractor fails to submit a Claim for an extension in the Contract Time in the time period specified in the Contract Documents, Contractor shall be deemed to have waived the right to any change or any other relief.

The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of the Contractor if he makes a Claim therefor as provided in paragraph above. Such delays shall include, but not be restricted to, acts of neglect by any separate Contractor employed by the Town, or Force Majeure Excused Event.

All time limits stated in the Contract Documents are of the essence of the Contract. The provisions of this article shall not exclude recovery for damages (including compensation for additional professional services) for delay by either party.

It is the Contractor's responsibility to notify his Surety of any extension in the Contract Time. The Contractor will furnish proof of consent by the Surety to any such extension. The Contractor will indemnify and save harmless the Town from all damages, losses and expenses, including attorney's fees incurred by the Town as a result of denial of liability or delay of performance by the Contractor's Surety with respect to any changes in the Work as herein provided.

In support of any request for an extension of the contract Time, Contractor must demonstrate to the reasonable satisfaction of Town that the critical path of the Project Schedule was delayed. Contractor shall be entitled to an increase in the Contract Time for the number of days that the critical path was delayed solely as a result of the compensable or excusable event. Contractor shall compare the critical path of the Project Schedule to the actual critical path of the Work, identifying the specific impact of the compensable or excusable event. Contractor shall submit to the Town a written time impact analysis illustrating the influence of each compensable or excusable event on the Date of Substantial Completion. Each time impact analysis shall include a fragmentary network (network analysis) demonstrating how the Contractor proposes to incorporate the delay into Project Schedule. The time impact analysis shall demonstrate the time impact based on the date of the delay in time and the event time computation of all affected activities.

5.3 CHANGES TO CONTRACT PRICE

The value of any Change in Work covered by a Field Directive/Change Order that results in an increase in the Contract Price or credit to the Town shall be determined in one of the following ways:

(1) By application of unit prices to the quantities of the items involved when the Work involved is covered by unit prices contained in the Contract Documents

(2) By mutual acceptance of a lump sum.

(3) By the actual cost of the Work and a fixed amount for overhead and profit.

a) Costs shall only include labor (payroll, payroll taxes, fringe benefits, workmen's compensation, etc.), materials, equipment, tools and other incidentals directly related to the Work involved. In such case, the Contractor will submit, in form prescribed by the Engineer, an itemized cost breakdown together with supporting data. The maximum percentage which shall be allowed for Contractor's combined overhead and profit shall be as follows:

1) For all such Work done by his own organization, the Contractor may add up to fifteen percent (15%) of his actual **net increase** in costs, and

2) For all such Work done by Subcontractors, each Subcontractor may add up to ten percent (10%) of his actual **net increase** in costs for combined overhead and profit, and the Contractor may add up to five percent (5%) of the Subcontractor's **net increase** in costs for his combined overhead and profit. No overhead or profit shall be allowed on costs incurred in connection with premiums for public liability insurance or otherwise special insurance directly related to such Work.

3) When determining the amount of credit to the Town for any change which results in a decrease in costs, said credit will be determined by the Engineer. The actual cost of the Work described above minus any credits shall be the **net increase** in costs used to determine combined overhead and profit.

ARTICLE 6 - CONTROL OF THE WORK AREA

6.1 GENERAL HOUSEKEEPING

The Contractor will keep the Work area free from accumulations of waste materials, rubbish and other debris resulting from the Work and legally dispose of same, and at the completion of the Work he will remove all waste materials, rubbish and debris from and about the premises and legally dispose of same, as well as all tools, construction equipment and machinery, and surplus materials. He will leave the site clean and ready for occupancy by the Town.

6.2 DUST CONTROL

During the progress of the Work, the Contractor shall conduct his operations and maintain the area of his activities so as to minimize the creation and dispersion of dust. If the Town determines that it is necessary to use water or calcium chloride for more effective dust control, the Contractor shall furnish and spread the materials, as directed. If there is no direct method of payment specified elsewhere in the contract documents, this Work will be performed without additional compensation.

6.3 MAINTENANCE OPERATIONS

The Contractor must accommodate routine and emergency maintenance operations performed by the Town (i.e. refuse pickup, leaf collection, snow plowing, etc.) within the Work area.

6.4 SANITARY PROVISIONS

The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of its employees as may be necessary to comply with the regulations and requirements of the State Department of Public Health.

ARTICLE 7 - COORDINATION

7.1 WITH OTHER WORK

The Town may award other contracts in the vicinity of the Work which may proceed simultaneously with the execution of this Contract. The Contractor shall perform his Work, causing as little interference with other Contractors, so far as circumstances will permit. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work, and shall properly connect and coordinate his Work with theirs.

Wherever Work being done by the Town of Manchester's forces or by other Contractors is contiguous to Work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer, to secure the completion of the various portions of the Work in general harmony.

7.2 WITH UTILITY COMPANIES

At least two full days, excluding Saturdays, Sundays and holidays, but not more than thirty days before commencing excavation, the Contractor shall call the telephone number 1-800-922-4455 (Call Before You Dig) to allow notification of utilities. The Contractor shall be responsible for coordinating his own work and that of his Subcontractors with any and all utilities in the work area.

The Contractor shall be responsible to coordinate all construction activities with the appropriate utilities. Where the Engineer determines that the relocation or adjustment of public or private utilities is dependent upon the performance of certain contract requirements, the Contractor shall perform these operations within a reasonable length of time.

The Contractor shall schedule his operations in such a manner as to minimize interference with the operation of the forces of utility companies or the Town in effecting the installation of new facilities as shown on the plans or relocation of their existing facilities. The Contractor shall consider in his bid all permanent and temporary utility appurtenances in their present or relocated positions and installation of new facilities as required for the project; and no additional compensation will be made for delays, inconvenience or damage sustained by him due to interference form the above-noted utility appurtenances or the operation of installing or moving them.

The Contractor shall be responsible to support all utility poles in the vicinity of excavations necessary to perform work under this project. The Contractor must obtain all approvals required by the custodian of the utility pole, and coordinate all work. There will be no direct payment for the support of utility poles.

ARTICLE 8 - ENGINEER'S CONTROL

8.1 GENERAL

In the performance of the Work, the Contractor shall abide by all orders, directions and requirements of the Engineer and shall perform all Work to the satisfaction of the Engineer and, at such time and places, by such methods and in such manner and sequence as he may require. The Engineer shall determine the amount, quality, acceptability and fitness of all parts of the Work, shall interpret the Contract Documents and Modifications and shall decide all other questions in connection with the Work.

The enumeration herein or elsewhere in the Contract Documents of particular instances in which the opinion, judgment, discretion or determination of the Engineer shall control, or in which Work shall be performed to his satisfaction or subject to his approval or inspection, shall not imply that only matters similar to those enumerated shall be so governed and performed but, without exception, all the Work shall be governed and so performed.

The Town shall issue all communications to the Contractor through the Engineer.

The Engineer will **not** be responsible for the Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto; and he will **not** be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents.

The Engineer will **not** be responsible for the acts or omissions of the Contractor or any Subcontractors, or any of his or their agents, servants or employees, or any other persons at the site or otherwise performing any of the Work.

8.2 AUTHORITY AND DUTIES OF THE INSPECTOR

Inspectors employed by the Town shall be authorized to inspect all Work done and material furnished. Such inspection may extend to all or any part of the Work and to the preparation or manufacture of the materials to be used. In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the Work, the Inspector shall have authority to reject material or suspend the Work until the question at issue can be referred to and decided by the Engineer. The Inspector shall **not** be authorized to revoke, alter, enlarge, relax or release any requirements of the Contract Drawings and Specifications, nor to approve or to accept any portion of the Work, nor issue instructions contrary to the Contract Drawings and Specifications. The Inspector shall in no case act as foreman or perform other duties for the Contractor, or interfere with the management of the Work by the latter. Any advice which the Inspector may give the Contractor shall in no circumstance be construed as binding the Town in any way nor releasing the Contractor from fulfillment of the terms of the Contract.

ARTICLE 9 – INSPECTION, TESTING, AND CORRECTION OF THE WORK

9.1 GENERAL

All materials and each part or detail of the work shall be subject at all times to inspection by the Engineer. The Engineer shall be allowed unhindered access to all parts of the work and shall be furnished with such information and assistance by the Contractor as the Engineer deems necessary to make a complete, detailed and timely inspection.

The Contractor shall always notify the Engineer of its intention to perform work on the Project, including notice of the particular work it intends to perform, at least 24 hours before the Contractor commences that work.

The Contractor shall be responsible for coordinating his/her Work with the Engineer at all times. In instances when it shall be necessary to utilize Manchester Public Works Department inspectors during other than normal Department working hours, the Contractor shall make payment to the Town of Manchester for such use. Normal working hours for the Department are from 7:30 a.m. to 4:00 p.m. daily, Monday through Friday, excluding holidays. The Town's holiday schedule is attached to these Contract Documents in an appendix. Payment will be made in accordance with the following:

1. For each Public Works Department employee utilized by the Contractor, the Town shall receive the standard overtime rate paid to the employee by the Department.

2. In the event a Public Works Department employee is called out after the end of normal working hours, minimum payment to the Town by the Contractor for each Department employee utilized shall be at the standard overtime rate for a period no less than four (4) hours. Payment for overtime that is a continuation of the normal working day shall be at the standard overtime rate for the actual hours worked. There will be no charge for use of Department personnel during normal working hours for services provided by the Department.

9.2 TESTING AND INSPECTIONS

Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities.

The Contractor shall make arrangements for such quality control testing as necessary to demonstrate that the Work will meet specifications. Unless otherwise specified, the Engineer shall perform and bear the costs for initial quality assurance testing to verify that the Work meets

specifications. If the results of the initial quality assurance testing reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated inspection(s) and compensation for the Engineer's services and expenses shall be at the Contractor's expense.

Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Engineer prior to construction.

Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

All testing will be in accordance with the methods prescribed by the American Society for Testing and Materials or such other applicable organization as may be required by law or the Contract Documents.

Any work which fails to meet the requirements of any such test, inspection or approval, and any work which meets the requirements of any such test or approval but does not meet the requirements of the Contract Documents shall be considered defective. Such defective work may be rejected, corrected or accepted as provided.

Neither observations by the Engineer nor inspections, tests or approvals by persons other than the Contractor, shall relieve the Contractor from his obligations to perform the Work in accordance with the requirements of the Contract Documents.

9.3 ACCESS TO THE WORK

The Contractor shall provide the Engineer and his representative's safe access to the Work at all times. The Contractor will provide proper facilities for such access and observation of the Work and also for any inspection or testing thereof by others.

9.4 COSTS FOR UNCOVERING WORK

(1) If any Work is covered contrary to the request of the Engineer, it must, if requested by the Engineer, be uncovered for his observation and replaced at the Contractor's expense.

(2) If any such Work required so to be inspected, tested or approved is covered up without written approval or consent of the Engineer, it must, if directed by the Engineer, be uncovered for observation at the Contractor's expense.

(3) If any Work has been covered which the Engineer has not specifically requested to observe prior to its being covered, or if the Engineer considers it necessary or advisable that covered Work be inspected or tested by others, the Contractor, at

the Engineer's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Engineer may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective or does not meet the requirements of the Contract Documents, the Contractor will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate Change Order shall be issued deducting all such costs from the Contract Price. If, however, such work is found to be non-defective and meets the requirements of the Contract Documents, the Contractor will be allowed an increase in the Contract Price or extension of the Contract Time directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction if he makes a claim therefore as provided hereafter.

ARTICLE 10 - INTENT OF CONTRACT DOCUMENTS

It is the intent of the Contract Drawings and Specifications to describe a complete Project to be constructed in accordance with the Contract Documents. The Contract Documents comprise the entire Contract between the Town and the Contractor, and any prior oral representations are null and void. The Contract may be altered only by a Modification.

The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If the Contractor finds a conflict, error or discrepancy in the Contract Documents, he will call it to the Engineer's attention in writing before proceeding with the Work affected thereby. In resolving such conflicts, errors and discrepancies, the documents shall be given precedence in the following order: Contract, Contract Specifications and Contract Drawings. Within the Contract Specifications, the order of precedence shall be: "Section 3 – Project Specific Requirements", "Section 2 – General Conditions for All Projects", "Section 1 – Bidding Requirements". Figure dimensions on drawings shall govern over scale dimensions and detailed drawings over general drawings. Any Work that may reasonably be inferred from the Contract Drawings and Specifications as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which so applied have a well-known technical or trade meaning shall be deemed to refer to such recognized standards. The Contractor assumes full responsibility for having familiarized himself with the nature and extent of the Contract Documents, Work, locality, and local conditions that may in any manner affect the Work to be done.

The captions which have been used in these Contract Documents are for convenience only and should not be construed to define or limit the meaning and intent of the paragraphs to which the captions apply.

Wherever in these Contract Documents reference is made to "Form 817", it shall mean, "State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 817", dated 2016, with all addenda at the time of award. Particular paragraphs and articles cited herein are made a part of these Contract Documents.

The quantities of work as listed in the Proposal Estimate Bid Sheet are to be used for comparison bidding. The quantities in all items of work may differ from the actual quantities of work listed due to actual field locations and conditions.

ARTICLE 11 - LAYOUT OF WORK

Unless noted otherwise in the Contract Documents, the Town of Manchester Survey Unit will be responsible for providing limited layout and staking required for construction. The Contractor shall provide the Engineer a minimum of forty-eight (48) hours advanced notice for all survey requests and shall maintain and protect all survey stakes during construction. The Contractor will be charged $150.00 per hour for any re-staking required due to the Contractor's negligence in protecting the original stakes.

The Contractor shall be responsible for retaining a Professional Land Surveyor (PLS) licensed in the State of Connecticut for the layout and staking of all the Work when "Construction Staking" is included as a bid item in the Contract. The Town of Manchester will provide to the Contractor's surveyor an electronic copy of the proposed Plan in AutoCAD .dwg or .dwf format to assist in the preparation of construction staking. All stakes shall be maintained as necessary to complete and inspect the Work. The Contractor shall maintain baseline stakes and/or critical control necessary for the Engineer to verify the accuracy of the Work.

ARTICLE 12 - LEGAL REQUIREMENTS

12.1 TERMINATION BY THE TOWN FOR CONVENIENCE

The Town may, at any time, terminate the Contract for the Town's convenience and without cause.

Upon receipt of written notice from the Town of such termination for the Town's convenience, the Contractor shall

(1) cease operations as directed by the Town in the notice;

(2) take actions necessary, or that the Town may direct, for the protection and preservation of the Work; and

(3) except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

In case of such termination for the Town's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

12.2 TERMINATION BY THE TOWN FOR CAUSE

The Town may terminate the Contract if the Contractor:

(1) repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

(2) fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

(3) repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;

(4) otherwise is guilty of substantial breach of a provision of the Contract Documents; or

(5) adjudged bankrupt or insolvent, or he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or similar laws.

When any of the above reasons exist, the Town, may without prejudice to any other rights or remedies of the Town and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

(1) exclude the Contractor from the site and take possession of all materials, equipment, tools and construction equipment and machinery thereon owned by the Contractor;

(2) accept assignment of subcontracts pursuant to the General Conditions; and

(3) finish the Work by whatever reasonable method the Town may deem expedient. Upon written request of the Contractor, the Town shall furnish to the Contractor a detailed accounting of the costs incurred by the Town in finishing the Work.

When the Town terminates the Contract for one of the reasons stated above, the Contractor shall not be entitled to receive further payment until the Work is finished.

If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, and other damages incurred by the Town and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Town. The amount to be paid to the Contractor or Town, as the case may be, shall be certified by the Engineer, upon application, and this obligation for payment shall survive termination of the Contract.

If, in the opinion of the Town, the Contractor is not executing the Work at a sufficient rate of progress, so as to finish in the time specified, or has abandoned said Work or is not complying with the terms and stipulations of the Contract Documents the Town may serve notice on the Contractor to adopt such methods as will insure the completion of the Work in the time specified, or in compliance with the terms and stipulations of the Contract Documents. If, within five (5) days after the Town has notified the Contractor that his Work is not carried on satisfactorily as before mentioned, the Town shall have the right to terminate the Contract and manage the Work under the direction of the Engineer, or relet, for the very best interest of the Town as a new Contract, the Work remaining to be done, without, in any manner, affecting or releasing the Bond of defaulting Contractor, and the cost of the Work under said new Contract shall be considered the cost to the Town of the Work left undone by the defaulting Contractor.

ARTICLE 13 - MATERIALS

13.1 GENERAL

The Contractor will provide and pay for all materials, equipment, tools, labor, transportation, construction equipment and machinery, appliances, fuel, power, light, heat, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of the Work.

Unless otherwise specified, all materials and equipment incorporated in the Work shall be new. If required by the Engineer, the Contractor will furnish satisfactory evidence as to the kind and quality of materials and equipment.

All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator or processors, except as otherwise specifically provided in the Contract Documents.

13.2 "OR EQUAL" CLAUSE

Wherever in these Contract Documents a particular brand, make of material, device or equipment is shown or specified and followed by the clause "or equal," such brand, make of material, device or equipment specified shall be regarded as the standard, and shall not preclude the furnishing of items other than those specified where the quality, use and serviceability of the substitute is determined by the Engineer to be the same or equal of the standard. If the clause "or equal" is not used, the particular brand, make of material, device or equipment specified **shall** be provided.

13.3 SHOP DRAWINGS AND SAMPLES

After checking and verifying all field measurements, the Contractor will submit to the Engineer for approval, in accordance with the accepted schedule of Shop Drawing submissions, five (5) copies (or at the Engineer's option, one (1) reproducible copy) of all Shop Drawings, which shall have been checked by and stamped with the approval of the Contractor and identified as the Engineer may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction, manufacturer's certificates and the like to enable the Engineer to review the information as required.

The Contractor will also submit to the Engineer for approval, with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and stamped with the approval of the Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.

At the time of each submission, the Contractor will, in writing, call the Engineer's attention to any deviations that the Shop Drawing or sample may have from the requirements of the Contract Documents.

The Engineer will check and approve with reasonable promptness Shop Drawings and samples, but his checking and approval shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. The Contractor will make any corrections required by the Engineer and will return the required number of corrected copies of Shop Drawings and resubmit new samples until approved. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by the Engineer on previous submissions.

No work requiring a Shop Drawing or sample submission shall be commenced until the submission has been approved by the Engineer.

The Engineer's approval of Shop Drawings or sample shall not relieve the Contractor from his responsibility for any deviations from the requirements of the Contract Documents, unless the Contractor has in writing called the Engineer's attention to such deviations at the time of submission and the Engineer has given written approval to the specific deviation, nor shall any approval by the Engineer relieve the Contractor from responsibility for errors or omissions in the Shop Drawings.

13.4 CONNECTICUT SALES AND USE TAX

Materials and equipment purchased for installation in this project will be exempt from the Connecticut Sales and Use Tax under the Connecticut Education, Welfare and Public Health Tax Act. Each Bidder shall take this exemption into account in calculating his bid for the Work.

13.5 SURPLUS EXCAVATED MATERIALS

All surplus excavated material shall become the property of the Contractor, except where otherwise specifically noted in the Contract Documents or required for other portions of the Work as directed by the Engineer. The Contractor shall remove and dispose of such surplus material not required for other portions of the job and legally dispose of same.

ARTICLE 14 - PERMITS

14.1 GENERAL

Permits, fees, and licenses, necessary for the prosecution of the Work shall be secured and paid for by the Contractor. Such permits, licenses, etc., shall be obtained by the Contractor prior to performing any Work and shall include, but not be limited to, water and sewer permits, building permits, landfill permits, de-watering permits and road-cut permits. Evidence of all pertinent licenses shall be provided to the Engineer upon request. **NO FEES WILL BE WAIVED UNLESS SPECIFICALLY INDICATED OTHERWISE IN THE NOTICE TO CONTRACTOR.**

The Contractor will give all notices and comply with all laws, ordinances, rules and regulations applicable to the Work. If the Contractor observes that the Contract Drawings and Specifications are at variance therewith, he will give the Engineer prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate Modification. If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Engineer, he will bear all costs arising therefrom.

14.2 RIGHT OF WAY PERMIT

Prior to any construction, the Contractor must take out a "Right of Way Permit" with the Town of Manchester Engineering Division.

14.3 WATER AND SEWER PERMIT

Prior to any construction involving or impacting facilities owned and/or operated by the Town of Manchester Water and Sewer Department, the Contractor must take out a "Water and Sewer Permit" with the Town of Manchester Engineering Division.

14.4 LANDFILL PERMIT

Regardless of whether tipping fees are waived or not, any Contractor or subcontractor wishing to dispose of any material at the Town of Manchester Landfill must possess a valid permit for each vehicle entering the Landfill. Contact the Town of Manchester Landfill at 647-3257 for permit fees and other information.

14.5 BUILDING PERMITS

Certain work including, but not limited to, retaining wall construction and electrical work, requires a building permit. The Contractor shall secure building permit(s) for such work at the Town of Manchester Building Department. Contact the Town Building Department at 647-3052 for building permit information.

14.6 SPECIAL PERMITS

Some projects will have required special approval(s) from the Town of Manchester Planning and Zoning Commission, the State of Connecticut Department of Energy and Environmental Protection (DEEP), the United States Army Corps of Engineers or any other agency with jurisdictional rights. In most of these cases, separate plans have been approved and are on file. Any specific permit approval(s) by another agency or commission will be identified in the "Notice to Contractor" section of these Specifications. If such permits are identified, then the approved permit plans are hereby made part of the Contract Documents and the Contractor represents that he/she is fully aware of all the requirements of the permit and his/her intention to comply with such requirements.

14.7 CONNDOT ENCROACHMENT PERMIT

If any of the Work is within or directly abuts a State road, the Contractor must secure and pay for an "Encroachment Permit" from the Connecticut Department of Transportation – District 1. By signing the Contract, the Contractor represents that he/she is fully aware of the permit requirements and of his/her intention to comply with such requirements. The Contractor shall submit a copy of the permit to the Engineer prior to construction.

ARTICLE 15 - PRELIMINARY MATTERS

15.1 CONTRACT DOCUMENTS

At least three (3) counterparts of the Contract and such other Contract Documents as practicable will be executed and delivered by Contractor to the Town within ten (10) days of the Notice of Award. When he delivers the executed Contracts to the Town, the Contractor shall also deliver to the Town such Bonds and Certificates of Insurance as he may be required to furnish in accordance with the Contract Specifications.

15.2 PRECONSTRUCTION MEETING

Prior to any construction, a preconstruction meeting will be held to review schedules, to establish procedures for handling Shop Drawings and other submissions, to review the procedures for processing Applications for Payment and to establish a working understanding between the parties with respect to the Project. Representatives from the Contractor shall be at a minimum the Project Manager and a representative from each major subcontractor.

15.3 KNOWLEDGE OF PROJECT

The Contractor represents that he has familiarized himself with, and assumes full responsibility for having familiarized himself with the nature and extent of the Contract Documents, work, locality and with all local conditions and Federal, State and local laws, ordinances, rules and regulations that may in any manner affect performance of the Work, and represents that he has correlated his study and observations with the requirements of the Contract Documents. Contractor also represents that he has studied all surveys and investigation reports of subsurface and latent physical conditions referred to in the Contract Documents, and made such additional surveys and investigations as he deems necessary for the performance of the Work at the Contract Price, in accordance with the requirements of the Contract Documents, and that he has correlated the results of all such data with the requirements of the Contract Documents. In addition, the Contractor represents that he has contacted all utility companies or contractors who may be doing work in the Project area to insure that their activities and schedules have been taken into account when planning his own Work.

15.4 COPIES OF DOCUMENTS

The Town will furnish the Contractor up to five (5) copies of the Contract Drawings and Specifications as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

ARTICLE 16 - PROGRESS PAYMENTS

At least ten (10) days before each progress payment falls due (but not more often than once a month), the Contractor will submit to the Engineer for review the Application for Payment filled out on forms provided by the Engineer and signed by the Contractor covering the Work completed as of the date of the Application and supported by such data as the Engineer may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work, but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such supporting data, satisfactory to the Town, as will establish the owner's title to the material and equipment and protect his interest therein, including applicable insurance.

The Contractor warrants and guarantees that title to all Work, materials and equipment covered by an Application for Payment, whether incorporated in the Project or not, will have passed to the Town prior to the making of the Application for Payment, free and clear of all liens, claims, security interests and encumbrances; and that no Work, materials or equipment covered by an Application for Payment will have been acquired by the Contractor or by any other person performing the Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

The Engineer will, within ten (10) days after receipt of each Application for Payment, either indicate in writing his approval of payment and present the Application to the Town, or return the Application to the Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Application.

The Town may withhold some or all of each Progress Payment if the Contractor fails to adequately supply skilled workers to perform the work and/or has not submitted all requisite paperwork.

The amount paid the Contractor shall be the amount due less five percent (5%) retainage. At the completion of the Work, the Town will retain five percent (5%) of the total project for a period of one (1) year. Upon written request by the Contractor, this retainage will be released after a final inspection is made and all items of Work are found to have been performed in accordance with the pertinent Contract Drawings and Specifications.

The Town will, within thirty (30) working days of receipt of an approved Application for Payment, pay the Contractor the amount approved by the Engineer.

ARTICLE 17 - PROSECUTION AND PROGRESS

17.1 GENERAL

It is hereby understood and mutually agreed, by and between the Contractor and the Town, that the date of beginning and the time for completion, as specified in the Contract of the Work to be done hereunder are **essential conditions** of this Contract; and it is further mutually understood and agreed that the Work embraced in this Contract shall be commenced on a date to be specified in the Notice to Proceed.

The Contractor agrees that said Work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Town, that the time for the completion of the Work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

17.2 LIQUIDATED DAMAGES

If the Contractor shall neglect, fail or refuse to complete the Work within the time herein specified, or any proper extension thereof granted by the Town, then the Contractor does hereby agree, as a part consideration for the awarding of this Contract, to pay to the Town the amount specified in the Contract, not as a penalty but as liquidated damages for such breach of Contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the Contract for completing the Work.

The said amount is fixed and agreed upon by and between the Contractor and the Town because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Town would in such event sustain, and said amount is agreed to be the amount of damages which the Town would sustain.

17.3 PROGRESS AND COMPLETION

It is agreed that time is of the essence of each and every portion of the Contract Documents wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract an additional time is allowed for the completion of any Work, the new time limit fixed by such extension shall be of the essence of this Contract. Provided that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of Work is due to a Force Majeure excused event or to any delays of Subcontractors or suppliers occasioned by a Force Majeure excused event.

17.4 CONTRACT TIME

(1) Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Final Completion of the Work.

(2) The date of commencement of the Work is the date established in the Contract Documents.

(3) The date of Final Completion is the date the Town notifies the Contractor it achieved Final Completion and has satisfied the conditions required to achieve such milestone.

(4) The term "day" as used in the Contract Documents shall mean working day unless otherwise specifically defined.

(5) By executing the Contract the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

(6) The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by the Contract Documents to be furnished by the Contractor and Town. The date of commencement of the Work shall not be changed by the effective date of such insurance.

(7) The Contractor shall proceed expeditiously with adequate forces and shall achieve Final Completion within the Contract Time.

17.5 DELAYS AND EVENTS THAT JUSTIFY A TIME EXTENSION

If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Town or Engineer, or of any employee of either, or of a separate contractor employed by the Town; or by changes ordered in the Work; or Force Majeure Excused Event; or by other causes that the Engineer determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Town may determine.

17.6 FORCE MAJEURE EXCUSED EVENT

"Force Majeure Excused Event" shall mean an event outside the asserting Party's control that materially and adversely affects the performance of the Party (other than payment obligations) and includes, but is not limited to the following: an act of God, fire, tornado, hurricane, flood, earthquake, explosion, war, act of terrorism, civil disturbance, labor strikes away from the site,

actual monthly precipitation or actual monthly snowfall that exceeds the maximums listed for each month shown in the National Oceanic and Atmospheric Administration weather report for the Town of Manchester for the current year and unavoidable casualties beyond Contractor's control.

Force Majeure Excused Events shall not excuse the Contractor (i) if the failure to perform or delay is due to the non-performing Contractor's fault, negligence or lack of diligence; (ii) if the Contractor asserting a Force Majeure Excused Event fails to provide notice as provided herein; or (iii) to the extent that the Force Majeure Excused Event was caused or provoked by the asserting party; (iv) if an experienced contractor could have foreseen and taken reasonable precautions to prevent such event or circumstance; (v) if such event or circumstance does not result in a delay to the critical path of Work; or (vi) where the Party asserting a Force Majeure Excused Event fails to fulfill its obligations as soon as reasonably possible after such Force Majeure Excused Event has been eliminated or has ceased to prevent the affected party from fulfilling its obligations.

If the Parties do not agree that a Force Majeure Excused Event has occurred, the burden of proof shall rest with the asserting Party. If a Force Majeure Excused Event has occurred, the Contractor shall be entitled to a Time Change only.

The Contractor shall, at its sole expense, use its best efforts to avoid and minimize delay resulting from a Force Majeure Excused Event and shall keep the Owner promptly informed of any event which may delay performance of the Work. Delay in the Contractor's receipt of subcontracted portions of the Work, including Materials, for any reason shall not entitle the Contractor to any Change or any other relief, except in the case of a delay in the delivery of Materials due to no fault of the Contractor, the Contractor shall be entitled to a Day for Day time extension until such time that Materials of equal or better quality are delivered.

Within two (2) business Days from the beginning of any delay resulting from a potential Force Majeure Excused Event, the Contractor shall provide a detailed written notice to the Owner of the cause(s) of such delay. In a case of a continuing cause of delay, only one request shall be necessary.

Nothing contained herein shall preclude the Contractor from holding any other contractor(s), subcontractor(s), or entity responsible for unreasonable or unjustifiable delays incurred by the Contractor caused by such other contractor, subcontractor, or entity.

The Contractor's full compliance with the requirements of this Article shall be a condition of receiving any Change and the Contractor's failure to comply with these requirements shall constitute a waiver of any right to a Change or any other claim.

Nothing within this Article shall prevent the Owner from exercising its termination or suspension rights under this Contract.

17.7 SCHEDULE UPDATES THROUGHOUT THE PROJECT

Contractor shall provide at least once per month updated information on the Project Schedule, including thirty (30) day "look-ahead schedules," projected variances per event category and per subcontractor, identification of all variances and calculation of the number of days difference between the as-built critical path and the Project Schedule critical path. Contractor shall, with each Application for Payment, provide completed monthly updated information for the previous month on the Project Schedule and updated information on manpower indicating as-built and as-planned conditions. The updated information on the Project schedule shall not modify any milestone dates in the Project Schedule that Owner has previously approved.

17.8 WINTER SHUTDOWN

Unless otherwise specified in a "Notice to Contractor", contract time will not be charged during a winter shutdown period between November 15th and April 1st. The Contractor will not be allowed to work during the winter shutdown (other than maintaining the project area) without the approval of the Engineer. Prior to a winter shutdown, the Contractor and the Town shall meet to discuss the Contractor's procedures for preparing the Work area for a winter shutdown.

17.9 PROJECT SCHEDULE

The Contractor shall submit a Project Schedule to the Town with delivery of the signed contract identifying the major activities associated with the project, the order and connectivity of such activities, and critical milestone dates. The schedule should identify work being performed by subcontractors. The Town will notify the Contractor if it has objections to the Project Schedule. If notified of an objection, the Contractor shall resolve the issue and re-submit the Project Schedule within five (5) business days. No schedule will be approved that shows any activities beyond the allotted contract time for the project. The Contractor shall update the schedule as determined by the Engineer to be necessary as the project progresses. Upon giving the Contractor a five (5) day written notice, the Town may require the Contractor to prepare a thirty (30) day "Look-Ahead" Schedule.

17.10 TOWN'S RIGHT TO SUSPEND OR STOP WORK

If the Work is defective, or the Contractor fails to supply sufficient skilled workmen or suitable materials or equipment, or if the Contractor fails to make prompt payments to Subcontractors for labor, materials or equipment, the Town may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated.

17.11 TOWN'S RIGHT TO DO WORK

If the Contractor fails to furnish sufficient qualified workers or materials of the required quality or quantity necessary to perform the Work in accordance with the Contract Documents or the Project Schedule for any period of three (3) or more Days after written notice specifying such failure, the Town shall have the option to supply workers, materials, or both, and perform the Work. The Town shall deduct expenses incurred in engaging other Contractors, and supplying workers and material from payments due or which may become due to the Contractor or Retainage. If expenses exceed the balance due or which becomes due to the Contractor, the Contractor shall pay the excess to the Town immediately upon written demand therefore.

Town shall have the right to perform work with its own employees or by other contractors and to permit other entities to do work during the progress and within the limits of, or adjacent to, the project site, and the Contractor shall conduct its Work and cooperate with all others so as to mitigate any possible interference. The Contractor shall allow other contractors or entities access to their work within the project site. The Contractor shall make no claims against the Town for additional payment due to delays or other conditions created by the operations of such other parties.

17.12 RECOVERY SCHEDULE

The Town may, at any time that a non-excusable delay occurs on the Project, request the Contractor to prepare and submit a recovery project schedule that will return the Work to the as-planned Project Schedule so as to achieve Final Completion. The Contractor shall prepare the recovery schedule at no additional expense to the Town.

17.13 TOWN'S EXTENSION OF CONTRACT TIME

The Town may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to the Contractor which shall fix the date on which Work shall be resumed. The Contractor will resume the Work on the date so fixed. The Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time directly attributable to any suspension if he makes a claim therefor as provided in the General Conditions.

Should the Work be carried on late in the year, and in the opinion of the Engineer is in danger by reason of inclemency of weather, or could not be finished in time to prevent such danger, the Contractor shall cease operations upon order of the Engineer, and shall not resume them until ordered to do so by the Engineer, when the weather conditions are favorable. The time of suspension during the winter months shall not be considered in making a claim for extension of Contract Time. The Contractor shall, upon such orders, discontinue work, remove all materials or appliances for or in use upon the work site, and place the streets in proper condition for use by the public during the time the Work is suspended as herein provided, without cost to the Town.

ARTICLE 18 - PROTECTION

In general, the Contractor shall protect all existing features, public or private, within or adjacent to the Work area that is not called out to be removed or replaced.

18.1 EXISTING MONUMENTATION

The Contractor shall be responsible for the protection and replacement of all survey markers, streetline monuments, and private property markers. Prior to construction, the Town will provide information as to the location of all survey markers. Unless noted otherwise in the Contract Documents, any survey markers disturbed or destroyed during construction will be replaced by the Town of Manchester at the Contractor's expense. The fee for replacing survey markers is as follows:

Type of Survey Marker Replaced	Fee
Iron Pipes/Rods/Drill Holes	$150.00 each
Concrete Monuments (Private Property)	$300.00 each
Natural Stone Monuments (Private Property)	$300.00 each
Intersection, Street Corner, Point of Curvature Markers	$500.00 each
Town GPS Control Network Monument	$2,500.00 each

Any charges for survey marker replacement will be directly deducted from the Contractor's payment for the month that charges were incurred.

18.2 CONTRACT WORK

The Contractor shall protect his Work so as to prevent damage and/or vandalism to newly poured sidewalks and other concrete surfaces. Any newly poured sidewalks or ramps which are damaged or defaced shall be promptly repaired or replaced at the Contractor's expense. Determination to repair or replace will be at the sole discretion of the Engineer.

18.3 TREES AND SHRUBS

The Contractor will take precautionary measures to protect all public and private trees or shrubs remaining within or adjacent to the Project area. This also includes protection of root systems that may become damaged due to the excavation activities near or adjacent to vegetation designated to remain.

The Contractor shall be fully responsible for compensation, repair, or replacement of any damaged tree or shrub because of neglect by the Contractor or any of his/her assigned Subcontractors.

18.4 UTILITIES

All existing utilities shall be protected and supported according to the specific utility company's requirements. It is the Contractor's sole responsibility to coordinate and communicate with the utility company in question.

18.5 TRAFFIC CONTROL FACILITIES

The Contractor's attention is called to the fact that there are underground traffic control facilities (loop detectors) at various intersections in the Town of Manchester. Should these facilities become damaged during the course of the Work due to the Contractor's negligence; the Contractor will be responsible for replacement of the detectors. Splicing of the existing detectors will not be permitted.

18.6 PRIVATE PROPERTY

Any claims for damage to private property as a result of the Contractor's operations or lack of providing protective measures to prevent such damage will be forwarded directly to the Contractor for action. For each claim, the Contractor shall provide to the Town evidence that the claim has been resolved. The Town will not release final retainage for any project where there are any unresolved claims.

18.7 SUBSURFACE ARCHAEOLOGICAL FINDS

If human burials or human skeletal remains are encountered during construction or agricultural, archaeological or other activity that might alter, destroy or otherwise impair the integrity of such burials or remains, the activity shall cease and not resume until authorized by the Engineer.

ARTICLE 19 - PUBLIC CONVENIENCE

The Contractor shall conduct the work at all times in such a manner as to ensure the least possible obstruction to both vehicular and pedestrian traffic. All equipment and materials shall be placed or stored in such a way and in such locations as will not create a hazard to the general public.

The Contractor shall notify residents in writing at least 24 hours in advance of any work which will close or restrict access to their property. Work shall be coordinated such that no residential driveway access is closed for more than a 24 hour period and such that no commercial driveway access is fully closed at any time.

Work shall be coordinated such that it does not leave any excavated area open for more than one day without prior approval of the Engineer.

Not more than one block at a time of the street shall be torn up, obstructed or closed without the permission of the Engineer. The Contractor shall provide such barricades, signs, warnings, flagmen and shall conduct his Work in such a manner so that hazards to vehicular and pedestrian traffic are at a minimum. If, in the opinion of the Engineer or other Town Public Safety Authorities, additional precautions or measures should be taken in the interest of public safety, the Contractor shall so comply promptly. If the Contractor finds it necessary to close a portion of the road to vehicular traffic, written approval of the Engineer and the Chief of the Manchester Police Department shall be obtained. The Contractor shall notify the Fire Department and any other concerned agencies of such road closing a minimum of 48 hours in advance. Access shall be provided at all times to fire hydrants and precautions shall be taken to prevent freezing of any exposed or partially uncovered water lines.

ARTICLE 20 - RECORD DRAWINGS

The Contractor shall keep one (1) record copy of all Contract Specifications, Contract Drawings, Addenda, Modifications and Shop Drawings at the site in good order and annotated to show all changes made during the construction process. These shall constitute the Record Drawings for the Project, be available to the Engineer at any time and shall be delivered to him upon completion of the Work.

ARTICLE 21 - SAFETY

The Contractor shall comply with all requirements of the Occupational Safety and Health Act (OSHA), applicable laws, building and construction codes. Prior to any Construction, the Contractor shall provide the name of his/her "competent person" who is responsible for project safety.

The Contractor shall furnish to the Engineer a report in duplicate on each accident on the Project or related to the prosecution of the Project which involves personal injury requiring medical treatment or which causes an employee's loss of work time. The Contractor shall also furnish to the Engineer a report in duplicate regarding any accident involving public liability or property damage in connection with the Project.

At all times, the Contractor shall protect his/her work from the motoring or walking public. It will be the Contractor's responsibility to supply and utilize flagmen or Town Police personnel, barricades, signs, drums, cones, etc. throughout the construction. Any sidewalk left excavated at the end of the work shift shall be cordoned off and properly signed to restrict pedestrian access.

The Contractor shall utilize OSHA approved safety caps on all pins or other protruding metal used for sidewalk forms.

Prior to any construction involving trenching and/or shoring, the Contractor shall provide the Town one copy of its "Trenching and Shoring" safety plan.

If any of the Work requires any person to enter into a confined space as defined by OSHA, the Contractor shall submit to the Town a copy of its "Confined Space Entry" procedures.

The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to:

(1) All employees on the Work and other persons who may be affected thereby.

(2) All the Work and materials or equipment to be incorporated therein, whether in storage on or off the site, and

(3) Other property at the site or adjacent thereto, including but not limited to trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

The Contractor shall take all proper precautions to protect existing access to properties from injury or unnecessary interference. He shall provide proper means of access to any property where the existing access is cut off by the Contractor. The Contractor shall take all proper precautions to protect persons from injury or unnecessary inconvenience and leave an

unobstructed way along the public and private places for travelers, vehicles, and for access to hydrants.

No materials or other obstruction shall be placed within fifteen (15) feet of any fire hydrant which, at all times, must be readily accessible to the Fire Department.

The Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. The Contractor shall provide and maintain all necessary flagmen, barricades, red lights and warning signs and take all necessary precautions for the protection of the public. He shall continuously maintain adequate protection of all Work from damage, and shall take all reasonable precautions to protect the Town from injury or loss arising in connection with this Contract. He shall make good any damage or injury to his Work or to the property of the Town resulting from lack of reasonable protective precautions, except such as may be due to errors in the Contract Documents, or caused by agents or employees of the Town. He shall adequately protect adjacent private and public property, as provided by law and the Contract Documents. He will notify owners of adjacent utilities when prosecution of the Work may affect them. When the use or storage of explosives or other hazardous materials is necessary for the prosecution of the Work, the Contractor will exercise the utmost care and will carry on such activities under the supervision of properly qualified personnel. All damage, injury or loss to any property referred to in the above paragraphs caused, directly or indirectly, in whole or in part, by the Contractor, Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, will be remedied by the Contractor, except damage or loss attributable to the fault of the Contract Drawings or Specifications or to the acts or omissions of the Town or anyone employed by the Town or for whose acts the Town may be liable, and not attributable to the fault or negligence of the Contractor.

In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Town, is obligated to act, at his discretion, to prevent threatened damage, injury or loss. He will give the Engineer prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved.

ARTICLE 22 - SUBCONTRACTS

22.1 GENERAL

As specified in the Contract Documents and prior to the execution and delivery of the Contract, the successful Bidder will submit to the Engineer for acceptance the following:

(1) a list of all Subcontractors;

(2) a list of such other persons or organizations proposed to perform portions of the Work, including those who are to furnish materials or equipment fabricated to a special design.

Prior to the execution and delivery of the Contract, the Engineer will notify the successful Bidder in writing if the Engineer, after due investigation, has reasonable objection to any Subcontractor, person or organization on such list. The failure of the Engineer to make objection to any Subcontractor, person or organization on the list prior to the execution and delivery of the Contract shall constitute an acceptance of such Subcontractor, person or organization but shall not constitute a waiver of any right of the Engineer to reject defective Work, material or equipment not in conformance with the requirements of the Contract Documents.

The Contractor will be fully responsible for all acts and omissions of his Subcontractors and of persons directly or indirectly employed by them, and of persons for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create any contractual relationship between any Subcontractor and the Town, or the Engineer or any obligation on the part of the Town or the Engineer to pay or to see to the payment of any monies due any Subcontractor, except as may otherwise be required by law.

The Contractor agrees to specifically bind every Subcontractor to all of the applicable terms and conditions of the Contract Documents. Every Subcontractor, by undertaking to perform any of the Work, will thereby automatically be deemed to be bound by such terms and conditions.

22.2 ASSIGNMENT OF SUBCONTRACTS

Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Town, provided that

(1) assignment is effective only after termination of the Contract by the Town for Cause pursuant to the General Conditions and only for those subcontract agreements that the Town accepts by notifying the Subcontractor and Contractor in writing; and

(2) assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Town accepts the assignment of a subcontract agreement, the Town assumes the Contractor's rights and obligations under the subcontract.

Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

Upon such assignment of subcontracts to the Town, the Town may further assign the subcontract to a successor contractor or other entity. If the Town assigns the subcontract to a successor contractor or other entity, the Town shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 23 - SUBSTANTIAL COMPLETION AND FINAL COMPLETION

23.1 SUBSTANTIAL COMPLETION

Substantial Completion shall occur when the Town has confirmed that all of the following conditions have been satisfied or waived in writing by the Town:

1. All Work has been sufficiently completed pursuant to the Contract Documents so that the owner can utilize the Work for its intended use;
2. The punch list (a comprehensive list of items to be completed or corrected prior to Final Payment) has been agreed upon and accepted in writing by the Town;
3. All Work has been completed in accordance with law, and the Contractor has obtained all inspections or certificated of inspections as required by the Contract Documents; and
4. All maintenance and operating instructions, schedules, guarantees, bonds, and other documents, all as required by the Contract Documents, have been submitted to the Town.

When the Contractor considers that the work is substantially complete, the Contractor shall notify the Town in writing. Upon written notice, the Engineer, as representative of the Town, will make an inspection with the Contractor. The Town will notify the Contractor in writing within fifteen (15) days of any particulars in which this inspection reveals that the Work is defective or discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Town can occupy or utilize the Work or designated portion thereof for its intended use. If the Substantial Completion has not occurred, the Contractor shall immediately make such corrections as are necessary to achieve Substantial Completion. The foregoing notice procedure shall be repeated until Substantial Completion occurs. The Town shall issue a notice when Substantial Completion Occurs.

23.2 FINAL COMPLETION

Final Completion shall occur when the following conditions have been satisfied:

1. Substantial Completion has been achieved and the Contractor received notice by the Town;
2. all items on the Punch list have been completed;
3. the Contractor has completed all Work;
4. the Project site is free from construction debris;
5. Contractor has provided the Town record drawings in accordance with Article 20;
6. the Contractor has paid all Liquidated Damages in full, if any were assessed;
7. the Final Payment Application has been submitted with such supporting data as the Engineer may require;

8. the Town has received complete and legally effective releases or waivers (satisfactory to the Town) of all liens arising out of the Contract Documents for the labor and services performed and the material and equipment furnished thereunder, including releases or waivers from each subcontractor; and
9. the Contractor has removed all of its construction equipment, material and support personnel from the Project site.

In lieu of releases or waivers and as approved by the Town, the Contractor may furnish receipts or releases in full; an affidavit of the Contractor that the releases and receipts include all material, equipment, tools and labor bills, and other indebtedness connected with the Work for which the Town or its property might in any way be responsible, have been paid or otherwise satisfied; and consent of the Surety, if any, to final payment.

The Contractor shall notify the Town in writing when it has achieved Final Completion, including all documentation to verify the conditions set forth above have been achieved, and shall submit a Final Payment Application following the procedure for progress payments.

Town shall either notify the Contractor of any reason why Final Completion has not occurred or notify the Contractor in writing that Final Completion has been achieved. The Final Completion date shall be the first date on which all condition for Final Acceptance were satisfied.

Within fifteen (15) days after the receipt of the final Application for Payment and the Engineer is satisfied that the Work has been completed and the Contractor has fulfilled all of his obligations under the Contract Documents, the Engineer will, indicate in writing his approval of payment and present the Application to the Town for payment. Otherwise, he will return the Application to the Contractor, indicating in writing his reasons for refusing to approve final payment, in which case the Contractor will make the necessary corrections and resubmit the Application. Once the Town issues the Final Payment, the Contractor will be deemed to achieve Final Completion.

Final payment shall constitute ninety-five percent (95%) of the final Contract amount. The remaining five percent (5%) will be payable in accordance with the provisions stated herein. The Town will, within thirty (30) days of receipt of an approved final Application for Payment, pay the Contractor the amount approved by the Engineer.

The making of final payment shall constitute a waiver of claims by the Owner except those arising from:

1. Claims, security interests or encumbrances arising out of the Contract and unsettled;
2. Failure of the Work to comply with the requirements of the Contract Documents; or
3. Terms of special warranties required by the Contract Documents.

Acceptance of final payment by the Contractor, subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of the Final Payment Application.

When the Work or designated portion thereof is substantially complete, the Town will prepare a Notice of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Town and Contractor for security, maintenance, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Notice of Substantial Completion.

ARTICLE 24 - SUBSURFACE UTILITIES

Subsurface information which may be contained in these Contract Documents has been developed from the best available records, the accuracy of which cannot be guaranteed. These locations are subject to possible errors in the source of the information; also, errors in transcription. The Contractor shall make certain of the exact location of mains, ducts, poles and services prior to excavation near utility lines. The Contractor shall cooperate fully with the various utilities and shall plan his Work so that least interference is caused for all parties concerned. The various utility companies will make all adjustments to their own lines except as otherwise shown on the Contract Drawings or detailed in the Contract Specifications. **The Contractor shall give ample notice to "Call Before You Dig" so that existing lines can be marked in the field and adjustments made.** If, in the course of construction, conditions are found which result in changes of alignment and/or delays necessitating the rescheduling of the Contractor's operation, such changes in alignment or rescheduling of operations shall not constitute the basis of a claim for extra payment. **It is anticipated that the Contractor will provide for contingencies which may confront him during the execution of the Work in the preparation of his bid**.

The Contractor shall support all utility lines uncovered due to trench excavation in accordance with the requirements of the specific utility company.

ARTICLE 25 - SUPERVISION

The Contractor will supervise and direct the Work efficiently and with his best skill and attention. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. Before undertaking the Work, he will carefully study and compare the Contract Documents and check and verify all figures shown thereon and all field measurements. He will at once report in writing to the Engineer any conflict, error or discrepancy which he may discover. The Contractor will be responsible to see that the finished work complies accurately with the Contract Documents.

The Contractor will keep a Resident Superintendent, satisfactory to the Engineer, on the site at all times. The Superintendent shall not be replaced without the consent of the Engineer except under extraordinary circumstances. The Superintendent will be the Contractor's representative at the site and shall have authority to act on behalf of the Contractor. All communications given to the Superintendent shall be as binding as if given to the Contractor.

The Engineer will not be responsible for the acts or omissions of the Contractor, or any Subcontractors, or any of his or their agents, servants or employees, or any other persons performing any of the Work.

ARTICLE 26 - WARRANTY OF WORK

The Contractor warrants and guarantees to the Town and the Engineer that all materials and equipment will be new unless otherwise specified, and that all Work will be of good quality and free from faults or defects and in accordance with the requirements of the Contract Documents and of any inspections, tests or approvals referred to in herein. All unsatisfactory Work, all faulty or defective Work and all Work not conforming to the requirements of the Contract Documents or of such inspections, tests or approvals shall be considered defective. Prompt notice of all defects shall be given to the Contractor. All defective Work, whether or not in place, may be rejected.

If required by the Engineer prior to the issuance of the Certificate of Substantial Completion, the Contractor will promptly, without cost to the Town and as required by the Engineer, either correct any defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by the Engineer, remove it from the site and replace it with non-defective Work. If the Contractor does not correct such defective Work or remove and replace such rejected Work within a reasonable time, all as required by written notice from the Engineer, the Town may have the deficiency corrected or the rejected Work removed and replaced. All direct or indirect costs of such correction or removal and replacement, including compensation for additional professional services, shall be paid by the Contractor and an appropriate Change Order shall be issued deducting all such costs from the Contract Price. The Contractor will also bear the expenses of making good all Work of others destroyed or damaged by his correction, removal or replacement of his defective Work.

If, prior to completion of the punch list resulting from the final inspection at expiration of the warranty period, any Work is found to be defective, the Contractor will, promptly without cost to the Town and in accordance with the Town's written instructions, either correct such defective Work, or, if it has been rejected by the Town, remove it from the site and replace it with non-defective Work. If the Contractor does not promptly comply with the terms of such instructions, the Town may have the defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, will be paid by the Contractor.

Unless otherwise stated in a Notice to Contractor, five percent (5%) of the total Contract Price shall be retained by the Town for a period of one (1) year after substantial completion of the Contract to allow appearance of any defect in materials and workmanship. Within this one (1) year period, the Contractor shall remedy any defective Work appearing and pay for any damages to other Work caused by such defective Work, or occasioned in correcting same. If the Town determines the defective Work creates a situation requiring immediate attention, the Town may have the defective Work removed and replaced. All direct and indirect costs, including compensation for professional services, will be paid by the Contractor. If an excessive amount of defective Work appears during the one (1) year period after the substantial completion, the Town, upon written notice to the Contractor, may extend the retainage period for an additional year.

ARTICLE 27 - WATER AND SEWER PROVISIONS

27.1 OPERATION OF TOWN'S FACILITIES

In instances when it is necessary to operate valves or hydrants which are the property of the Town of Manchester, the Contractor shall coordinate his activities with the Town of Manchester Water and Sewer Department and arrange for the Department to operate such facilities. A minimum of forty-eight (48) hours' notice shall be given the Department to minimize delay and allow public notice where necessary.

27.2 CONTINUANCE OF SERVICE

All Work is to be accomplished in such manner as to minimize the time that water and/or sanitary sewer service will be interrupted. The Contractor shall be responsible for providing all temporary connections and coordinating his activities to ensure that all customers have continuous water and/or sanitary sewer service. The Contractor's attention is called to the fact that the inability to discontinue water service to some customers in the construction area during normal working hours may require work to be done during off hours or the provision of temporary service.

27.3 PAYMENT FOR USE OF WATER AND SEWER DEPT. PERSONNEL AND EQUIPMENT

The Contractor shall be responsible for coordinating his Work with the Manchester Water and Sewer Department at all times. Instances when it shall be necessary to utilize Department personnel and equipment during other than normal Department working hours, the Contractor shall make payment to the Town of Manchester for such use. Normal working hours for the Department are from 7:00 a.m. to 3:30 p.m. daily, Monday through Friday excluding holidays. The Town's Holiday Schedule is attached to these Contract Documents in an Appendix. Payment shall be made in accordance with the following:

(1) For each Water and Sewer Department employee utilized by the Contractor, the Town shall receive the standard overtime rate paid to the employee by the Department.

(2) In the event a Water and Sewer Department employee is called out after the end of normal working hours, minimum payment to the Town by the Contractor for each Department employee utilized shall be at the standard overtime rate for a period no less than four (4) hours. Payment for overtime that is a continuation of the normal workday shall be at the standard overtime rate for the actual hours worked.

(3) For Water and Sewer Department equipment required for use in conjunction with utilization of Department personnel, the Town shall receive the standard rates as charged by the Department for such use.

There will be no charge for use of Water and Sewer Department personnel and equipment during normal working hours for routine services provided by the Department (i.e., open/close valves, shut down mains, shut down notification, etc.). However, use of Department personnel and equipment for non-routine services (i.e., use of vac-truck, etc.) shall be compensated for at the standard rates for personnel and equipment.

27.4 LICENSING REQUIREMENTS

Any person involved in the installation of a water main and/or appurtenances must have a P-1, P-6 or P-7 license or be an apprentice registered with the State of Connecticut Labor Department working under the direct (on-site) supervision of a person possessing a P-1, P-6 or P-7 license.

Any person involved in the installation of a sanitary sewer and/or appurtenances must have either a P-1, P-6, P-7, W-8 or W-9 license or be an apprentice registered with the State of Connecticut Labor Department working under the direct (on-site) supervision of a person possessing a P-1, P-6, P-7, W-8 or W-9 license.

SECTION 3

PROJECT SPECIFIC REQUIREMENTS

NOTICE TO CONTRACTOR - GENERAL

Limitation of Operations

Work hours shall be defined as 7:00 a.m. to 7:00 p.m. Mondays through Fridays. No work shall take place outside those hours without prior permission from the Engineer.

Layout of Work

The Town of Manchester Survey Unit will provide offset reference stakes for newly proposed drainage structures. The Contractor shall provide a minimum forty-eight (48) hour advanced notice for all survey requests. Concrete sidewalks shall be installed at the same locations as existing walks. The Contractor shall install reference stakes prior to the removal of sidewalks to assure the new sidewalks are installed in the correct location.
Water main shall be laid out off existing curb and existing main as shown on the Plans.

Order of Work

All erosion and sedimentation control devices shall be installed prior to any construction activity.

Safety

Implementing worker safety and health protocols that address compliance with all rules, laws and regulations regarding safety and risk of exposure to physical and chemical hazards is the sole responsibility of the Contractor. All employees of the contractor and subcontractors are to wear reflective vests and hard hats at all times when on the project site.

Temporary Storage Areas

The Contractor is responsible for identifying material storage areas for the project that provide safe access and egress for construction vehicles accessing public roads, and for providing appropriate erosion controls and restoration as directed by the Engineer. The Contractor shall not store construction equipment or materials within the public right-of-way.

Disposal of Surplus Material

Surplus materials are the responsibility of the Contractor and shall be properly disposed of in accordance with all local, state and federal regulations.

Permits

The Contractor must obtain a “Right of Way” permit and a “Water and Sewer” permit from the Town’s Engineering Division for this project. The permit fees will be waived.

Pre-Construction Meeting

The contractor’s foreman, subcontractors and other responsible personnel that will be directly involved in construction shall attend a pre-construction meeting for this project that will be scheduled by the Town.

Indeterminate Quantities

Certain items in the bid (identified with a “*”) are indeterminate quantities; i.e. the quantity cannot be estimated and is based on conditions encountered during construction. For these

items, the quantity shown in the bid is for bidding purposes only. No adjustment in unit prices will be made based on final quantities.

Preliminary List of Required Submittals

The Contractor shall submit shop drawings of the following items for review and approval by the Town during the initial stages of construction. No items shall be installed for the project until approval is obtained. Note that the list is preliminary and it is the Contractor's responsibility to identify and provide all required submittals in accordance with the Contract Specifications. This list may be modified by the Town at any time during the project.

Technical Specification	Submittal Description
-	Project Schedule
Bituminous Concrete Driveway	Bituminous Concrete Mix, Tack Coat, Joint Seal & Processed Aggregate Base Test Results
Catch Basins and Storm Manholes	Catch Basin/Storm Manhole Structures, CB/MH Frames and Covers, Mortar, Waterproof Coating & Pervious Material and Granular Fill Test Results
Concrete Driveway Apron	Concrete Mix Design, Reinforcing, Dowels, Joint Material & Processed Aggregate Base Test Results
Concrete Sidewalk and Ramps	Concrete Mix Design, Reinforcing, Dowels, Joint Material & Processed Aggregate Base Test Results
Culverts	Drainage Pipe, Concrete Mix Design (incl. Flowable Fill) & Granular Fill, Processed Aggregate Base and Bedding Material Test Results
Erosion and Sedimentation Control	Geotextile, Silt Sacks & Crushed Stone Test Results
Extruded Concrete Curb	Concrete Mix Design & Adhesive
Granular Fill	Granular Fill Test Results
HMA	HMA Mix, Tack Coat, Joint Seal & Processed Aggregate Base Test Results
Hydrant Assembly	Hydrants, Ductile Iron Pipe, Valves and Fittings, Anchor Tee, Auxiliary Gate, Tapping Sleeves and Valves, Hydrant Paint, Concrete Mix Design, Bedding Material, Joint Restraint & Connecting Sleeves
Maintenance and Protection of Traffic	Traffic Detour Plan (when required)
Processed Aggregate Base	Processed Aggregate Base Test Results
Replace Valve Box	Valve Boxes, Curb Stops, Extension Stems & Bedding Material
Restoration of Lawn and Wetland Areas and Erosion Control Blanket	Topsoil, Fertilizer, Seed Mix and Erosion Control Blanket
Sanitary Sewer Manholes	Sanitary Manhole Structures, Manhole Frames and Covers, Precast Masonry, Brick, Mortar, Flexible Joints, Waterproof Coating, Drop Piping & Sand and Granular Fill Test Results
Water Bypass Piping	Bypass Piping, Valves and Fittings, Couplings, Joint Gaskets, Connecting

NOTICE TO CONTRACTOR - GENERAL

Technical Specification	Submittal Description
	Sleeves, Joint Restraints and Water Bypass Piping Plan
Water Main	Ductile Iron Pipe, Valves and Fittings, Tapping Sleeve and Valves, Joint Gaskets, Blowoffs, Valve Boxes, Connecting Sleeves, Joint Restraints, Polyethylene Wrap, Pipe Insulation, Concrete Mix Design & Bedding Material
Water Service	Copper Tubing, Corporation Stop, Service Saddle, Couplings, Curb Stop & Curb Box

Note:
Test results for Processed Aggregate Base shall include testing for sieve, hardness and soundness. Only sieve test results are required for all other materials.

NOTICE TO CONTRACTOR - UTILITIES

Existence of Underground Utilities

Existing utilities located within the project area include natural gas mains and services, water mains and services, sanitary sewer mains and services and electrical and communications facilities. The Contractor shall notify "Call Before You Dig" at 1-800-922-4455 and must have all utilities marked out prior to the start of construction.

Anticipated Utility Impacts

The following non-Town-owned utility facilities are anticipated to be impacted by the construction:

1. Resetting of existing gas valve boxes, if necessary.

The Contractor is responsible for all coordination with the impacted utility owner.

The following are the utility company contacts for this project:

Connecticut Natural Gas Corp.
Jonathan Gould
(860) 727-3044
jgould@ctgcorp.com

Cox Communications
Denise Mazzoli
(860) 250-1378
denise.mazzoli@cox.com

Frontier Communications
Marc Sweeney (Overhead Utilities)
(860) 521-0692
marc.w.sweeney@ftr.com

Manchester Water and Sewer Dept. (Water and Sanitary Sewer)
Construction Inspector assigned to project

Eversource Energy
Robert Ferguson
(860) 280-2355
robert.ferguson@eversource.com

CUT BITUMINOUS CONCRETE PAVEMENT

DESCRIPTION

"Cut Bituminous Concrete Pavement" includes the sawcutting of existing bituminous concrete pavement at locations shown on the plans or as directed by the Engineer. It shall not include the cutting of bituminous concrete pavement associated with trenches, patches or driveways.

MATERIALS

Not applicable.

CONSTRUCTION DETAILS

The existing bituminous concrete pavement shall be sawcut to a neat, straight line at the locations shown on the plans to a depth suitable to remove the pavement without damage to the adjacent pavement to remain.

MEASUREMENT

"Cut Bituminous Concrete Pavement" will be measured for payment by the actual linear feet of cut made to the lines delineated on the plans or as directed by the Engineer. Existing pavement cuts beyond the limits shown on the plans, pavement cuts necessary for trench excavation, installation of curb or drainage structures, driveways, or any other item where the cutting of bituminous concrete pavement is included in the cost of that item, will not be measured for payment under this item.

PAYMENT

This item will be paid for at the contract unit price per linear foot for "Cut Bituminous Concrete Pavement" complete in place, which price shall include all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Cut Bituminous Concrete Pavement	Linear Foot

MILLING, RECLAMATION AND REMOVAL OF BITUMINOUS CONCRETE PAVEMENT

DESCRIPTION

"Mill Bituminous Concrete Pavement" of the thickness specified includes the milling, removal and disposal of existing bituminous concrete pavement within the limits shown on the Plans or where directed by the Engineer.

"Reclaim Bituminous Concrete Pavement" of the thickness specified includes the in-place pulverization of the existing pavement surface and the mixing of the pulverized material in place where shown on the Plans or where directed by the Engineer.

"Remove Bituminous Concrete Pavement" of the thickness specified includes the complete removal and disposal of existing pavement where shown on the Plans or where directed by the Engineer. This work may be accomplished by milling, cold-planing or excavating the entire pavement section.

The pavement thicknesses listed for reclamation and removal of pavement are based on the best available information. The bid prices for these items will be used for payment unless the pavement thickness encountered in the field varies by more than 50% of the stated thickness for significant areas of the project area as determined by the Engineer. In these cases, new items will be added to the Contract and associated unit prices for such work will be negotiated between the Engineer and Contractor.

EQUIPMENT

Methods, equipment and tools to be used shall be approved by the Engineer prior to construction.

The equipment used to mill the pavement shall have a minimum 6 foot cutting width and shall be capable to maintain a minimum speed of ten feet (10') per minute and be able to provide a 2 inch deep cut in one pass. The milling equipment shall be equipped with a built-in automatic grade averaging control system that can control the longitudinal profile and transverse cross slope to a specified result.

The equipment used for reclaiming pavement shall be capable of pulverizing and mixing to a minimum width of six feet (6') and a minimum depth of one foot (1').

Planing machines or grinders shall be self-propelled and capable of grinding pavement material and accurately establishing profile grades within a tolerance of 0.02 foot by reference from either the existing pavement or from independent grade control. It shall have positive means for controlling cross slope elevations. It shall also have an effective means of removing loosened material from the surface and minimizing dust from escaping into the air.

MILLING, RECLAMATION AND REMOVAL OF BITUMINOUS CONCRETE PAVEMENT

CONSTRUCTION DETAILS

All milled, reclaimed or removed pavement material identified as to be hauled and disposed by the Contractor shall become the property of the Contractor and removed from the site and disposed of in accordance with federal, state and local regulations.

Care shall be taken to avoid damage to existing facilities (curb, sidewalk, driveway apron, utility structures, etc.) within or adjacent to the work. Any existing facilities damaged as a result of the work shall be replaced at the Contractor's expense.

Work shall be such that the milling depth is maintained throughout the project limits. The milled surface shall be free from gouges, excessive longitudinal grooves and ridges, oil film, and other imperfections. Any unsatisfactory surfaces shall be corrected at the Contractor's expense.

Immediately after milling is complete, the pavement surface shall be swept with a sweeper equipped with a water tank or calcium chloride to control dust that is capable of removing excess millings and loose debris.

For removal of pavement, the entire bituminous concrete pavement section shall be removed to the top of granular base material.

A clean, vertical face shall be sawcut at all limits of milling, reclamation or pavement removal.

PROSECUTION AND PROGRESS

Unless otherwise directed by the Engineer, the Contractor shall complete all work in one area (i.e. adjoining streets) prior to moving to another work area. The schedule and order of work shall be approved by the Engineer.

MEASUREMENT

"Mill Bituminous Concrete Pavement" of the thickness specified will be measured for payment by the actual number of square yards of pavement milled in accordance with the lines and depth as agreed upon with the Engineer. No area deductions will be made for minor unmilled areas such as around catch basins or utility structures. No separate payment will be made for material disposal, sweeping, or dust control; its costs shall be considered as included in the unit price bid for "Mill Bituminous Concrete Pavement".

"Reclaim Bituminous Concrete Pavement" of the thickness specified will be measured for payment by the actual number of square yards of pavement pulverized and mixed in accordance with the lines and depth as agreed upon with the Engineer. No area deductions will be made for minor areas such as around catch basins or utility structures. No separate payment will be made for dust control; its costs shall be considered as included in the unit price bid for "Reclaim Bituminous Concrete Pavement".

MILLING, RECLAMATION AND REMOVAL OF BITUMINOUS CONCRETE PAVEMENT

"Remove Bituminous Concrete Pavement" of the thickness specified will be measured for payment by the actual number of square yards of bituminous concrete pavement and bituminous curb removed. Only areas shown on the plan as "Remove Bituminous Concrete Pavement" will be measured under this item. No separate payment will be made for material disposal or dust control; its costs shall be considered as included in the unit price bid for "Remove Bituminous Concrete Pavement".

Grading and compaction of the reclaimed surface or existing granular base material will be measured for payment under the item "Formation of Subgrade" elsewhere in these Specifications.

Removal of bituminous concrete driveways within driveway reconstruction limits will not be measured for payment; it's costs shall be considered as included in the item "Bituminous Concrete Driveway".

PAYMENT

The milling of bituminous concrete pavement will be paid for at the contract unit price bid per square yard for "Mill Bituminous Concrete Pavement" of the thickness specified, which price shall constitute full compensation for all equipment, tools, labor and materials incidental thereto. No separate payment will be made for material disposal, sweeping, or dust control; providing protection for catch basins and other structures; or repairing surface defects.

The reclaiming of bituminous concrete pavement will be paid for at the contract unit price bid per square yard for "Reclaim Bituminous Concrete Pavement" of the thickness specified, which price shall constitute full compensation for all equipment, tools, labor and materials incidental thereto. No separate payment will be made for providing protection for catch basins and other structures; or dust control.

The removal of bituminous concrete pavement by other means where specifically shown on the Plans will be paid for at the contract unit price bid per square yard for "Remove Bituminous Concrete Pavement" of the thickness specified, which price shall constitute full compensation for all equipment, tools, labor and materials incidental thereto. No separate payment will be made for providing protection for catch basins and other structures; material disposal or dust control.

Removal of existing bituminous concrete curb where shown on the Plans or where directed by the Engineer shall be considered as included in the item "Remove Bituminous Concrete Pavement".

Grading and compaction of the reclaimed surface or existing granular base material will be paid under the item "Formation of Subgrade" elsewhere in these Specifications.

Pay Item	Pay Unit
Remove Bituminous Concrete Pavement (0" to 6")	Square Yard

EXCAVATION

DESCRIPTION

"Earth Excavation" shall consist of the removal and satisfactory disposal of unsuitable base material as determined by the Engineer.

"Rock in Trench Excavation" shall consist of the removal and satisfactory disposal of rock in definite ledge formation and boulders, or the portion of boulders, one cubic yard or more in volume, within the trench excavation limits.

"Test Pit Excavation" shall consist of the careful excavation to determine the horizontal and vertical location and size and material of an existing underground utility where shown on the plans or as directed by the Engineer.

Excavation below the finished grade of new sidewalk, pavement or slope necessary to install new sidewalk, pavement or slope is included in the unit price bid for "Concrete Sidewalk," "Bituminous Concrete Roadway" or "Restoration of Lawn Areas" of the type specified.

Trench excavation for new culverts, sanitary sewers and laterals, water mains and services, underdrains or conduit is included in the unit price bid for "Culvert", "Sanitary Sewer", "Sanitary Sewer Lateral", "Water Main, "Water Service", "Underdrain" or "Conduit" of the size and type specified.

CONSTRUCTION DETAILS

Excavation shall be made in conformance to the limits and grades shown on the plans. Excavation beyond the limits shown on the plans will not be measured for payment. Topsoil, sod and other organic matter shall be removed and disposed of.

When bedrock is encountered, it shall be excavated to the slope lines and depths indicated on the plans. All loose and unstable material shall be removed and disposed of. Any blasting shall conform to applicable local, State and Federal laws and regulations. The Contractor shall be responsible for all damage due either directly or indirectly to such operation.

All excavated material obtained within the project limits shall be used in the formation of embankments. Embankments shall be constructed of earth only. No bituminous concrete or reclaimed waste shall be used in the embankment. The material shall be free from refuse, stumps, roots, rocks, brush, weeds or other unsuitable material.

The depth of each layer, before compaction, shall not exceed twelve inches (12"). The embankment shall be crowned or pitched to provide drainage at the close of each day's operation.

The entire embankment area shall be leveled off by suitable grading equipment and shall be compacted to at least the required minimum density by use of compaction equipment consisting of rollers, compactors or a combination thereof. The dry density after compaction shall not be

less than 95 percent of the dry density for that soil when tested in accordance with AASHTO T180, Method D. Each layer shall be compacted at optimum moisture.

All surplus excavated material shall become the property of the Contractor and disposed of off of the project site unless otherwise directed by the Engineer.

Earth slopes shall be tracked by traversing the slopes with cleated tracks so that the cleat indentations are horizontal. Tracking shall be completed prior to placing topsoil. After all grading for the roadbed has been substantially completed and all drains installed, the subgrade shall be brought to the lines, grades and cross-sections shown on the plans. No particle over 3" shall in its greatest dimension be placed within 12" below the top of the prepared subbase.

All soft and yielding material within the subgrade shall be removed and replaced with suitable material. Compaction shall be as specified in Section 2.02 of Form 817. The Contractor shall protect the completed subgrade from damage. The subgrade shall be checked and approved by the Engineer prior to placing pavement structure thereon.

For test pit excavation, the Contractor shall follow all the requirements of "Call Before You Dig", including requesting utility markouts and hand-digging in the vicinity of the underground utility. The Contractor shall notify the Engineer 48 hours in advance of digging the test pit so the Engineer and the appropriate utility representative may be present.

Prior to excavation, the Contractor and Engineer shall agree on the exact location of the test pit based upon available mapping and the utility markout. The Contractor shall adjust the limits of excavation as needed to successfully locate the utility.

Horizontal and vertical locations and size and material of utilities must be obtained during test pit excavation and provided to the Engineer for review. Horizontal utility locations shall be field-surveyed or field-measured with a minimum of two (2) swing-ties from fixed physical features identified on the plans. Vertical utility elevations shall be field-surveyed using a level or other related equipment to provide elevation to the nearest hundredth of a foot (0.01'). The Contractor is made aware that additional test pits may be required and the proposed design may be modified based on results of test pit information obtained.

MEASUREMENT

"Earth Excavation" will be measured for payment by the actual number of cubic yards of material excavated as ordered by the Engineer.

"Rock in Trench Excavation" shall be measured for payment by the cubic yard. Payment lines for "Rock in Trench Excavation" shall coincide with the slope and grade lines as shown on the plans in areas where rock is encountered. The payment lines will be based on a predetermined limit as mutually agreed to by the Engineer and Contractor. Prior to any rock excavation, the Engineer and Contractor shall survey the conditions and agree on the payment limits for each item. In no case will the payment limits extend beyond the lines and grades shown on the plans and cross sections.

EXCAVATION

"Test Pit Excavation" shall be measured for payment by the cubic yard.

Trench excavation for culverts, sanitary sewers, sanitary sewer laterals, water mains, water services, underdrains and conduits will not be measured for payment; its costs shall be considered as included in the cost for the appropriate item herein.

Excavation for curbs, sidewalk and pavement will not be measured for payment; its costs shall be considered as included in the cost for the appropriate item herein.

PAYMENT

Payment for "Earth Excavation" and "Rock in Trench Excavation" will be made at the contract unit price bid per cubic yard for each item subject to the method of measurement above. The prices shall constitute full compensation for all equipment, tools, and labor incidental to the completion of the excavation, the formation and compaction of embankments, the formation and compaction of subgrades, and the disposal of surplus or unsuitable material in accordance with these Specifications.

Payment for "Test Pit Excavation" will be made at the contract unit price bid per cubic yard for each item subject to the method of measurement above. The prices shall constitute full compensation for all equipment, tools, and labor incidental to the completion of the excavation and location of utilities as indicated herein, and the backfill and compaction of the excavation to restore the ground surface to the original condition in accordance with these Specifications.

Pay Item	Pay Unit
Earth Excavation	Cubic Yard
Rock in Trench Excavation	Cubic Yard
Test Pit Excavation	Cubic Yard

GRANULAR FILL

DESCRIPTION

"Granular Fill" includes the furnishing and installation of material to be used as a foundation for structures, to replace unstable material in slopes and shoulders, to replace rock and unsuitable material in trenches, and elsewhere as indicated on the Plans or Specifications or where directed by the Engineer. It shall consist of gravel conforming to the requirements of these specifications.

MATERIALS

Granular fill shall conform to the requirements of Section M.02.01 of Form 817.

CONSTRUCTION DETAILS

When granular fill is used for foundation for structures, as backfill or to replace rock or unsuitable material in trenches, it shall be deposited in layers not over six (6) inches in depth, with each layer thoroughly compacted before the addition of other layers.

MEASUREMENT

Only granular fill used to replace unsuitable material and rock in trenches or other areas directed by the Engineer will be measured for payment. It will be measured in place by the cubic yard after compaction within the payment lines shown or specified by the Engineer.

PAYMENT

This work will be paid for at the contract unit price per cubic yard for "Granular Fill", complete in place, which price shall constitute full compensation for all materials, tools, equipment and labor incidental thereto.

Pay Item	Pay Unit
Granular Fill	Cubic Yard

PROCESSED AGGREGATE BASE

DESCRIPTION

"Processed Aggregate Base" shall consist of furnishing and installing processed aggregate base as a foundation for bituminous concrete roadways, concrete sidewalks, curbs, driveways and other items where shown on the Plans in accordance with these Specifications and in conformity with the lines, grades, compacted thickness and typical cross-section as shown on the Plans.

MATERIALS

At the discretion of the Engineer, contractors shall supply copies of material test results, certified by an approved testing laboratory.

The materials for this work shall conform to the requirements of Section M.05.01, Processed Aggregate Base and Pavement of Form 817.

CONSTRUCTION DETAILS

Coarse aggregate shall be broken stone. Only one type of coarse aggregate shall be used on a project unless otherwise permitted by the Engineer.

Prior to placing the bottom coarse of the processed aggregate base, the prepared subbase shall be maintained true to line and grade. After the aggregate is spread, it shall be thoroughly compacted and bound by use of equipment approved by the Engineer. Water may be used during the compaction and binding operation.

When the bottom course has been completed, as specified above, the top course aggregate shall be spread over it to such thickness that, after final compaction and binding, the total thickness of the two courses will equal that thickness specified for the completed base. The top course shall be spread, compacted and bound exactly as specified above for the bottom course.

The final surface of the subbase course shall be fine graded so that, after final compaction and just prior to placement of base or pavement courses, the surface elevation shall not vary more than one-quarter inch above or below the design grade at any location. The surface shall be completed to the above tolerance and approved by the Engineer prior to any work at a given location to place an overlying course. If after approval, the course becomes displaced or disturbed in any way for any reason, the Contractor shall repair and regrade the damage to the satisfaction of the Engineer prior to placing the overlying course. All repaired sections shall be recompacted until they meet the requirements as stated herein.

MEASUREMENT

Only "Processed Aggregate Base" used in the roadway cross section where directed by the Engineer will be measured for payment.

Processed aggregate base used under sidewalks, driveways or any other items where processed aggregate base is specified, will not be measured separately for payment, but its costs shall be included in the prices bid for the items which include this material.

PROCESSED AGGREGATE BASE

PAYMENT

When measured for payment, this work will be paid for at the contract unit price per cubic yard for "Processed Aggregate Base" complete in place, which price shall include all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Processed Aggregate Base	Cubic Yard

FORMATION OF SUBGRADE

DESCRIPTION

"Formation of Subgrade" shall consist of the grading and compaction of the subgrade to the lines, grades and dimensions shown on the Plans or as directed by the Engineer.

MATERIALS

Not applicable

CONSTRUCTION DETAILS

Construction methods and compaction requirements shall conform to Section 2.09 of Form 817.

If unsuitable material is encountered during this work, it shall be excavated and replaced with processed aggregate base to the depth and limits directed by the Engineer. This additional work shall be measured and paid for as "Earth Excavation" and "Processed Aggregate Base" in accordance with these specifications.

MEASUREMENT

"Formation of Subgrade" is considered a **"Final Pay"** item (i.e. the quantity will not be measured for payment but the quantity used for payment purposes will be that shown in the Bid Proposal.) No changes to the quantity shown in the Bid Proposal will be made unless significant changes to the proposed limits are directed by the Engineer. In the case of significant changes to the proposed limits as directed by the Engineer, the quantity shown in the Bid Proposal shall be used as the baseline quantity and agreed measured changes shall be added or subtracted from the baseline quantity.

Formation and compaction of subgrade material for driveways and sidewalks will not be measured for payment, but its costs shall be considered as included in the unit prices for "Driveway", "Driveway Apron" or "Sidewalk" of the type specified.

PAYMENT

Payment for "Formation of Subgrade" will be made at the contract unit price bid per square yard, which price shall constitute full compensation for all equipment, tools, and labor incidental to the completion of the formation and compaction of subgrades as specified herein.

Pay Item	Pay Unit
Formation of Subgrade	Square Yard

BITUMINOUS CONCRETE (HOT MIX ASPHALT)

DESCRIPTION

"Bituminous Concrete (Hot Mix Asphalt)", hereafter referred to as HMA, of the type specified includes the furnishing and installation of a bituminous concrete constructed on a prepared base or existing pavement course in accordance with the lines, grades and depths shown on the typical section or as directed by the Engineer. It also includes furnishing quality control testing as required in the Specification.

All references to the "State" or "State Inspector" shall mean the Town of Manchester or the Town of Manchester's designated inspector.

MATERIALS

HMA shall conform to the requirements of the Department of Transportation's special provision, Section M.04 "Bituminous Concrete Materials", included in these Specifications.

Superpave Design Level 2 shall be used.

CONSTRUCTION DETAILS

HMA shall be installed in accordance with the Department of Transportation's special provision, Section 4.06 "Bituminous Concrete", included in these Specifications.

The furnishing of a "Material Transfer Vehicle" as described in 4.06.03.3 will not be required for this project.

Core correlation density samples as described in Section 4.06.03.10 are required.

MEASUREMENT

"HMA" of the type specified within the limits of roadway construction shall be measured for payment by the actual number of tons, complete and accepted in place.

Adjustments may be applied to bituminous concrete quantities and will be measured for payment using the formulas in Section 4.06.04.2.

Material used for tack coat will not be measured separately for payment, but its cost shall be included in the unit price for "HMA" of the type specified.

Bituminous concrete for driveways and driveway aprons will not be measured for payment under this item; it shall be measured as specified in the item "Bituminous Concrete Driveway".

PAYMENT

This work will be paid for at the contract unit price bid per ton for "HMA" of the type specified, which price shall constitute full compensation for all equipment, tools, labor and materials incidental thereto. No separate payment will be made for tack coat.

BITUMINOUS CONCRETE (HOT MIX ASPHALT)

Pay Item	Pay Unit
HMA S0.5	Ton
HMA S1.0	Ton

SECTION M.04 - BITUMINOUS CONCRETE MATERIALS

Section M.04 is being deleted in its entirety and replaced with the following:

M.04.01—Bituminous Concrete Materials and Facilities
M.04.02—Mix Design and Job Mix Formula (JMF)
M.04.03—Production Requirements

M.04.01—Bituminous Concrete Materials and Facilities: Each source of material, Plant, and laboratory used to produce and test bituminous concrete must be qualified on an annual basis by the Engineer. AASHTO or ASTM Standards noted with an (M) have been modified and are detailed in Table M.04.03-5.

Aggregates from multiple sources of supply must not be blended or stored in the same stockpile.

1. Coarse Aggregate: All coarse aggregate shall meet the requirements listed in M.01.

2. Fine Aggregate: All fine aggregate shall meet the requirements listed in M.01.

3. **Mineral Filler:** Mineral filler shall conform to the requirements of AASHTO M 17.

4. Performance Graded (PG) Asphalt Binder:

(a) General:

i. PG asphalt binder shall be uniformly mixed and blended and be free of contaminants such as fuel oils and other solvents. Binder shall be properly heated and stored to prevent damage or separation.

ii. The binder shall meet the requirements of AASHTO M 332 and shall be graded or verified in accordance with AASHTO R 29. The Contractor shall submit a Certified Test Report and bill of lading representing each delivery in accordance with AASHTO R 26(M). The Certified Test Report must also indicate the binder specific gravity at 77°F; rotational viscosity at 275°F and 329°F; and the mixing and compaction viscosity-temperature chart for each shipment.

iii. The Contractor shall submit the name(s) of personnel responsible for receipt, inspection, and record keeping of PG binder. Contractor Plant personnel shall document specific storage tank(s) where binder will be transferred and stored until used and provide binder samples to the Engineer upon request. The person(s) shall assure that each shipment is accompanied by a statement certifying that the transport vehicle was inspected before loading was found acceptable for the material shipped and that the binder is free of contamination from any residual material, along with 2 copies of the bill of lading.

iv. The blending or combining of PG binders in 1 storage tank at the Plant from different suppliers, grades, or additive percentages is prohibited.

(b) Basis of Approval: The request for approval of the source of supply shall list the location where the material will be manufactured, and the handling and storage methods, along with necessary certification in accordance with AASHTO R 26(M). Only suppliers/refineries that have an approved "Quality Control Plan for Performance Graded Binders" formatted in accordance with AASHTO R 26(M) may supply PG binders to Department projects.

(c) Standard Performance Grade (PG) Binder:

i. Standard PG binder shall be defined as "Neat." Neat PG binders shall be free from modification with: fillers, extenders, reinforcing agents, adhesion promoters,

thermoplastic polymers, acid modification and other additives such as re-refined motor oil, and shall indicate such information on each bill of lading and Certified Test Report.

ii. The standard asphalt binder shall be PG 64S-22.

(d) Modified Performance Grade (PG) Binder: The modified asphalt binder shall be Performance Grade PG 64E-22 asphalt modified solely with a Styrene-Butadiene-Styrene (SBS) polymer. The polymer modifier shall be added at either the refinery or terminal and delivered to the bituminous concrete production facility as homogenous blend. The stability of the modified binder shall be verified in accordance with ASTM D7173 using the Dynamic Shear Rheometer (DSR). The DSR G*/sin(δ) results from the top and bottom sections of the ASTM D7173 test shall not differ by more than 10%. The results of ASTM D7173 shall be included on the Certified Test Report. The binder shall meet the requirements of AASHTO M 332 (including Appendix X1) and AASHTO R 29.

(e) Warm Mix Additive or Technology:

i. The warm mix additive or technology must be listed on the North East Asphalt User Producer Group (NEAUPG) Qualified Warm Mix Asphalt (WMA) Technologies List at the time of bid, which may be accessed online at http://www.neaupg.uconn.edu.

ii. The warm mix additive shall be blended with the asphalt binder in accordance with the manufacturer's recommendations.

iii. The blended binder shall meet the requirements of AASHTO M 332 and shall be graded or verified in accordance with AASHTO R 29 for the specified binder grade. The Contractor shall submit a Certified Test Report showing the results of the testing demonstrating the binder grade. In addition, it must include the grade of the virgin binder, the brand name of the warm mix additive, the manufacturer's suggested rate for the WMA additive, the water injection rate (when applicable), and the WMA Technology manufacturer's recommended mixing and compaction temperature ranges.

5. Emulsified Asphalts:

(a) General:

i. The emulsified asphalt shall meet the requirements of AASHTO M 140(M) or AASHTO M 208 as applicable.

ii. The emulsified asphalts shall be free of contaminants such as fuel oils and other solvents.

iii. The blending at mixing Plants of emulsified asphalts from different suppliers is prohibited.

(b) Basis of Approval:

i. The request for approval of the source of supply shall list the location where the material is manufactured, the handling and storage methods, and certifications in accordance with AASHTO R 77. Only suppliers that have an approved "Quality Control Plan for Emulsified Asphalt" formatted in accordance with AASHTO R 77 and that submit monthly split samples per grade to the Engineer may supply emulsified asphalt to Department projects.

ii. Each shipment of emulsified asphalt delivered to the Project site shall be accompanied with the corresponding Certified Test Report listing Saybolt viscosity, residue by evaporation, penetration of residue, and weight per gallon at 77°F and Material Certificate.

iii. Anionic emulsified asphalts shall meet the requirements of AASHTO M-140. Materials

used for tack coat shall not be diluted and meet grade RS-1 or RS-1h. When ambient temperatures are 80°F and rising, grade SS-1 or SS-1h may be substituted if permitted by the Engineer.

iv. Cationic emulsified asphalt shall meet the requirements of AASHTO M-208. Materials used for tack coat shall not be diluted and meet grade CRS-1. The settlement and demulsibility test will not be performed unless deemed necessary by the Engineer. When ambient temperatures are 80°F and rising, grade CSS-1 or CSS-1h may be substituted if permitted by the Engineer.

6. Reclaimed Asphalt Pavement (RAP):

(a) General: RAP is a material obtained from the cold milling or removal and processing of bituminous concrete pavement. RAP material shall be crushed to 100% passing the 1/2 inch sieve and free from contaminants such as joint compound, wood, plastic, and metals.

(b) Basis of Approval: The RAP material will be accepted on the basis of one of the following criteria:

i. When the source of all RAP material is from pavements previously constructed on Department projects, the Contractor shall provide a Materials Certificate listing the detailed locations and lengths of those pavements and that the RAP is only from those locations listed.

ii. When the RAP material source or quality is not known, the Contractor shall request approval from the Engineer at least 30 calendar days prior to the start of the paving operation. The request shall include a Material Certificate and applicable test results stating that the RAP consists of aggregates that meet the specification requirements of M.04.01-1 through M.04.01-3 and that the binder in the RAP is substantially free of solvents, tars and other contaminants. The Contractor is prohibited from using unapproved material on Department projects and shall take necessary action to prevent contamination of approved RAP stockpiles. Stockpiles of unapproved material shall remain separate from all other RAP materials at all times. The request for approval shall include the following:

1. A 50-lb. sample of the RAP to be incorporated into the recycled mixture.
2. A 25-lb. sample of the extracted aggregate from the RAP.

7. Crushed Recycled Container Glass (CRCG):

(a) Requirements: The Contractor may propose to use clean and environmentally-acceptable CRCG in an amount not greater than 5% by weight of total aggregate.

(b) Basis of Approval: The Contractor shall submit to the Engineer a request to use CRCG. The request shall state that the CRCG contains no more than 1% by weight of contaminants such as paper, plastic, and metal and conforms to the following gradation:

CRCG Grading Requirements	
Sieve Size	Percent Passing
3/8 inch	100
No. 4	35-100
No. 200	0.0-10.0

The Contractor shall submit a Material Certificate to the Engineer stating that the CRCG complies with all the applicable requirements in this Section.

8. Joint Seal Material: Joint seal material must meet the requirements of ASTM D6690 - Type 2. The Contractor shall submit a Material Certificate in accordance with 1.06.07 certifying that the joint seal material meets the requirements of this Section.

9. Recycled Asphalt Shingles (RAS): RAS shall consist of processed asphalt roofing shingles from post-consumer asphalt shingles or from manufactured shingle waste. The RAS material under consideration for use in bituminous concrete mixtures must be certified as being asbestos-free and shall be entirely free of whole, intact nails. The RAS material shall meet the requirements of AASHTO MP 23.

The Producer shall test the RAS material to determine the asphalt content and the gradation of the RAS material. The Producer shall take necessary action to prevent contamination of RAS stockpiles.

The Contractor shall submit a Material Certificate to the Engineer stating that the RAS complies with all the applicable requirements in this Section.

10. Plant Requirements:

(a) General: The Plant producing bituminous concrete shall comply with AASHTO M 156.

(b) Storage Silos: The Contractor may use silos for short-term storage with the approval of the Engineer. A storage silo must have heated cones and an unheated silo cylinder if it does not contain a separate internal heating system. When multiple silos are filled, the Contractor shall discharge 1 silo at a time. Simultaneous discharge of multiple silos for the same Project is not permitted.

Type of silo cylinder	Maximum storage time for all classes (hr)	
	HMA	WMA/PMA
Open Surge	4	Mfg Recommendations*
Unheated - Non-insulated	8	Mfg Recommendations*
Unheated - Insulated	18	Mfg Recommendations*
Heated - No inert gas	TBD by the Engineer	TBD by the Engineer

*Not to exceed HMA limits

(c) Documentation System: The mixing Plant documentation system shall include equipment for accurately proportioning the components of the mixture by weight and in the proper order, controlling the cycle sequence, and timing the mixing operations. Recording equipment shall monitor the batching sequence of each component of the mixture and produce a printed record of these operations on each Plant ticket, as specified herein.

If recycled materials are used, the Plant tickets shall include their dry weight, percentage, and daily moisture content.

If a WMA Technology is added at the Plant, the Plant tickets shall include the actual dosage rate.

For drum Plants, the Plant ticket shall be produced at 5 minute intervals and maintained by the vendor for a period of 3 years after the completion of the Project.

For batch Plants, the Plant ticket shall be produced for each bath and maintained by the vendor for a period of 3 years after the completion of the Project. In addition, an asterisk (*)

shall be automatically printed next to any individual batch weight(s) exceeding the following tolerances:

Each Aggregate Component	±1.5% of individual or cumulative target weight for each bin
Mineral Filler	±0.5% of the total batch
Bituminous Material	±0.1% of the total batch
Zero Return (Aggregate)	±0.5% of the total batch
Zero Return (Bituminous Material)	±0.1% of the total batch

The entire batching and mixing interlock cut-off circuits shall interrupt and stop the automatic batching operations when an error exceeding the acceptable tolerance occurs in proportioning.

The scales shall not be manually adjusted during the printing process. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest. A unique printed character (m) shall automatically be printed on the truck and batch plant printout when the automatic batching sequence is interrupted or switched to auto-manual or full manual during proportioning.

(d) Aggregates: Aggregate stockpiles shall be managed to prevent segregation and cross contamination. For drum Plants only, the percent moisture content, at a minimum prior to production and half way through production, shall be determined.

(e) Mixture: The dry and wet mix times shall be sufficient to provide a uniform mixture and a minimum particle coating of 95% as determined by AASTO T 195(M).

Bituminous concrete mixtures shall contain no more than 0.5% moisture when tested in accordance with AASHTO T 329.

(f) RAP: RAP moisture content shall be determined a minimum of twice daily (prior to production and halfway through production).

(g) Asphalt Binder: A binder log shall be submitted to the Department's Central Lab on a monthly basis.

(h) Warm mix additive: For mechanically foamed WMA, the water injection rate shall be monitored during production and not exceed 2.0% by total weight of binder. For additive added at the Plant, the dosage rate shall be monitored during production.

(i) Testing Laboratory: The Contractor shall maintain a laboratory to test bituminous concrete mixtures during production. The laboratory shall have a minimum of 300 s.f., have a potable water source and drainage in accordance with the CT Department of Public Health Drinking Water Division, and be equipped with all necessary testing equipment as well as with a PC, printer, and telephone with a dedicated hard-wired phone line. In addition, the PC shall have a high speed internet connection and a functioning web browser with unrestricted access to https://ctmail.ct.gov . This equipment shall be maintained in working order at all times and be made available for use by the Engineer.

The laboratory shall be equipped with a heating system capable of maintaining a minimum temperature of 65°F. It shall be clean and free of all materials and equipment not associated with the laboratory. Sufficient light and ventilation must be provided. During summer months

adequate cooling or ventilation must be provided so the indoor air temperature shall not exceed the ambient outdoor temperature.

The laboratory testing apparatus, supplies, and safety equipment shall be capable of performing all the applicable tests in their entirety that are referenced in AASHTO R 35 and AASHTO M 323. The Contractor shall ensure that the Laboratory is adequately supplied at all times during the course of the Project with all necessary testing materials and equipment.

The Contractor shall maintain a list of laboratory equipment used in the acceptance testing processes including, but not limited to, balances, scales, manometer/vacuum gauge, thermometers, and gyratory compactor, clearly showing calibration and/or inspection dates, in accordance with AASHTO R 18. The Contractor shall notify the Engineer if any modifications are made to the equipment within the laboratory. The Contractor shall take immediate action to replace, repair, or recalibrate any piece of equipment that is out of calibration, malfunctioning, or not in operation.

M.04.02—Mix design and Job Mix Formula (JMF)

1. Curb Mix:

(a) Requirements: The Contractor shall use bituminous concrete that meets the requirements of Table M.04.02-1. RAP may be used in 5% increments by weight up to 30%.

(b) Basis of Approval: Annually, an approved JMF based on a mix design for curb mix must be on file with the Engineer prior to use.

The Contractor shall test the mixture for compliance with the submitted JMF and Table M.04.02-1. The maximum theoretical density (Gmm) will be determined by AASHTO T 209. If the mixture does not meet the requirements, the JMF shall be adjusted within the ranges shown in Table M.04.02-1 until an acceptable mixture is produced.

An accepted JMF from the previous operating season may be acceptable to the Engineer provided that there are no changes in the sources of supply for the coarse aggregate, fine aggregate, recycled material (if applicable) and the Plant operation had been consistently producing acceptable mixture.

Any change in component source of supply or consensus properties must be approved by the Engineer. A revised JMF shall be submitted prior to use.

TABLE M.04.02-1:
Control Points for Curb Mix Mixtures

Mix	Curb Mix	Production Tolerances from JMF Target
Grade of PG Binder content %	**PG 64S-22 6.5 - 9.0**	**0.4**
Sieve Size		
No. 200	3.0 - 8.0 (b)	2.0
No. 50	10 - 30	4
No. 30	20 - 40	5
No. 8	40 - 70	6
No. 4	65 - 87	7
1/4 inch		
3/8 inch	95 - 100	8
1/2 inch	100	8
3/4 inch		8
1 inch		
2 inch		
Additionally, the fraction of material retained between any 2 consecutive sieves shall not be less than 4%.		
Mixture Temperature		
Binder	325°F maximum	
Aggregate	280-350°F	
Mixtures	265-325°F	
Mixture Properties		
Air Voids (VA) %	0 – 4.0 (a)	

Notes: (a) Compaction Parameter 50 gyrations (N_{des})
(b) The percent passing the No. 200 sieve shall not exceed the percentage of bituminous asphalt binder.

2. Superpave Design Method – S0.25, S0.375, S0.5, and S1:

(a) Requirements: All designated mixes shall be designed using the Superpave mix design method in accordance with AASHTO R 35. A JMF based on the mix design shall meet the requirements of Tables M.04.02-2 to M.04.02-5. Each JMF and component samples must be submitted no less than 7 days prior to production and must be approved by the Engineer prior to use. All JMFs expire at the end of the calendar year.

All aggregate component consensus properties and tensile strength ratio (TSR) specimens shall be tested at an AASHTO Materials Reference Laboratory (AMRL) by NETTCP Certified Technicians.

All bituminous concrete mixes shall be tested for stripping susceptibility by performing the TSR test procedure in accordance with AASHTO T 283(M) at a minimum every 36 months. The compacted specimens may be fabricated at the Plant and then tested at an AMRL accredited facility. A minimum of 45000 grams of laboratory or plant blended mixture and the

corresponding complete Form MAT-412s shall be submitted to the Division of Material Testing (DMT) for design TSR testing verification. The mixture submitted shall be representative of the corresponding mix design as determined by the Engineer.

i. Superpave Mixtures with RAP: RAP may be used with the following conditions:
   - RAP amounts up to 15% may be used with no binder grade modification.
   - RAP amounts up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.
   - Two (2) representative samples of RAP shall be obtained. Each sample shall be split, and 1 split sample shall be tested for binder content in accordance with AASHTO T 164 and the other in accordance with AASHTO T 308.
   - RAP material shall not be used with any other recycling option.

ii. Superpave Mixtures with RAS: RAS may be used solely in HMA S1 mixtures with the following conditions:
   - RAS amounts up to 3% may be used.
   - RAS total binder replacement up to 15% may be used with no binder grade modification.
   - RAS total binder replacement up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.
   - Superpave Mixtures with RAS shall meet AASHTO PP 78 design considerations.

iii. Superpave Mixtures with CRCG: CRCG may be used solely in HMA S1 mixtures. One percent (1%) of hydrated lime, or other accepted non-stripping agent, shall be added to all mixtures containing CRCG. CRCG material shall not be used with any other recycling option.

(b) Basis of Approval: The following information must be included in the JMF submittal:

i. Gradation, consensus properties and specific gravities of the aggregate, RAP or RAS.
ii. Average asphalt content of the RAP or RAS by AASHTO T 164.
iii. Source of RAP or RAS and percentage to be used.
iv. Warm mix Technology, manufacturer's recommended additive rate and tolerances, and manufacturer recommended mixing and compaction temperatures.
v. TSR test report and anti-strip manufacturer and recommended dosage rate if applicable.
vi. Mixing and compaction temperature ranges for the mix with and without the warm-mix technology incorporated.
vii. JMF ignition oven correction factor by AASHTO T 308.

With each JMF submittal, the following samples shall be submitted to the Division of Materials Testing:

- 4 - one (1) quart cans of PG binder, with corresponding Safety Data Sheet (SDS)
- 1 - 50 lbs. bag of RAP
- 2 - 50 lbs. bags of Plant-blended virgin aggregate

A JMF may not be approved if any of the properties of the aggregate components or mix do not meet the verification tolerances as described in the Department's current QA Program for Materials, Acceptance and Assurance Testing Policies and Procedures.

Any material based on a JMF, once approved, shall only be acceptable for use when it is produced by the designated Plant, it utilizes the same components, and the production of material continues to meet all criteria as specified in Tables M.04.02-2, M.04.02-3 and M.04.02-4. A new JMF must be submitted to the Engineer for approval whenever a new component source is proposed.

Only 1 mix with 1 JMF will be approved for production at a time. Switching between approved JMF mixes with different component percentages or sources of supply is prohibited.

TABLE M.04.02-2: Superpave Master Range for Bituminous Concrete Mixture Design Criteria

	S0.25		**S0.375**		**S0.5**		**S1**	
Sieve	Control Points		Control Points		Control Points		Control Points	
inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)
2.0	-	-	-	-	-	-	-	-
1.5	-	-	-	-	-	-	100	-
1.0	-	-	-	-	-	-	90	100
3/4	-	-	-	-	100	-	-	90
1/2	100	-	100	-	90	100	-	-
3/8	97	100	90	100	-	90	-	-
No. 4	72	90	-	72	-	-	-	-
No. 8	32	67	32	67	28	58	19	45
No. 16	-	-	-	-	-	-	-	-
No. 30	-	-	-	-	-	-	-	-
No. 50	-	-	-	-	-	-	-	-
No. 100	-	-	-	-	-	-	-	-
No. 200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0
VMA (%)	16.5 ± 1		16.0 ± 1		15.0 ± 1		13.0 ± 1	
VA (%)	4.0 ± 1		4.0 ± 1		4.0 ± 1		4.0 ± 1	
Gse	JMF value		JMF value		JMF value		JMF value	
Gmm	JMF ± 0.030		JMF ± 0.030		JMF ± 0.030		JMF ± 0.030	
Dust / effective binder	0.6 - 1.2		0.6 - 1.2		0.6 - 1.2		0.6 - 1.2	
TSR	≥ 80%		≥ 80%		≥ 80%		≥ 80%	
T-283 Stripping	Minimal as determined by the Engineer							

(c) Mix Status: Each facility will have each type of bituminous concrete mixture rated based on the results of the previous year of production. Mix status will be provided to each bituminous concrete Producer prior to the beginning of the paving season.

The rating criteria are based on compliance with Air Voids and Voids in Mineral Aggregate (VMA) as indicated in Table M.04.03-4 and are calculated as follows:

Criteria A: Percentage of acceptance test results with compliant air voids.

Criteria B: The average of the percentage of acceptance results with compliant VMA and the percentage of acceptance results with compliant air voids.

The final rating assigned will be the lower of the rating obtained with Criteria A or Criteria B.

Mix status is defined as:

"A" – Approved: Assigned to each mixture type from a production facility with a current rating of 70% or greater, or to each mixture type completing a successful PPT.

"PPT" – Pre-Production Trial: Temporarily assigned to each mixture type from a production facility when:

1. there are no compliant acceptance production test results submitted to the Department from the previous year;
2. there is a source change in one or more aggregate components;
3. there is a component percentage change of more than 5% by weight;
4. there is a change in RAP percentage;
5. the mixture has a rating of less than 70% from the previous season;
6. it is a new JMF not previously submitted; or
7. the average of 10 consecutive acceptance results for VFA, Density to N_{ini} or dust to effective binder ratio does not meet the criteria in tables M.04.02-2 and M.04.02-4.

Bituminous concrete mixtures rated with a "PPT" status cannot be used on Department projects. Testing shall be performed by the Producer with NETTCP certified personnel on material under this status. Test results must confirm that specification requirements in Tables M.04.02-2 through M.04.02-4 are met and the binder content (Pb) meets the requirements in Table M.04.03-2 before material can be used. One of the following methods must be used to verify the test results:

Option A: Schedule a day when a Department Inspector can be at the facility to witness testing

Option B: When the Contractor or their representative performs testing without being witnessed by an Inspector, the Contractor shall submit the test results and a split sample including 2 gyratory molds, 5,000 grams of boxed bituminous concrete, and 5,000 grams of cooled loose bituminous concrete for verification testing and approval

Option C: When the Contractor or their representative performs testing without being witnessed by a Department Inspector, the Engineer may verify the mix in the Contractor's laboratory

Witnessing or verifying by the Department of compliant test results will change the mix's status to "A"

The differences between the Department's test results and the Contractor's must be within the "C" tolerances included in the Department's QA Program for Materials, Acceptance and Assurance Testing Policies and Procedures in order to be verified.

"U" – Not Approved: Status assigned to a type of mixture that does not have an approved JMF. Bituminous concrete mixtures with a "U" status cannot be used on Department projects.

TABLE M.04.02-3:
Superpave Consensus Properties Requirements for Combined Aggregate

Traffic Level	Design ESALs (80kN) Millions	Coarse Aggregate Angularity[1] ASTM D5821, Minimum %	Fine Aggregate Angularity AASHTO T 304, Method A Minimum %	Flat and Elongated Particles[2] ASTM D4791, Maximum %	Sand Equivalent AASHTO T 176, Minimum %
1	< 0.3	55/- -	40	10	40
2	0.3 to < 3.0	75/- -	40	10	40
3	≥ 3.0	95/90	45	10	45

Notes:
(1) 95/90 denotes that a minimum of 95% of the coarse aggregate, by mass, shall have one fractured face and that a minimum of 90% shall have two fractured faces.
(2) Criteria presented as maximum Percent by mass of flat and elongated particles of materials retained on the No. 4 sieve, determined at 5:1 ratio.

TABLE M.04.02-4: Superpave Traffic Levels and Design Volumetric Properties

Traffic Level	Design ESALs	Number of Gyrations by Superpave Gyratory Compactor			Percent Density of Gmm from HMA/ WMA Specimen			Voids Filled with Asphalt (VFA) Based on Nominal Mix Size - Inch			
	(million)	N_{ini}	N_{des}	N_{max}	N_{ini}	N_{des}	N_{max}	0.25	0.375	0.5	1
1	<0.3	6	50	75	≤91.5	96.0	≤98.0	70-80	70-80	70-80	67-80
2	0.3 to <3.0	7	75	115	≤90.5	96.0	≤98.0	65-78	65-78	65-78	65-78
3	≥3.0	7	75	115	≤90.0	96.0	≤98.0	65-77	65-76	65-75	65-75

TABLE M.04.02-5:
Superpave Minimum Binder Content by Mix Type and Level

Mix Type	Level	Binder Content Minimum
S0.25	1	5.80
S0.25	2	5.70
S0.25	3	5.70
S0.375	1	5.70
S0.375	2	5.60
S0.375	3	5.60
S0.5	1	5.10
S0.5	2	5.00
S0.5	3	5.00
S1	1	4.60
S1	2	4.50
S1	3	4.50

M.04.03—Production Requirements:

1. Standard Quality Control Plan (QCP) for Production: The QCP for production shall describe the organization and procedures, which the Contractor shall use to administer quality control. The QCP shall include the procedures used to control the production process, to determine when immediate changes to the processes are needed, and to implement the required changes. The QCP must detail the inspection, sampling and testing protocols to be used, and the frequency for each.

Control Chart(s) shall be developed and maintained for critical aspect(s) of the production process as determined by the Contractor. The control chart(s) shall identify the material property, applicable upper and lower control limits, and be updated with current test data. As a minimum, the following quality characteristics shall be included in the control charts:

- percent passing No. 4 sieve
- percent passing No. 200 sieve
- binder content
- air voids
- Gmm
- Gse
- VMA

The control chart(s) shall be used as part of the quality control system to document variability of the bituminous concrete production process. The control chart(s) shall be submitted to the Engineer the first day of each month.

The QCP shall also include the name and qualifications of a Quality Control Manager. The Quality Control Manager shall be responsible for the administration of the QCP, including compliance with the plan and any plan modifications.

The Contractor shall submit complete production testing records to the Engineer within 24 hours in a manner acceptable to the Engineer.

The QCP shall also include the name and qualifications of any outside testing laboratory performing any QC functions on behalf of the Contractor. The QCP must also include a list of sampling and testing methods and frequencies used during production, and the names of all Quality Control personnel and their duties.

Approval of the QCP does not imply any warranty by the Engineer that adherence to the plan will result in production of bituminous concrete that complies with these specifications. The Contractor shall submit any changes to the QCP as work progresses.

2. Acceptance Requirements:

(a) General:

For those mixes with a total estimated project tonnage over 500 tons, a NETTCP HMA Paving Inspector certified Contractor representative shall obtain a field sample of the material placed at the project site in accordance with AASHTO T 168 using the procedure indicated in Section 5.2.3 or an alternate procedure approved by the Engineer. Sampling from the truck at the Plant in accordance with AASHTO T 168 using the procedure indicated in Section 5.2.2 will be allowed for those mixes with a total estimated project tonnage equal to or less than 500 tons. Regardless of sampling location, the sample shall be quartered by the Contractor in accordance with AASHTO R 47 and placed in an approved container. The container shall be sealed with a security tape provided by the Department and labelled to include the project number, date of paving, mix type, lot and sublot numbers and daily tonnage. The minimum weight of each quartered sample shall be 14000 grams. The Contractor shall transport one of the containers to the Departments Central Laboratory in Rocky Hill, retain one of the sealed containers for potential use in dispute resolution and test the remaining samples for acceptance in accordance with past practice.

The Contractor shall submit all acceptance tests results to the Engineer within 24 hours or prior to the next day's production. All acceptance test specimens and supporting documentation must be retained by the Contractor and may be disposed of with the approval of the Engineer. All quality control specimens shall be clearly labeled and separated from the acceptance specimens.

Contractor personnel performing QC and acceptance testing must be present at the facility prior to, during, and until completion of production, and be certified as a NETTCP HMA Plant Technician or Interim HMA Plant Technician and be in good standing. Production of material for use on State projects must be suspended by the Contractor if such personnel are not present. Technicians found by the Engineer to be non-compliant with NETTCP policies and procedures or Department policies may be removed by the Engineer from participating in the acceptance testing process for Department projects until their actions can be reviewed.

Verification and dispute resolution testing will be performed by the Engineer in accordance with the Department's QA Program for Materials.

Should the Department be unable to validate the Contractor's acceptance test result(s) for a lot of material, the Engineer will use results from verification testing and re-calculate the pay adjustment for that lot. The Contractor may request to initiate the dispute resolution process in writing within 24 hours of receiving the adjustment and must include supporting documentation or test results to justify the request.

(b) Curb Mix Acceptance Sampling and Testing Procedures: Curb Mixes shall be tested by the Contractor at a frequency of 1 test per every 250 tons of cumulative production, regardless of the day of production.

When these mix designs are specified, the following acceptance procedures and AASHTO test methods shall be used:

TABLE M.04.03-1: Curb Mix Acceptance Test Procedures

Protocol	Reference	Description
1	**AASHTO T 30(M)**	Mechanical Analysis of Extracted Aggregate
2	**AASHTO T 168**	Sampling of Bituminous Concrete
3	**AASHTO T 308**	Binder Content by Ignition Oven Method (adjusted for aggregate correction factor)
4	**AASHTO T 209(M)[(2)]**	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
5	**AASHTO T 312[(2)]**	[(1)]Superpave Gyratory Molds Compacted to N_{des}
6	**AASHTO T 329**	Moisture Content of Hot-Mix Asphalt (HMA) by Oven Method

Notes: [(1)] One (1) set equals 2 each of 6-inch molds. Molds to be compacted to 50 gyrations.
[(2)] Once per year or when requested by the Engineer.

i. Determination of Off-Test Status:
1. Curb Mix is considered "off test" when the test results indicate that any single value for bitumen content or gradation are not within the tolerances shown in Table M.04.02-1 for that mixture. If the mix is "off test," the Contractor must take immediate actions to correct the deficiency and a new acceptance sample shall be tested on the same day or the following day of production.
2. When multiple silos are located at 1 site, mixture supplied to 1 project is considered as coming from 1 source for the purpose of applying the "off test" status.
3. The Engineer may cease supply from the Plant when test results from 3 consecutive samples are not within the JMF tolerances or the test results from 2 consecutive samples not within the control points indicated in Table M.04.02-1 regardless of production date.

ii. JMF Revisions
1. If a test indicates that the bitumen content or gradation are outside the tolerances, the Contractor may make a single JMF revision as allowed by the Engineer prior to any additional testing. Consecutive test results outside the requirements of Table M.04.02-1 JMF tolerances may result in rejection of the mixture.
2. Any modification to the JMF shall not exceed 50% of the JMF tolerances indicated in Table M.04.02-1 for any given component of the mixture without approval of the Engineer. When such an adjustment is made to the bitumen, the corresponding production percentage of bitumen shall be revised accordingly.

(c) Superpave Mix Acceptance:

i. Sampling and Testing Procedures

Production Lot: The lot will be defined as one of the following types:
- Non-PWL Production Lot for total estimated Project quantities per mixture less than 3500 tons: All mixture placed during a single continuous paving operation.
- PWL Production Lot for total estimated Project quantities per mixture of 3500 tons or more: Each 3500 tons of mixture produced within 30 calendar days.

Production Sub Lot:
- For Non-PWL: As defined in Table M.04.03-2
- For PWL: 500 tons (The last sub lot may be less than 500 tons.)

Partial Production Lots (For PWL only): A Lot with less than 3500 tons due to:

- completion of the course;
- a Job Mix Formula revision due to changes in:
    - cold feed percentages over 5%,
    - target combined gradation over 5%,
    - target binder over 0.15%,
    - any component specific gravity; or
- a lot spanning 30 calendar days.

The acceptance sample(s) location(s) shall be selected using stratified - random sampling in accordance with ASTM D3665 based on:

- the total daily estimated tons of production for non-PWL lots, or
- the total size for PWL lots.

One (1) acceptance sample shall be obtained and tested per sub lot with quantities over 125 tons. The Engineer may direct that additional acceptance samples be obtained. For non-PWL lots, one (1) acceptance test shall always be performed in the last sub lot based on actual tons of material produced.

For non-PWL lots, quantities of the same mixture per Plant may be combined daily for multiple State projects to determine the number of sub lots.

The payment adjustment will be calculated as described in 4.06.

TABLE M.04.03-2:
Superpave Acceptance Testing Frequency per Type/Level/Plant for Non-PWL Lots

Daily Quantity Produced in Tons (Lot)	Number of Sub Lots/Tests
0 to 125	0, Unless requested by the Engineer
126 to 500	1
501 to 1,000	2
1,001 to 1,500	3
1,500 or greater	1 per 500 tons or portions thereof

The following test procedures shall be used for acceptance:

TABLE M.04.03-3: Superpave Acceptance Testing Procedures

Protocol	Procedure	Description
1	AASHTO T 168	Sampling of bituminous concrete
2	AASHTO R 47	Reducing samples to testing size
3	AASHTO T 308	Binder content by ignition oven method (adjusted for aggregate correction factor)
4	AASHTO T 30(M)	Gradation of extracted aggregate for bituminous concrete mixture
5	AASHTO T 312	[(1)]Superpave gyratory molds compacted to N_{des}
6	AASHTO T 166	[(2)]Bulk specific gravity of bituminous concrete
7	AASHTO R 35	[(2)]Air voids, VMA
8	AASHTO T 209(M)	Maximum specific gravity of bituminous concrete (average of 2 tests)
9	AASHTO T 329	Moisture content of bituminous concrete

Notes: [(1)] One (1) set equals 2 each of 6-inch molds. Molds to be compacted to Nmax for PPTs and to Ndes for production testing. The first sub lot of the year shall be compacted to N_{max}.

[(2)] Average value of 1 set of 6-inch molds.

If the average ignition oven corrected binder content differs by 0.3% or more from the average of the Plant ticket binder content in 5 consecutive tests regardless of the production date (moving average), the Contractor shall immediately investigate, determine an assignable cause, and correct the issue. When 2 consecutive moving average differences are 0.3% or more and no assignable cause has been established, the Engineer may require a new ignition oven aggregate correction factor to be performed or to adjust the current factor by the average of the differences between the corrected binder content and production Plant ticket for the last 5 acceptance results.

The Contractor shall perform TSR testing within 30 days after the start of production for all design levels of HMA- and PMA- S0.5 Plant-produced mixtures, in accordance with AASHTO T 283(M). The TSR test shall be performed at an AMRL certified laboratory by NETTCP certified technicians. The compacted specimens may be fabricated at the Plant and then tested at an AMRL accredited facility. A minimum of 45000 grams of plant blended mixture and the corresponding complete Form MAT-412s shall be submitted to the DMT for production TSR testing verification. The mixture submitted shall be representative of the corresponding mix design as determined by the Engineer. Additionally, the TSR test report and tested specimens shall be submitted to the Engineer for review. Superpave mixtures that require anti-strip additives (either liquid or mineral) shall continue to meet all requirements specified herein for binder and bituminous concrete. The Contractor shall submit the name, manufacturer, percent used, technical datasheet and SDS for the anti-strip additive (if applicable) to the Engineer.

i. Determination of Off-Test Status:
   1. Superpave mixes shall be considered *"off test"* when any control point sieve, binder content, VA, VMA, and Gmm value is outside of the limits specified in Table M.04.03-4 or the target binder content at the Plant is below the minimum binder

content stated in Table M.04.02-5. Note that further testing of samples or portions of samples not initially tested for this purpose cannot be used to change the status.

2. Any time the bituminous concrete mixture is considered off-test:
   A. The Contractor shall notify the Engineer when the Plant is *"off test"* for any mix design that is delivered to the Project in any production day. When multiple silos are located at 1 site, mixture supplied to 1 project is considered as coming from 1 source for the purpose of applying the *"off test"* determination.
   B. The Contractor must take immediate actions to correct the deficiency, minimize *"off test"* production to the Project, and obtain an additional Process Control (PC) test after any corrective action to verify production is in conformance with the specifications. A PC test will not be used for acceptance and is solely for the use of the Contractor in its quality control process.

ii. Cessation of Supply for Superpave Mixtures in Non-PWL Lots:

A mixture **shall not be used** on Department projects when it is "off test" for:

1. four (4) consecutive tests in any combination of VA, VMA or Gmm, regardless of date of production, or
2. two (2) consecutive tests in the control point sieves in 1 production shift.

As a result of cessation of supply, the mix status will be changed to PPT

iii. JMF revisions:

JMF revisions are only permitted prior to or after a production shift. A JMF revision is effective from the time it was submitted and is not retroactive to the previous test(s).

JMF revisions shall be justified by a documented trend of test results.

Revisions to aggregate or RAP specific gravities are only permitted when testing is performed at an AMRL certified laboratory by NETTCP certified technicians.

A JMF revision is required when the Plant target RAP or bin percentage deviates by more than 5% or the Plant target binder content deviates by more than 0.15% from the active JMF.

TABLE M.04.03-4: Superpave Mixture Production Requirements

	S0.25		**S0.375**		**S0.5**		**S1**		Tolerances
Sieve	Control Points		Control Points		Control Points		Control Points		From JMF Targets[2]
inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	+/- Tolerance
1.5	-	-	-	-	-	-	100	-	
1.0	-	-	-	-	-	-	90	100	
3/4	-	-	-	-	100	-	-	90	
1/2	100	-	100	-	90	100	-	-	
3/8	97	100	90	100	-	90	-	-	
No. 4	72	90	-	72	-	-	-	-	
No. 8	32	67	32	67	28	58	19	45	
No. 16	-	-	-	-	-	-	-	-	
No. 200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0	
Pb	JMF value		JMF value		JMF value		JMF value		0.3[3]
VMA (%)	16.5		16.0		15.0		13.0		1.0[4]
VA (%)	4.0		4.0		4.0		4.0		1.0[5]
Gmm	JMF value		JMF value		JMF value		JMF value		0.030
Mix Temp. – HMA[6]	265-325°F [1]		265-325°F [1]		265-325°F [1]		265-325°F [1]		
Mix Temp. – PMA[6]	285-335°F [1]		285-335°F [1]		285-335°F [1]		285-335°F [1]		
Prod. TSR	N/A		N/A		≥80%		N/A		
T-283 Stripping	N/A		N/A		Minimal TBD by the Engineer		N/A		

Notes: [1] 300°F minimum after October 15.
[2] JMF tolerances shall be defined as the limits for production compliance.
[3] 0.4 for PWL lots
[4] 1.3 for all PWL lots except S/P 0.25 mixes. 1.1 for S/P 0.25 Non-PWL lots. 1.4 for S/P 0.25 PWL lots
[5] 1.2 for PWL lots
[6] Also applies to placement

Table M.04.03-5:
Modifications to Standard AASHTO and ASTM Test Specifications and Procedures

AASHTO Standard Method of Test	
Reference	**Modification**
T 30	Section 7.2 through 7.4 Samples are not routinely washed for production testing
T 209	Section 7.2 The average of 2 bowls is used proportionally in order to satisfy minimum mass requirements. 8.3 Omit Pycnometer method.
T 283	When foaming technology is used, the material used for the fabrication of the specimens shall be cooled to room temperature, and then reheated to the manufacturer's recommended compaction temperature prior to fabrication of the specimens.
AASHTO Standard Recommended Practices	
Reference	**Modification**
R 26	All laboratory technician(s) responsible for testing PG binders shall be certified or Interim Qualified by NETTCP as a PG Asphalt Binder Lab Technician. All laboratories testing binders for the Department are required to be accredited by the AMRL. Sources interested in being approved to supply PG binders to the Department by use of an "in-line blending system" must record properties of blended material and additives used. Each source of supply of PG binder must indicate that the binders contain no additives used to modify or enhance their performance properties. Binders that are manufactured using additives, modifiers, extenders, etc., shall disclose the type of additive, percentage and any handling specifications or limitations required. All AASHTO M 320 references shall be replaced with AASHTO M 332. Once a month, 1 split sample and test results for each asphalt binder grade and each lot shall be submitted by the PG binder supplier to the Department's Central Lab. Material remaining in a certified lot shall be re-certified no later than 30 days after initial certification. Each April and September, the PG binder supplier shall submit test results for 2 BBR tests at 2 different temperatures in accordance with AASHTO R 29.

SECTION 4.06 - BITUMINOUS CONCRETE

Section 4.06 is being deleted in its entirety and replaced with the following:

4.06.01—Description: Work under this Section shall include the production, delivery, placement and compaction of a uniform textured, non-segregated, smooth bituminous concrete pavement to the grade and cross section shown on the plans.

The following terms as used in this specification are defined as:

Bituminous Concrete: A composite material consisting of prescribed amounts of asphalt binder and aggregates. Asphalt binder may also contain additives engineered to modify specific properties and/or behavior of the composite material. References to bituminous concrete apply to all of its forms, such as those identified as hot-mix asphalt (HMA) or polymer-modified asphalt (PMA).

Bituminous Concrete Plant (Plant): A structure where aggregates and asphalt binder are combined in a controlled fashion into a bituminous concrete mixture suitable for forming pavements and other paved surfaces.

Course: A continuous layer (a lift or multiple lifts) of the same bituminous concrete mixture placed as part of the pavement structure.

Density Lot: The total tonnage of all bituminous concrete placed in a single lift which are:

PWL density lots = When the project total estimated quantity per mixture is larger than 3,500 tons

Simple Average density lots = When the project total estimated quantity per mixture is 3,500 tons or less

Disintegration: Erosion or fragmentation of the pavement surface which can be described as polishing, weathering-oxidizing, scaling, spalling, raveling, or formation of potholes.
Dispute Resolution: A procedure used to resolve conflicts between the Engineer and the Contractor's results that may affect payment.
Hot Mix Asphalt (HMA): A bituminous concrete mixture typically produced at 325°F.
Job Mix Formula (JMF): A recommended aggregate gradation and asphalt binder content to achieve the required mixture properties.
Lift: An application of a bituminous concrete mixture placed and compacted to a specified thickness in a single paver pass.
Percent Within Limits (PWL): The percentage of the lot falling between the Upper Specification Limit (USL) and the Lower Specification Limit (LSL).
Polymer Modified Asphalt (PMA): A bituminous concrete mixture containing a polymer-modified asphalt binder and using a qualified warm mix technology.
Production Lot: The total tonnage of a bituminous concrete mixture from a single source that may receive an adjustment.
Production Sub Lot: Portion of the production lot typically represented by a single sample.
Quality Assurance (QA): All those planned and systematic actions necessary to provide CTDOT the confidence that a Contractor will perform the work as specified in the Contract.
Quality Control (QC): The sum total of activities performed by the vendor (Producer, Manufacturer, and Contractor) to ensure that a product meets contract specification requirements.
Superpave: A bituminous concrete mix design used in mixtures designated as "S*" Where "S" indicates Superpave and * indicates the sieve related to the nominal maximum aggregate size of the mix.
Segregation: A non-uniform distribution of a bituminous concrete mixture in terms of gradation, temperature, or volumetric properties.
Warm Mix Asphalt (WMA) Technology: A qualified additive or technology that may be used to produce a bituminous concrete at reduced temperatures and/or increase workability of the mixture.

4.06.02—Materials: All materials shall meet the requirements of Section M.04.

1. Materials Supply: The bituminous concrete mixture must be from one source of supply and originate from one Plant unless authorized by the Engineer.

2. Recycled Materials: Reclaimed Asphalt Pavement (RAP), Crushed Recycled Container Glass (CRCG), Recycled Asphalt Shingles (RAS), or crumb rubber (CR) from recycled tires may be incorporated in bituminous concrete mixtures in accordance with Project Specifications.

4.06.03—Construction Methods

1. Material Documentation: All vendors producing bituminous concrete must have Plants with automated vehicle-weighing scales, storage scales, and material feeds capable of producing a delivery ticket containing the information below.

a. State of Connecticut printed on ticket.
b. Name of Producer, identification of Plant, and specific storage silo if used.
c. Date and time.

d. Mixture Designation, mix type and level. Curb mixtures for machine-placed curbing must state "curb mix only."
e. If WMA Technology is used, "-W"must be listed following the mixture designation.
f. Net weight of mixture loaded into the vehicle. (When RAP and/or RAS is used, the moisture content shall be excluded from mixture net weight.)
g. Gross weight (equal to the net weight plus the tare weight or the loaded scale weight).
h. Tare weight of vehicle (daily scale weight of the empty vehicle).
i. Project number, purchase order number, name of Contractor (if Contractor other than Producer).
j. Vehicle number - unique means of identification of vehicle.
k. For Batch Plants: individual aggregate, recycled materials, and virgin asphalt max/target/min weights when silos are not used.
l. For every mixture designation: the running daily and project total delivered and sequential load number.

The net weight of mixture loaded into the vehicle must be equal to the cumulative measured weights of its components.

The Contractor must notify the Engineer immediately if, during production, there is a malfunction of the weight recording system in the automated Plant. Manually written tickets containing all required information will be allowed for no more than 1 hour.

The State reserves the right to have an Inspector present to monitor batching and/or weighing operations.

2. Transportation of Mixture: The mixture shall be transported in vehicles that are clean of all foreign material, excessive coating or cleaning agents, and that have no gaps through which material might spill. Any material spilled during the loading or transportation process shall be quantified by re-weighing the vehicle. The Contractor shall load vehicles uniformly so that segregation is minimized. Loaded vehicles shall be tightly covered with waterproof covers acceptable to the Engineer. Mesh covers are prohibited. The cover must minimize air infiltration. Vehicles found not to be in conformance shall not be loaded

Vehicles with loads of bituminous concrete being delivered to State projects must not exceed the statutory or permitted load limits referred to as gross vehicle weight (GVW). The Contractor shall furnish a list and allowable weights of all vehicles transporting mixture. The State reserves the right to check the gross and tare weight of any vehicle. If the gross or tare weight varies from that shown on the delivery ticket by more than 0.4%, the Engineer will recalculate the net weight. The Contractor shall correct the discrepancy to the satisfaction of the Engineer.

If a vehicle delivers mixture to the Project and the delivery ticket indicates that the vehicle is overweight, the load may not be rejected but a "Measured Weight Adjustment" will be taken in accordance with Article 4.06.04.

Vehicle body coating and cleaning agents must not have a deleterious effect on the mixture. The use of solvents or fuel oil, in any concentration, is prohibited for the coating of vehicle bodies.

For each delivery, the Engineer shall be provided a clear, legible copy of the delivery ticket.

3. Paving Equipment: The Contractor shall have the necessary paving and compaction equipment at the Project Site to perform the work. All equipment shall be in good working order and any equipment that is worn, defective, or inadequate for performance of the work shall be

repaired or replaced by the Contractor to the satisfaction of the Engineer. During the paving operation, the use of solvents or fuel oil, in any concentration, is strictly prohibited as a release agent or cleaner on any paving equipment (i.e., rollers, pavers, transfer devices, etc.).

Refueling or cleaning of equipment is prohibited in any location on the Project where fuel or solvents might come in contact with paved areas or areas to be paved. Solvents used in cleaning mechanical equipment or hand tools shall be stored clear of areas paved or to be paved. Before any such equipment and tools are cleaned, they shall be moved off of areas paved or to be paved.

Pavers: Each paver shall have a receiving hopper with sufficient capacity to provide for a uniform spreading operation and a distribution system that places the mix uniformly, without segregation. The paver shall be equipped with and use a vibratory screed system with heaters or burners. The screed system shall be capable of producing a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture. Pavers with extendible screed units as part of the system shall have auger extensions and tunnel extenders as necessary. Automatic screed controls for grade and slope shall be used at all times unless otherwise authorized by the Engineer. The controls shall automatically adjust the screed to compensate for irregularities in the preceding course or existing base. The controls shall maintain the proper transverse slope and be readily adjustable, and shall operate from a fixed or moving reference such as a grade wire or floating beam (minimum length 20 feet).

Rollers: All rollers shall be self-propelled and designed for compaction of bituminous concrete. Roller types shall include steel wheeled, pneumatic, or a combination thereof. Rollers that operate in a dynamic mode shall have drums that use a vibratory or oscillatory system or combination. Vibratory rollers shall be equipped with indicators for amplitude, frequency, and speed settings/readouts to measure the impacts per foot during the compaction process. Oscillatory rollers shall be equipped with frequency indicators. Rollers can operate in the dynamic mode using the oscillatory system on concrete structures such as bridges and catch basins if at the lowest frequency setting.

Pneumatic tire rollers shall be equipped with wide-tread compaction tires capable of exerting an average contact pressure from 60 to 90 psi uniformly over the surface. The Contractor shall furnish documentation to the Engineer regarding tire size, pressure and loading to confirm that the proper contact pressure is being developed and that the loading and contact pressure are uniform for all wheels.

Lighting: For paving operations which will be performed during hours of darkness the paving equipment shall be equipped with lighting fixtures as described below or with an approved equal. Lighting shall minimize glare to passing traffic. The lighting options and minimum number of fixtures are listed in Tables 4.06-1 and 4.06-2.

TABLE 4.06-1: Minimum Paver lighting

Option	Fixture Configuration	Fixture Quantity	Requirement
1	Type A	3	Mount over screed area
	Type B (narrow) or Type C (spot)	2	Aim to auger and guideline
	Type B (wide)or Type C (flood)	2	Aim 25feet behind paving machine
2	Type D Balloon	2	Mount over screed area

TABLE 4.06-2: Minimum Roller Lighting

Option	Fixture Configuration	Fixture Quantity	Requirement
1	Type B (wide)	2	Aim 50 feet in front of and behind roller
	Type B (narrow)	2	Aim 100 feet in front of and behind roller
2	Type C (flood)	2	Aim 50 feet in front of and behind roller
	Type C (spot)	2	Aim 100 feet in front of and behind roller
3	Type D Balloon	1	Mount above the roller

*All fixtures shall be mounted above the roller.

Type A: Fluorescent fixture shall be heavy duty industrial type. Each fixture shall have a minimum output of 8,000 lumens. The fixtures shall be mounted horizontally and be designed for continuous row installation.

Type B: Each floodlight fixture shall have a minimum output of 18,000 lumens.

Type C: Each fixture shall have a minimum output of 19,000 lumens.

Type D: Balloon light – each balloon light fixture shall have minimum output of 50,000 lumens and emit light equally in all directions.

Material Transfer Vehicle (MTV): A MTV shall be used when placing bituminous concrete surface course (a lift or multiple lifts) as indicated in the Contract except as noted on the plans or as directed by the Engineer. In addition, continuous paving lengths of less than 500 feet may not require the use of a MTV as determined by the Engineer.

The MTV must be a vehicle specifically designed for the purpose of delivering the bituminous concrete mixture from the delivery vehicle to the paver. The MTV must continuously remix the bituminous concrete mixture throughout the placement process.

The use of a MTV will be subject to the requirements stated in Article 1.07.05 Load Restrictions. The Engineer may limit the use of the vehicle if it is determined that the use of the MTV may damage highway components, utilities, or bridges. The Contractor shall submit to the Engineer at time of pre-construction the following information:

1. The make and model of the MTV.
2. The individual axle weights and axle spacing for each piece of paving equipment (haul vehicle, MTV and paver).
3. A working drawing showing the axle spacing in combination with all pieces of equipment that will comprise the paving echelon.

4. Test Section: The Engineer may require the Contractor to place a test section whenever the requirements of this specification or Section M.04 are not met.

The Contractor shall submit the quantity of mixture to be placed and the location of the test section for review and approval by the Engineer. The same equipment used in the construction of a passing test section shall be used throughout production.

If a test section fails to meet specifications, the Contractor shall stop production, make necessary adjustments to the job mix formula, Plant operations, or procedures for placement and compaction. The Contractor shall construct test sections, as allowed by the Engineer, until all the required specifications are met. All test sections shall also be subject to removal as set forth in Article 1.06.04.

5. Transitions for Roadway Surface: Transitions shall be formed at any point on the roadway where the pavement surface deviates, vertically, from the uniform longitudinal profile as specified on the plans. Whether formed by milling or by bituminous concrete mixture, all transition lengths shall meet the criteria below unless otherwise specified.

Permanent Transitions: Defined as any gradual change in pavement elevation that remains as a permanent part of the work.

A transition shall be constructed no closer than 75 feet from either side of a bridge expansion joint or parapet. All permanent transitions, leading and trailing ends shall meet the following length requirements:

Posted Speed Limit	Permanent Transition Length Required
> 35 mph	30 feet per inch of elevation change
35 mph or less	15 feet per inch of elevation change

In areas where it is impractical to use the above-described permanent transition lengths, the use of a shorter permanent transition length may be permitted when approved by the Engineer.

Temporary Transitions: Defined as a transition that does not remain a permanent part of the work.

All temporary transitions shall meet the following length requirements:

Posted Speed Limit	Temporary Transition Length Required
> 50 mph	Leading Transition: 15 feet per inch of vertical change (thickness) Trailing Transition: 6 feet per inch of vertical change (thickness)
40, 45 or 50 mph	Leading and Trailing: 4 feet per inch of vertical change (thickness)
35 mph or less	Leading and Trailing: 3 feet per inch of vertical change (thickness)

Note: Any temporary transition to be in place over the winter shutdown period or during extended periods of inactivity (more than 14 calendar days) shall meet the greater than 50 mph requirements shown above.

6. Spreading and Finishing of Mixture: Prior to the placement of the mixture, the underlying base course shall be brought to the plan grade and cross section within the allowable tolerance.

Immediately before placing a bituminous concrete lift, a uniform coating of tack coat shall be applied to all existing underlying pavement surfaces and on the exposed surface of a wedge joint.

Such surfaces shall be clean and dry. Sweeping or other means acceptable to the Engineer shall be used.

The mixture shall not be placed whenever the surface is wet or frozen.

Tack Coat Application: The tack coat shall be applied by a pressurized spray system that results in uniform overlapping coverage at an application rate of 0.03 to 0.05 gal./s.y. for a non-milled surface and an application rate of 0.05 to 0.07 gal./s.y. for a milled surface. For areas where both milled and un-milled surfaces occur, the tack coat shall be an application rate of 0.03 to 0.05 gal /s.y. The Engineer must approve the equipment and the method of measurement prior to use. The material for tack coat shall be heated to 160°F ± 10°F and shall not be further diluted.

Tack coat shall be allowed sufficient time to break prior to any paving equipment or haul vehicles driving on it.

The Contractor may request to omit the tack coat application between bituminous concrete layers that have not been exposed to traffic and are placed during the same work shift. Requests to omit tack coat application on the upper and lower surfaces of a wedge joint will not be considered.

Placement: The mixture shall be placed and compacted to provide a smooth, dense surface with a uniform texture and no segregation at the specified thickness and dimensions indicated in the plans and specifications.

When unforeseen weather conditions prevent further placement of the mixture, the Engineer is not obligated to accept or place the bituminous concrete mixture that is in transit from the Plant.

In advance of paving, traffic control requirements shall be set up, maintained throughout placement, and shall not be removed until all associated work including density testing is completed.

The mixture temperature will be verified by means of a probe or infrared type of thermometer. The placement temperature range shall be listed in the quality control plan (QCP) for placement and meet the requirements of Table M.04.03-4. Any HMA material that that falls outside the specified temperature range as measured by a probe thermometer may be rejected.

The Contractor shall inspect the newly placed pavement for defects in mixture or placement before rolling is started. Any deviation from standard crown or section shall be immediately remedied by placing additional mixture or removing surplus mixture. Such defects shall be corrected to the satisfaction of the Engineer.

Where it is impracticable due to physical limitations to operate the paving equipment, the Engineer may permit the use of other methods or equipment. Where hand spreading is permitted, the mixture shall be placed by means of suitable shovels and other tools, and in a uniformly loose layer at a thickness that will result in a completed pavement meeting the designed grade and elevation.

Placement Tolerances: Each lift of bituminous concrete placed at a specified thickness shall meet the following requirements for thickness and area. Any pavement exceeding these limits shall be subject to an adjustment or removal. Lift tolerances will not relieve the Contractor from meeting the final designed grade. Lifts of specified non-uniform thickness, i.e. wedge or shim course, shall not be subject to thickness and area adjustments.

a) Thickness: Where the average thickness of the lift exceeds that shown on the plans beyond

the tolerances shown in Table 4.06-3, the Engineer will calculate the thickness adjustment in accordance with Article 4.06.04.

TABLE 4.06-3: Thickness Tolerances

Mixture Designation	Lift Tolerance
S1	+/- 3/8 inch
S0.25, S0.375, S0.5	+/- 1/4 inch

Where the thickness of the lift of mixture is less than that shown on the plans beyond the tolerances shown in Table 4.06-3, the Contractor, with the approval of the Engineer, shall take corrective action in accordance with this Section.

b) Area: Where the width of the lift exceeds that shown on the plans by more than the specified thickness, the Engineer will calculate the area adjustment in Article 4.06.04.

c) Delivered Weight of Mixture: When the delivery ticket shows that the truck exceeds the allowable gross weight for the vehicle type, the Engineer will calculate the weight adjustment in accordance with Article 4.06.04.

Transverse Joints: All transverse joints shall be formed by saw-cutting to expose the full thickness of the lift. Tack coat shall be applied to the sawn face immediately prior to additional mixture being placed.

Compaction: The Contractor shall compact the mixture to meet the density requirements as stated in Article 4.06.04 and eliminate all roller marks without displacement, shoving cracking, or aggregate breakage.

When placing a lift with a specified thickness less than 1 1/2 inches, or a wedge course, the Contractor shall provide a minimum rolling pattern as determined by the development of a compaction curve. The procedure to be used shall be documented in the Contractor's QCP for placement and demonstrated on the first day of placement.

The use of the vibratory system on concrete structures is prohibited. When approved by the Engineer, the Contractor may operate a roller using an oscillatory system at the lowest frequency setting.

If the Engineer determines that the use of compaction equipment in the dynamic mode may damage highway components, utilities or adjacent property, the Contractor shall provide alternate compaction equipment.

Rollers operating in the dynamic mode shall be shut off when changing directions.

These allowances will not relieve the Contractor from meeting pavement compaction requirements.

Surface Requirements:

Each lift of the surface course shall not vary more than 1/4 inch from a Contractor-supplied 10 foot straightedge. For all other lifts of bituminous concrete, the tolerance shall be 3/8 inch. Such tolerance will apply to all paved areas.

Any surface that exceeds these tolerances shall be corrected by the Contractor at its own expense.

7. Longitudinal Joint Construction Methods: The Contractor shall use Method I - Notched Wedge Joint (see Figure 4.06-1) when constructing longitudinal joints where lift thicknesses are 1 ½ inches to 3 inches. S1.0 mixtures shall be excluded from using Method I. Method II - Butt Joint (see Figure 4.06-2) shall be used for lifts less than 1 1/2 inches or greater than 3 inches.

Each longitudinal joint shall maintain a consistent offset from the centerline of the roadway along its entire length. The difference in elevation between the two faces of any completed longitudinal joint shall not exceed 1/4 inch at any location.

Method I - Notched Wedge Joint:

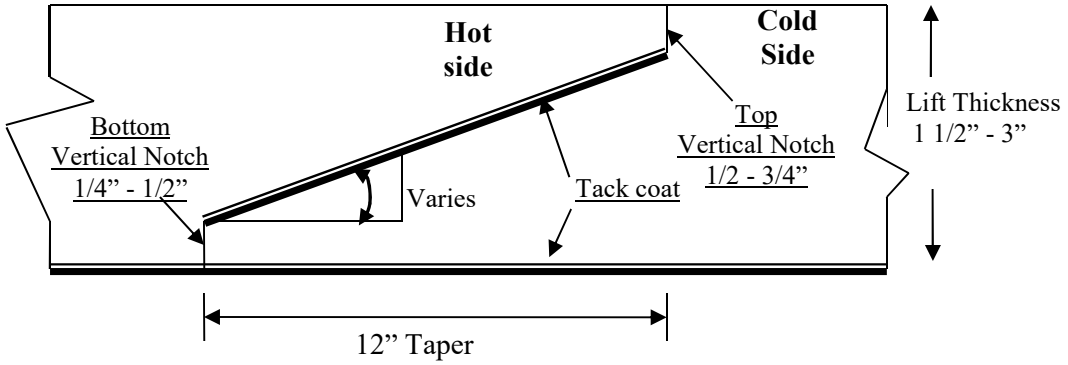
A notched wedge joint shall be constructed as shown in Figure 4.06-1 using a device that is attached to the paver screed and is capable of independently adjusting the top and bottom vertical notches. The device shall have an integrated vibratory system. The top vertical notch must be located at the centerline or lane line in the final lift. The requirement for paving full width "curb to curb" as described in Method II may be waived if addressed in the QC plan and approved by the Engineer.

The taper portion of the wedge joint shall be evenly compacted using equipment other than the paver or notch wedge joint device. The compaction device shall be the same width as the taper and not reduce the angle of the wedge or ravel the top notch of the joint during compaction.

When placed on paved surfaces, the area below the sloped section of the joint shall be treated with tack coat. The top surface of the sloped section of the joint shall be treated with tack coat prior to placing the completing pass.

The taper portion of the wedge joint shall not be exposed to traffic for more than 5 calendar days.

Figure 4.06-1: Notched Wedge Joint (Not to Scale)



Any exposed wedge joint must be located to allow for the free draining of water from the road surface.

The Engineer reserves the right to define the paving limits when using a wedge joint that will be exposed to traffic.

If Method I cannot be used on those lifts which are 1 ½ inches to 3 inches, Method III may be substituted according to the requirements below for "Method III - Butt Joint with Hot Poured Rubberized Asphalt Treatment."

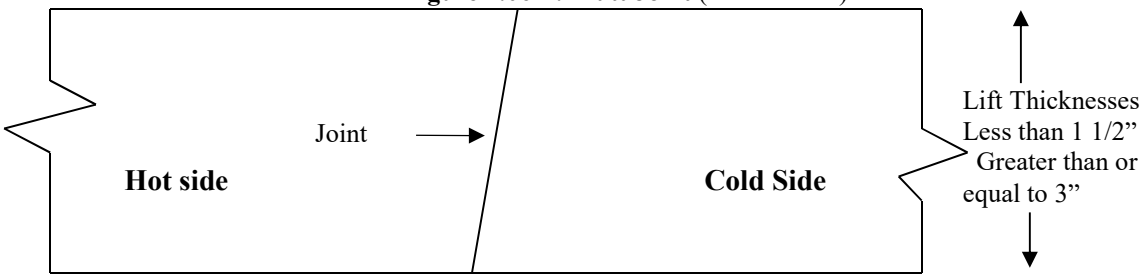
Method II - Butt Joint:

When adjoining passes are placed, the Contractor shall use the end gate to create a near vertical edge (refer to Figure 4.06-2). The completing pass (hot side) shall have sufficient mixture so that the compacted thickness is not less than the previous pass (cold side). During placement of multiple lifts, the longitudinal joint shall be constructed in such a manner that it is located at least

6 inch from the joint in the lift immediately below. The joint in the final lift shall be at the centerline or at lane lines. The end gate on the paver should be set so there is an overlap onto the cold side of the joint.

The Contractor shall not allow any butt joint to be incomplete at the end of a work shift unless otherwise allowed by the Engineer. When using this method, the Contractor is not allowed to leave a vertical edge exposed at the end of a work shift and must complete paving of the roadway full width "curb to curb."

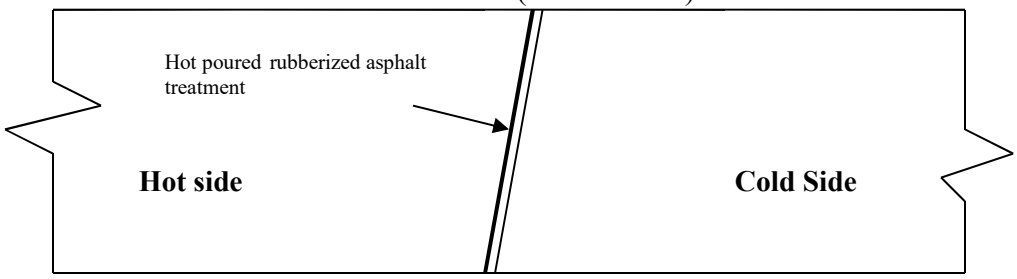
Figure 4.06-2: Butt Joint (Not to Scale)



<u>Method III - Butt Joint with Hot Poured Rubberized Asphalt Treatment</u>:

If Method I cannot be used due to physical constraints in certain limited locations, the Contractor may submit a request in writing for approval by the Engineer to use Method III as a substitution in those locations. There shall be no additional measurement or payment made when Method III is substituted for Method I. When required by the Contract or approved by the Engineer, Method III (see Figure 4.06-3) shall be used.

Figure 4.06-3: Butt Joint with Hot Poured Rubberized Asphalt Treatment
(Not to Scale)



All of the requirements of Method II must be met with Method III. In addition, the longitudinal vertical edge must be treated with a rubberized joint seal material meeting the requirements of ASTM D6690, Type 2. The joint sealant shall be placed on the face of the "cold side" of the butt joint as shown above prior to placing the "hot side" of the butt joint. The joint seal material shall

be applied in accordance with the manufacturer's recommendation so as to provide a uniform coverage and avoid excess bleeding onto the newly placed pavement.

8. Contractor Quality Control (QC) Requirements: The Contractor shall be responsible for maintaining adequate quality control procedures throughout the production and placement operations. Therefore, the Contractor must ensure that the materials, mixture, and work provided by Subcontractors, Suppliers, and Producers also meet Contract specification requirements.

This effort must be documented in Quality Control Plans (QCP) and must address the actions, inspection, or sampling and testing necessary to keep the production and placement operations in control, to determine when an operation has gone out of control and to respond to correct the situation in a timely fashion.

The Standard QCP for production shall consist of the quality control program specific to the production facility.

There are 3 components to the QCP for placement: a Standard QCP, a Project Summary Sheet that details Project-specific information, and, if applicable, a separate Extended Season Paving Plan as required in 4.06.03-9 "Temperature and Seasonal Requirements."

The Standard QCP for both production and placement shall be submitted to the Department for approval each calendar year and at a minimum of 30 days prior to production or placement.

Production or placement shall not occur until all QCP components have been approved by the Engineer.

Each QCP shall include the name and qualifications of a Quality Control Manager (QCM). The QCM shall be responsible for the administration of the QCP, and any modifications that may become necessary.

The QCM shall have the ability to direct all Contractor personnel on the Project during paving operations.

The QCPs shall also include the name and qualifications of any outside testing laboratory performing any QC functions on behalf of the Contractor. The QC Technician performing in-place density testing shall be NETTCP certified as a paving inspector.

Approval of the QCP does not relieve the Contractor of its responsibility to comply with the Project specifications. The Contractor may modify the QCPs as work progresses and must document the changes in writing prior to resuming operations. These changes include but are not limited to changes in quality control procedures or personnel. The Department reserves the right to deny significant changes to the QCPs.

QCP for Production: Refer to M.04.03-1.

QCP for Placement: The Standard QCP, Project Summary Sheet, and Extended Season Paving Plan shall conform to the format provided by the Engineer. The format is available at http://www.ct.gov/dot/lib/dot/documents/dconstruction/pat/qcp_outline_hma_placement.pdf

The Contractor shall perform all quality control sampling and testing, provide inspection, and exercise management control to ensure that bituminous concrete placement conforms to the requirements as outlined in its QCP during all phases of the work. The Contractor shall document these activities for each day of placement.

The Contractor shall submit complete field density testing and inspection records to the Engineer within 48 hours in a manner acceptable to the Engineer.

The Contractor may obtain 1 mat core and 1 joint core per day for process control, provided this process is detailed in the QCP. The results of these process control cores shall not be used to

dispute the Department's determinations from the acceptance cores. The Contractor shall submit the location of each process control core to the Engineer for approval prior to taking the core. The core holes shall be filled to the same requirements described in Subarticle 4.06.03-10.

9. Temperature and Seasonal Requirements: Paving, including placement of temporary pavements, shall be divided into 2 seasons, "In-Season" and "Extended-Season." In-Season paving occurs from May 1 to October 14, and Extended Season paving occurs from October 15 to April 30. The following requirements shall apply unless otherwise authorized or directed by the Engineer:

- Mixtures shall not be placed when the air or subbase temperature is less than 40°F regardless of the season.
- Should paving operations be scheduled during the Extended Season, the Contractor must submit an Extended Season Paving Plan for the Project that addresses minimum delivered mix temperature considering WMA, PMA, or other additives; maximum paver speed; enhanced rolling patterns; and the method to balance mixture delivery and placement operations. Paving during Extended Season shall not commence until the Engineer has approved the plan.

10. Field Density The Contractor shall obtain cores for the determination of mat and longitudinal joint density of bituminous concrete pavements. Within five calendar days of placement, mat and joint cores shall be extracted on each lift with a specified thickness of 1 1/2 inches or more. Joint cores shall not be extracted on HMA S1.0 lifts.

The Contractor shall extract cores from random locations determined by the Engineer in accordance with ASTM D3665. Four (4) or six (6) inch diameter cores shall be extracted for S0.25, S0.375 and S0.5 mixtures; 6 inch diameter cores shall be required for S1.0 mixtures. The Contractor shall coordinate with the Engineer to witness the extraction, labeling of cores, and filling of the core holes.

Each lift will be separated into lots as follows:

a. Simple Average Density Lots: For total estimated quantities below 2,000 tons, the lift will be evaluated in one lot which will include the total paved tonnage of the lift and all longitudinal joints between the curb lines.
   For total estimated quantities between 2,000 and 3,500 tons, the lift will be evaluated in two lots in which each lot will include approximately half of the total tonnage placed for the full paving width of a lift including all longitudinal joints between the curb lines.
b. PWL Density Lots: Mat density lots will include each 3,500 tons of mixture placed within 30 calendar days. Joint density lots will include 14,000 linear feet of constructed joints. Bridge density lots will always be analyzed using simple average lot methodology.
c. Partial Density Lot (For PWL only): A mat density lot with less than 3,500 tons or a joint density lot with less than 14,000 linear feet due to:
   - completion of the course; or
   - a lot spanning 30 calendar days.

Prior to paving, the type and number of lot(s) will be determined by the Engineer. Noncontiguous areas such as highway ramps may be combined to create one lot.

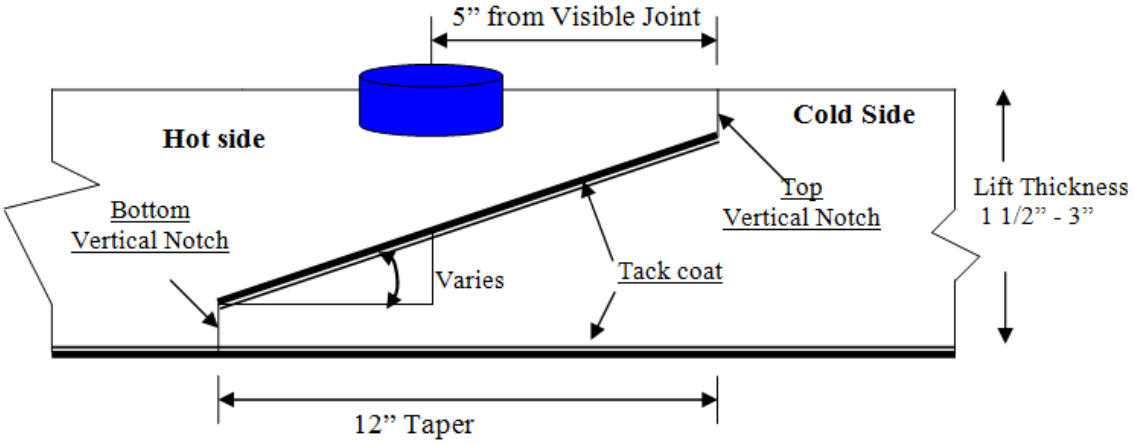
After the lift has been compacted and cooled, the Contractor shall cut cores to a depth equal to or greater than the lift thickness and shall remove them without damaging the lift(s) to be tested. Any core that is damaged or obviously defective while being obtained will be replaced with a

new core from a location within 2 feet measured in a longitudinal direction.

A mat core shall not be located any closer than 1 foot from the edge of a paver pass. If a random number locates a core less than 1 foot from any edge, the location will be adjusted by the Engineer so that the outer edge of the core is 1 foot from the edge of the paver pass.

Method I, Notched Wedge Joint cores shall be taken so that the center of the core is 5 inches from the visible joint on the hot mat side (Figure 4.06-4).

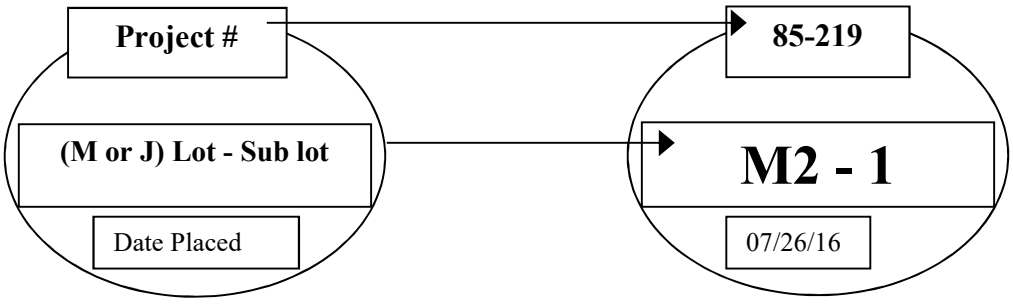
Figure 4.06-4: Notched Wedge Joint Cores (Not to Scale)



When Method II or Method III Butt Joint is used, cores shall be taken from the hot side so the edge of the core is within 1 inch of the longitudinal joint.

The cores shall be labeled by the Contractor with the Project number, date placed, lot number, and sub-lot number. The core's label shall include "M" for a mat core and "J" for a joint core. For example, a mat core from the first lot and the first sub-lot shall be labeled with "M1 – 1." A mat core from the second lot and first sub-lot shall be labeled "M2-1" (see Figure 4.06-5). The Engineer shall fill out a MAT-109 to accompany the cores. The Contractor shall deliver the cores and MAT-109 to the Department's Central Lab. The Contractor shall use a container approved by the Engineer. The container shall have a lid capable of being locked shut and tamper proof. The Contractor shall use foam, bubble wrap, or another suitable material to prevent the cores from being damaged during handling and transportation. Once the cores and MAT-109 are in the container the Engineer will secure the lid using security seals at the removable hinges(s) and at the lid opening(s). The security seals' identification number must be documented on the MAT-109. All sealed containers shall be delivered to the Department's Central Lab within two working days from time of extraction. Central Lab personnel will break the security seal and take possession of the cores.

Figure 4.06-5: Labeling of Cores



Each core hole shall be filled within 4 hours upon core extraction. Prior to being filled, the hole

shall be prepared by removing any free water and applying tack coat using a brush or other means to uniformly cover the cut surface. The core hole shall be filled using a bituminous concrete mixture at a minimum temperature of 240°F containing the same or smaller nominal maximum aggregate size and compacted with a hand compactor or other mechanical means to the maximum compaction possible. The bituminous concrete shall be compacted to 1/8 inch above the finished pavement.

Simple Average Density Lots:

A standard simple average density lot is the quantity of material placed within the defined area excluding any bridge decks.

A combo simple average density lot is the quantity of material placed within the defined area including bridge decks less than or equal to 500 feet long.

A bridge simple average density lot is the quantity of material placed on a bridge deck longer than 500 feet.

The number of cores per lot shall be determined in accordance with Table 4.06-4. If a randomly selected mat or joint core location is on a bridge deck, the core is to be obtained on the bridge deck in addition to the core(s) required on the bridge deck.

The number of cores per lot shall be determined in accordance with Table 4.06-5. Multiple bridge decks can be combined into one lot if the paving and underlying conditions are comparable. If multiple bridge decks are combined into a single bridge lot, at least one mat and joint core shall be obtained on each bridge.

The longitudinal locations of mat cores within a standard, combo, or bridge lot containing multiple paving passes will be determined using the combined length of the paving passes within the lot.

TABLE 4.06-4: Number of Cores per Lot (Simple Average)

Lot Type	No. of Mat Cores		No. of Joint Cores	
Standard Lot < 500 Tons	3		3	
Standard Lot ≥ 500 Tons	4		4	
Combo Lot < 500 Tons	2 plus	1 per bridge (≤ 300')	2 plus	1 per bridge (≤ 300)
Combo Lot ≥ 500 Tons[(1)]	4 plus	2 per bridge (301' – 500')	4 plus	2 per bridge (301' – 500')

TABLE 4.06-5: Number of Core per Bridge Density Lot (Simple Average)

Length of Bridge(s) (Feet)	Minimum No. of Mat Cores	Minimum No. of Joint Cores
< 500	2	2
501 – 1,500	3	3
1,501 – 2,500	4	4
2,501 and greater	5	5

PWL Density Lots:

A PWL mat density lot is 3,500 tons of material placed within the defined area excluding any bridges. One mat core will be obtained per every 500 tons placed.

A PWL joint density lot is 14,000 linear feet of longitudinal joint excluding any joints on bridge decks. One joint core will be obtained per every 2,000 linear feet of joint.

Bridge density lots will always be analyzed as using the simple average lot methodology. The number of cores per lot shall be determined in accordance with Table 4.06-5. Multiple bridge decks can be combined into one lot if the paving and underlying conditions are comparable. If multiple bridge decks are combined into a single bridge lot, at least one mat and joint core shall be obtained on each bridge.

11. Acceptance Sampling and Testing: Sampling shall be performed in accordance with ASTM D3665 or a statistically-based procedure of stratified random sampling approved by the Engineer.

Plant Material Acceptance: The Contractor shall provide the required sampling and testing during all phases of the work in accordance with M.04. The Department will verify the Contractor's acceptance test results. Should any test results exceed the specified tolerances in the Department's current QA Program for Materials, the Contractor's test results for a subject lot or sub lot may be replaced with the Department's results for the purpose of calculating adjustments. The verification procedure is included in the Department's current QA Program for Materials.

Density Acceptance: The Engineer will perform all acceptance testing in accordance with AASHTO T 331. The density of each core will be determined using the daily production's average maximum theoretical specific gravity (Gmm) established during the testing of the parent material at the Plant. When there was no testing of the parent material or any Gmm exceeds the specified tolerances in the Department's current QA Program for Materials, the Engineer will determine the maximum theoretical density value to be used for density calculations.

12. Density Dispute Resolution Process: The Contractor and Engineer will work in partnership to avoid potential conflicts and to resolve any differences that may arise during quality control or acceptance testing for density. Both parties will review their sampling and testing procedures and results and share their findings. If the Contractor disputes the Engineer's test results, the Contractor must submit in writing a request to initiate the Dispute Resolution Process within five calendar days of the notification of the test results. No request for dispute resolution will be allowed unless the Contractor provides quality control results from samples taken prior to and after finish rolling, and within the timeframe described in 4.06.03-8 supporting its position. No request for dispute resolution will be allowed for a density lot in which any core was not taken within the required 5 calendar days of placement. Should the dispute not be resolved through evaluation of existing testing data or procedures, the Engineer may authorize the Contractor to obtain a new core or set of core samples per disputed lot. The core samples must be extracted no later than seven calendar days from the date of the Engineer's authorization. All such core samples shall be extracted and the core hole filled using the procedure outlined in 4.06.03-10.

a) Simple Average Lots: The Contractor may only dispute any simple average lot that is adjusted at or below 95 percent payment. The number and location (mat, joint, or structure) of the cores taken for dispute resolution must reflect the number and location of the original cores. The location of each core shall be randomly located within the respective original sub lot. The

dispute resolution results shall be combined with the original results and averaged for determining the final in-place density value.
b) PWL Lots: The Contractor may dispute any PWL sublot when the PWL falls below 50% calculated in accordance with section 4.06.04.2.b. An additional random core in the sublot may be taken to validate the accuracy of the core in question. The Department will verify the additional core test result and may average the original test result with the additional core result for purpose of calculating adjustments.

13. Corrective Work Procedure:

If pavement placed by the Contractor does not meet the specifications, and the Engineer requires its replacement or correction, the Contractor shall:

a) Propose a corrective procedure to the Engineer for review and approval prior to any corrective work commencing. The proposal shall include:
   - Limits of pavement to be replaced or corrected, indicating stationing or other landmarks that are readily distinguishable.
   - Proposed work schedule.
   - Construction method and sequence of operations.
   - Methods of maintenance and protection of traffic.
   - Material sources.
   - Names and telephone numbers of supervising personnel.

b) Any corrective courses placed as the final wearing surface shall match the specified lift thickness after completion.

14. Protection of the Work: The Contractor shall protect all sections of the newly finished pavement from damage that may occur as a result of the Contractor's operations for the duration of the Project.

15. Cut Bituminous Concrete Pavement: Work under this item shall consist of making a straight-line cut in the bituminous concrete pavement to the lines delineated on the plans or as directed by the Engineer. The cut shall provide a straight, clean, vertical face with no cracking, tearing or breakage along the cut edge.

4.06.04—Method of Measurement:

1. HMA S* or PMA S*: Bituminous concrete will be measured for payment as the amount of material in tons placed as determined by the net weight on the delivered tickets and adjusted by area, thickness and weight as follows:

Quantity Adjustments**:** Adjustments may be applied to the placed bituminous concrete quantities that will be measured for payment using the following formulas:

Yield Factor for Adjustment Calculation = 0.0575 tons/SY/inch

Actual Area (SY) = [(Measured Length (ft)) x (Avg. of width measurements (ft))]÷9 s.f./SY

Actual Thickness (t) = Total tons delivered / [Actual Area (SY) x 0.0575 tons/SY/inch]

a) Area: If the average width exceeds the allowable tolerance, an adjustment will be made using the following formula. The tolerance for width is equal to the specified thickness

(inch) of the lift being placed.

Quantity Adjusted for Area (T_A) = [(L x W_{adj})/9] x (t) x 0.0575 Tons/SY/inch = (-) tons

Where: L = Length (ft)
(t) = Actual thickness (inches)
W_{adj} = (Designed width (ft) + tolerance /12) - Measured Width)

b) Thickness: If the actual average thickness is less than the allowable tolerance, the Contractor shall submit a repair procedure to the Engineer for approval. If the actual thickness exceeds the allowable tolerance, an adjustment will be made using the following formula:

Quantity Adjusted for Thickness (T_T) = A x t_{adj} x 0.0575 = (-) tons

Where: A = Area = {[L x (Design width + tolerance (lift thickness)/12)] / 9}
t_{adj} = Adjusted thickness = [(Dt + tolerance) - Actual thickness]
Dt = Designed thickness (inches)

c) Weight: If the quantity of bituminous concrete representing the mixture delivered to the Project is in excess of the allowable gross vehicle weight (GVW) for each vehicle, an adjustment will be made using the following formula:

Quantity Adjusted for Weight (T_W) = GVW – DGW= (-) tons

Where: DGW = Delivered gross weight as shown on the delivery ticket or measured on a certified scale

2. Bituminous Concrete Adjustment Cost:

a) Production Lot Adjustment: An adjustment may be applied to each production lot as follows:

i. Non-PWL Production Lot (less than 3,500 tons):
The adjustment values in Tables 4.06-6 and 4.06-7 will be calculated for each sub lot based on the Air Void (AV) and Asphalt Binder Content (PB) test results for that sub lot. The total adjustment for each day's production (lot) will be computed as follows:

Tons Adjusted for Superpave Design (T_{SD}) = [($AdjAV_t$ + $AdjPB_t$) / 100] x Tons

Where: $AdjAV_t$: Percent adjustment for air voids
$AdjPB_t$: Percent adjustment for asphalt binder
Tons: Weight of material (tons) in the lot adjusted by 4.06.4-1

Percent Adjustment for Air Voids = $AdjAV_t$ = [$AdjAV_1$ + $AdjAV_2$ + $AdjAV_i$ + … + $AdjAV_n$)] /n

Where: $AdjAV_t$ = Total percent air void adjustment value for the lot
$AdjAV_i$ = Adjustment value from Table 4.06-6 resulting from each sub lot or the average

of the adjustment values resulting from multiple tests within a sub lot, as approved by the Engineer.
n = number of sub lots based on Table M.04.03-2

TABLE 4.06-6: Adjustment Values for Air Voids

Adjustment Value ($AdjAV_i$) (%)	S0.25, S0.375, S0.5, S1 Air Voids (AV)
+2.5	3.8 - 4.2
+3.125*(AV-3)	3.0 - 3.7
-3.125*(AV-5)	4.3 – 5.0
20*(AV-3)	2.3 – 2.9
-20*(AV-5)	5.1 – 5.7
-20.0	≤ 2.2 or ≥ 5.8

Percent Adjustment for Asphalt Binder = $AdjPB_t = [(AdjPB_1 + AdjPB_2 + AdjPB_i + \ldots + AdjPB_n)] /n$

Where: $AdjPB_t$= Total percent liquid binder adjustment value for the lot
$AdjPB_i$ = Adjustment value from Table 4.06-7 resulting from each sub lot
n = number of binder tests in a production lot

TABLE 4.06-7: Adjustment Values for Binder Content

Adjustment Value ($AdjAV_i$) (%)	S0.25, S0.375, S0.5, S1 Pb
0.0	JMF Pb ± 0.3
- 10.0	≤ JMF Pb - 0.4 or ≥ JMF Pb + 0.4

ii. PWL Production Lot (3500 tons or more):
For each lot, the adjustment values will be calculated using PWL methodology based on AV, VMA, and PB test results. The results will be considered as being normally distributed and all applicable equations in AASHTO R 9 and AASHTO R 42 Appendix X4 will apply.
Only one test result will be considered for each sub lot. The specification limits are listed in M.04.
For AV, PB, and voids in mineral aggregate (VMA), the individual material quantity characteristic adjustment (Adj) will be calculated as follows:
For PWL between 50 and 90%: $Adj(AV_t$ or PB_t or $VMA_t) = (55 + 0.5\ PWL) - 100$
For PWL at and above 90%: $Adj(AV_t$ or PB_t or $VMA_t) = (77.5 + 0.25\ PWL) - 100$
Where: $AdjAV_t$ = Total percent AV adjustment value for the lot
$AdjPB_t$= Total percent PB adjustment value for the lot
$AdjVMA_t$= Total percent VMA adjustment value for the lot

A lot with PWL less than 50% in any of the 3 individual material quality characteristics will be evaluated under 1.06.04.

The total adjustment for each production lot will be computed using the following formula:

Tons Adjusted for Superpave Design (T_{SD}) = $[(0.5AdjAV_t + 0.25AdjPB_t + 0.25\ AdjVMA_t) / 100]$ X Tons

Where Tons: Weight of material (tons) in the lot adjusted by 4.06.4-1

iii. Partial Lots:

Lots with less than 4 sub lots will be combined with the prior lot. If there is no prior lot with equivalent material or if the last test result of the prior lot is over 30 calendar days old, the adjustment will be calculated as indicated in 4.06.04-2.a)i.

Lots with 4 or more sub lots will be calculated as indicated in 4.06.04-2.a)ii.

Production Lot Adjustment: T_{SD} x Unit Price = Est. (Pi)

Where: Unit Price = Contract unit price per ton per type of mixture
Est. (Pi)= Pay Unit in dollars representing incentive or disincentive per lot

b) Density Lot Adjustment: An adjustment may be applied to each density lot as follows:

i. Simple Average Density Lot (less than 3500 tons) and Bridge Lots:

The final lot quantity shall be the difference between the total payable tons for the Project and the sum of the previous lots. If either the Mat or Joint adjustment value is "remove and replace," the density lot shall be removed and replaced (curb to curb).

No positive adjustment will be applied to a density lot in which any core was not taken within the required 5 calendar days of placement.

Tons Adjusted for Density (T_D) = $[\{(PA_M \times 0.50) + (PA_J \times 0.50)\} / 100]$ X Tons

Where: T_D = Total tons adjusted for density for each lot
PA_M = Mat density percent adjustment from Table 4.06-8
PA_J = Joint density percent adjustment from Table 4.06-9
Tons: Weight of material (tons) in the lot adjusted by 4.06.4-1

TABLE 4.06-8: Adjustment Values for Pavement Mat density

Average Core Result Percent Mat Density	Percent Adjustment (Bridge and Non-Bridge) (1)(2)
97.1 - 100	-1.667*(ACRPD-98.5)
94.5 – 97.0	+2.5
93.5 – 94.4	+2.5*(ACRPD-93.5)
92.0 – 93.4	0
90.0 – 91.9	-5*(92-ACRPD)
88.0 – 89.9	-10*(91-ACRPD)
87.0 – 87.9	-30

86.9 or less	Remove and Replace (curb to curb)

Notes:
(1) ACRPD = Average Core Result Percent Density
(2) All Percent Adjustments to be rounded to the second decimal place; for example round 1.667 to 1.67.

TABLE 4.06-9: Adjustment Values for Pavement Joint Density

Average Core Result Percent Joint Density	Percent Adjustment (Bridge and Non-Bridge) [(1)(2)]
97.1 – 100	-1.667*(ACRPD-98.5)
93.5 – 97.0	+2.5
92.0 – 93.4	+1.667*(ACRPD-92)
91.0 – 91.9	0
89.0 – 90.9	-7.5*(91-ACRPD)
88.0 – 88.9	-15*(90-ACRPD)
87.0 – 87.9	-30
86.9 or less	Remove and Replace (curb to curb)

Notes:
(1) ACRPD = Average Core Result Percent Density
(2) All Percent Adjustments to be rounded to the second decimal place; for example round 1.667 to 1.67

Additionally, any sublot with a density result below 87% will be evaluated under 1.06.04.

ii. PWL Density Lot (3,500 tons or more):
For each lot, the adjustment values will be calculated using PWL methodology based on mat and joint density test results. Only one result will be included for each sublot. The results will be considered as being normally distributed and all applicable equations in AASHTO R 9 and AASHTO R 42 Appendix X4 will apply.
The specification limits for the PWL determination are as follows:

Mat Density: 91.5-98%
Joint Density: 90-98%

For mat and joint density, the individual percent adjustment (PA) will be calculated as follows:
For PWL between 50 and 90%: PA ($_M$ or $_J$)= 0.25 * PWL – 22.50
For PWL at and above 90%: PA ($_M$ or $_J$)= 0.125 * PWL – 11.25
Where: PA_M = Total percent mat density adjustment value for the PWL mat density lot
PA_J= Total percent joint density adjustment value for the PWL joint density lot
No positive adjustment will be applied to a density lot in which any core was not taken within the required 5 calendar days of placement.

A lot with PWL less than 50% will be evaluated under 1.06.04.
The total adjustment for each PWL mat density lot will be computed as follows:

Tons Adjusted for Mat Density (T_{MD}) = (PA_M / 100) X Tons

Where: Tons= Weight of material (tons) in the lot adjusted by 4.06.4-1.
The total adjustment for each PWL joint density lot will be computed as follows:

Tons Adjusted for Joint Density (T_{JD}) = (PA_J / 100) X J_Tons

Tons Adjusted for Joint Density will be calculated at the end of each project or project phase.

Where: $\text{J\_Tons} = \text{Tons in project or phase adjusted by } 4.06.4 - 1 \text{ x } \frac{\text{Lot joint length}}{\text{Joint length in project or phase}}$

All bridge density lot adjustments will be evaluated in accordance with 4.06.04-2.b)i.

Additionally, any sublot with a density result below 87% will be evaluated under 1.06.04.

iii. Partial Lots:

Lots with less than 4 sub lots will be combined with the prior lot. If there is no prior lot with equivalent material and placement conditions or if the last test result of the prior lot is over 30 calendar days old, the mat and joint individual adjustments will be calculated in accordance to Tables 4.06-8 and 4.06-9. T_{MD} and T_{JD} will be calculated as indicated in 4.06.04-2.b)i.

Lots with 4 or more sub lots will be calculated as indicated in 4.06.04-2.b)ii.

Density Lot Adjustment (Simple Average Lots): T_D x Unit Price = Est. (Di)
Density Lot Adjustment (PWL Lots): (T_{MD} or T_{JD}) x Unit Price = Est. (DMi or DJi)

Where: Unit Price = Contract unit price per ton per type of mixture
Est. (Di)= Pay Unit in dollars representing incentive or disincentive per simple average density lot
Est. (DMi)= Pay Unit in dollars representing incentive or disincentive per PWL mat lot
Est. (DJi)= Pay Unit in dollars representing incentive or disincentive per PWL joint lot

Additionally, any sublot with a density result below 87% will be evaluated under 1.06.04.

3. Transitions for Roadway Surface: The installation of permanent transitions will be measured under the appropriate item used in the formation of the transition.

The quantity of material used for the installation of temporary transitions will be measured for payment under the appropriate item used in the formation of the transition. The installation and removal of a bond breaker and the removal and disposal of any temporary transition formed by milling or with bituminous concrete pavement is not measured for payment.

~~**4. Cut Bituminous Concrete Pavement:** The quantity of bituminous concrete pavement cut will be measured in accordance with 2.02.04.~~

~~**5. Material for Tack Coat:** The quantity of tack coat will be measured for payment by the number of gallons furnished and applied on the Project and approved by the Engineer. No tack coat material shall be included that is placed in excess of the tolerance described in 4.06.03.~~

~~a. Container Method – Material furnished in a container will be measured to the nearest 1/2 gallon. The volume will be determined by either measuring the volume in the original container by a method approved by the Engineer or using a separate graduated container capable of measuring the volume to the nearest 1/2 gallon. The container in which the material is furnished must include the description of material, including lot number or batch number and manufacturer or product source.~~

~~b. Vehicle Method~~

~~i. Measured by Weight: The number of gallons furnished will be determined by weighing the material on calibrated scales furnished by the Contractor. To convert weight to gallons, one of the following formulas will be used:~~
~~Tack Coat (gallons at 60°F) = Measured Weight (pounds) / Weight per gallon at 60°F~~
~~Tack Coat (gallons at 60°F) = 0.996 x Measured Weight (pounds) / Weight per gallon at 77°F~~

~~ii. Measured by automated metering system on the delivery vehicle:~~
~~Tack Coat (gallons at 60°F) = 0.976 x Measured Volume (gallons).~~

~~**6. Material Transfer Vehicle (MTV):** The furnishing and use of a MTV will be measured separately for payment based on the actual number of surface course tons delivered to a paver using the MTV.~~

4.06.05—Basis of Payment:

1. HMA S* or PMA S*: The furnishing and placing of bituminous concrete will be paid for at the Contract unit price per ton for " HMA S*" or " PMA S*."

All costs associated with providing illumination of the work area are included in the general cost of the work.

All costs associated with cleaning the surface to be paved, including mechanical sweeping, are included in the general cost of the work. All costs associated with constructing longitudinal joints are included in the general cost of the work.

All costs associated with obtaining cores for acceptance testing and dispute resolution are included in the general cost of the work.

2. Bituminous Concrete Adjustment Costs: This adjustment will be calculated using the formulas shown below if all of the measured adjustments in 4.06.04-2 are not equal to zero. A positive or negative adjustment will be applied to monies due the Contractor.

Production Lot: Σ Est (Pi) = Est. (P)
Density Lot (Simple Average Lots): Σ Est (Di) = Est. (D)
Density Lot (PWL): Σ Est (DMi) + Σ (DJi) = Est. (D)
Bituminous Concrete Adjustment Cost= Est. (P) + Est. (D)

Where: Est. ( )= Pay Unit in dollars representing incentive or disincentive in each production or density lot calculated in 4.06.04-2

The Bituminous Concrete Adjustment Cost item, if included in the bid proposal or estimate, is not to be altered in any manner by the Bidder. If the Bidder should alter the amount shown, the altered figure will be disregarded and the original estimated cost will be used for the Contract.

3. Transitions for Roadway Surface: The installation of permanent transitions will be paid

under the appropriate item used in the formation of the transition. The quantity of material used for the installation of temporary transitions will be paid under the appropriate pay item used in the formation of the transition. The installation and removal of a bond breaker, and the removal and disposal of any temporary transition formed by milling or with bituminous concrete pavement is included in the general cost of the work.

~~**4.** The cutting of bituminous concrete pavement will be paid in accordance with 2.02.05.~~

~~**5.** Material for tack coat will be paid for at the Contract unit price per gallon at 60°F for "Material for Tack Coat."~~

~~**6.** The Material Transfer Vehicle (MTV) will be paid at the Contract unit price per ton for "Material Transfer Vehicle."~~

~~Pay Item~~	~~Pay Unit~~
~~HMA S*~~	~~ton~~
~~PMA S*~~	~~ton~~
~~Bituminous Concrete Adjustment Cost~~	~~est.~~
~~Material for Tack Coat~~	~~gal.~~
~~Material Transfer Vehicle~~	~~ton~~

BITUMINOUS CONCRETE PAVEMENT REPAIR

DESCRIPTION

"Permanent Pavement Repair" shall consist of the constructing a full depth pavement repair in an existing roadway of the classification specified where shown on the Plan or where directed by the Engineer. The surface course pavement structure shall consist of bituminous concrete constructed on a prepared stabilized base and in accordance with lines, grades as shown on the Plans, or as directed by the Engineer. It shall also include all excavation, furnishing, installing and compacting of processed aggregate base, sawcutting the existing pavement as required, and the resetting of storm drainage and utility structures and any pavement surrounding these structures.

"Temporary Pavement Repair" shall consist of the constructing a pavement repair in an existing roadway of the classification specified for temporarily repairing all pavement cuts and other pavement areas specified by the Engineer. The surface course pavement structure shall consist of bituminous concrete constructed on a prepared stabilized base and in accordance with lines, grades as shown on the Plans, or as directed by the Engineer. It shall also include all excavation, furnishing, installing and compacting of processed aggregate base, sawcutting the existing pavement, and the resetting of storm drainage and utility structures and any pavement surrounding these structures.

MATERIALS

Bituminous Concrete shall conform to the requirements of Section M.04 of Form 817.

All materials will be supplied from a plant certified and approved by the State of Connecticut, Department of Transportation.

Processed aggregate base shall conform to the specification for "Processed Aggregate Base" elsewhere in these Specifications.

If it is found that any Bituminous Mixture, even though meeting the requirements of the Job Mix Formula, fails to perform satisfactorily, the producer shall on notice (1) immediately cease furnishing the material, (2) take immediate corrective steps to provide a mix which does perform satisfactorily.

When bituminous concrete is laid, only material conforming to the requirements of these specifications and approved by the Engineer shall be used in the work. If tests of samples removed from the work reveal that the mixture is inconsistent or that other than approved materials have been incorporated in the mixture, or that the mixture is not in accordance with the specifications and the product proves unsatisfactory, the Town reserves the right to demand the replacement of the unsatisfactory bituminous concrete. All expenses of the Town incidental to such replacement, including all costs incurred in putting the road in satisfactory condition, shall be paid by the Contractor.

The tack coat to be used on all cold joints shall conform to the requirements of Section M.04 of Form 817.

BITUMINOUS CONCRETE PAVEMENT REPAIR

CONSTRUCTION DETAILS

Transportation of Mixtures: The mixture shall be transported from the paving plant in trucks having tight bodies, which have previously been cleaned of all foreign material. The use of kerosene, gasoline, fuel or similar products for the coating of the inside of truck bodies is strictly prohibited. Such coatings may consist of soapy water or commercial oil emulsions (also known

as soluble oils) in the proportion of one (1) part oil to six (6) parts water. When such coatings are applied, truck bodies shall be raised immediately prior to loading to remove any excess coating material. Loaded trucks shall be covered with waterproof canvas or other suitable covers.

The mixture shall be delivered at a temperature within -4 degrees Celsius (25 degrees Fahrenheit) of the approved job mix formula.

Paving Equipment: The paving machine to be used shall be a self-powered type with an adapter to provide guidance of the screeding action. The screed or strike-off member shall be adjustable to the shape of the cross section of the existing pavement. Some method shall be provided for the tilting of the screed while in operation to secure the proper "pulling" and to result in a uniformly screeded surface. The machine shall have sufficient number of driving wheels so that there will be no undue amount of slippage. Means shall be provided for heating the screeding members by some method that will prevent accumulations of bituminous materials.

Placement of Mixture: The areas to be repaired shall be sawcut and the existing pavement and base material removed to the depth shown on the Plan. The excavated area shall then be filled with processed aggregate base to the depth identified on the Plans and shall be installed and compacted in maximum 6” lifts.

The mixture shall be laid only when the surface is free of frost, dried to the satisfaction of the Engineer, and when the weather is not foggy or rainy. Operations shall be carried only when the atmospheric temperature in the shade is not less than 4 degrees Celsius (40 degrees Fahrenheit) unless approval is given by the Engineer. Upon arrival, the mixture shall be immediately spread and struck-off to the width required and to such appropriate loose depth so that the compacted pavement will conform to the specified depth.

In order to obtain tight and well-compacted longitudinal joints, the sequence of the bituminous concrete placing operations shall be subject to the control of the Engineer.

Before any compaction is started, the surface shall be checked and inequities adjusted; all “drippings,” i.e. fat, sandy accumulations, and all fat spots from any source, shall be removed and replaced by satisfactory material.

In areas where, on account of physical limitations, it is impractical to operate the paving equipment, the Engineer will permit the use of other type spreader or the mixture may be spread and screeded by hand.

BITUMINOUS CONCRETE PAVEMENT REPAIR

The Contractor shall cut to the limits of the area to be repaired a minimum of 150 mm (six (6) inches) beyond each side of the disturbed area or into the existing pavement with a cutting saw. The saw cut shall be vertical and in straight lines. After the pavement has been removed to a depth of 450 mm (eighteen (18) inches) below the existing pavement surface, the roadway base shall be installed, graded and compacted in accordance with the specification for "Processed Aggregate Base". The roadway base shall be placed in layers not to exceed 150 mm (six (6) inches) in depth and to such a depth that after compaction it shall be at the specified depth shown on the plans. Contact surfaces of curbing, manholes, etc. shall be painted with a thin uniform coat of hot asphalt cement or tack coat just before the material is placed against them. Such asphalt cement or tack coat shall not be paid for. Hot-laid bituminous concrete shall be placed evenly and uniformly to a minimum compacted thickness of six (6) inches. The maximum thickness to be placed per course shall be two (2) inches. Immediately before placing the mixture, the road surface shall be cleaned by brooming or as otherwise directed by the Engineer.

Refueling of equipment in such a position that fuel might be spilled on bituminous concrete mixtures already placed or to be placed is prohibited.

Solvents and cleaners for use in cleaning mechanical equipment or hand tools shall be stored well clear of areas paved or to be paved.

Compaction: After spreading and when sufficient set has developed to permit proper compaction, each course shall be compacted by rolling, consisting of initial or breakdown rolling, intermediate rolling and final or finish rolling. Initial rolling shall be performed with a power driven steel wheel tandem or three wheel rollers weighing not less than ten (10) tons. Intermediate rolling shall be done by a power driven steel wheel tandem roller. Final rolling shall be done with a self-propelled pneumatic tire roller equipped with Wide-tread compaction tires capable of exerting an average contact pressure from 60 to 90 pounds per square inch uniformly over the surface, adjusting ballast and tire inflation pressure as required. The Contractor shall furnish evidence regarding tire size, pressure and loading to confirm that the proper contact pressure is being developed and that the loading and contact pressure are uniform for all wheels.

Rolling shall begin at the sides and progress toward the center, parallel to the centerline of the roadway. Alternate trips of the roller shall be terminated in stops at least three feet distant from any preceding stop.

Other rolling procedures may be directed by the Engineer, as conditions may require. Rolling shall be discontinued if the surface shows signs of excessive cracking or displacement and shall be continued later as directed. If it is found that the cracking and displacement continues, the paving operation shall be discontinued until the cause of the condition is corrected.
Rolling shall proceed continuously and in such a manner that all roller marks are eliminated. The rollers shall be in good condition. They shall be operated by experienced roller operators and must be kept in continuous operation as nearly as practicable in such manner that all parts of the pavement shall receive substantially equal compression.

BITUMINOUS CONCRETE PAVEMENT REPAIR

In no case shall the Contractor use methods or equipment, which will result in fractured aggregate or lateral displacement of the material.

In all places inaccessible to a roller, such as adjacent to curbs, headers, gutters, and manholes, the required compression shall be secured with tamps. Depressions which may develop before the completion of the rolling shall be remedied by adding new material to bring such depressions to a true surface. Should any depressions remain after the final compaction has been obtained, new material shall be added to form a true and even surface. All high spots, high joints and other defects shall be adjusted as directed by the Engineer.

Placing of the pavement shall be as nearly continuous as possible and the roller shall pass over the unprotected end of the freshly laid mixture only when laying of the pavement is discontinued or interrupted for an appreciable period and joints shall be formed at such point. Where joints are to be formed, the edge of the existing pavement shall be cut square with the pavement. Before new material is laid, a thin coating of hot asphalt shall be applied to the vertical face of the cut pavement.

Depressions which may develop after initial rolling shall be remedied by scarifying the surface mixture laid and adding new material to bring such depressions to a true surface.

For permanent pavement repairs, all joints between new and existing pavements shall be sealed with an approved liquid bituminous concrete sealer material.

Protection of the Work: Sections of the newly finished bituminous work shall be protected from traffic to prevent damage to the finished mat.

MEASUREMENT

"Permanent Pavement Repair" will be measured by the actual number of square yards of bituminous concrete pavement repair completed and accepted in accordance with pay limits identified in the associated details on the Contract Plans. Excavation, asphalt emulsion tack coat, joint seal material, formation and compaction of subgrade, installation and compaction of processed aggregate base, sawcutting the existing pavement and bituminous concrete pavement shall not be measured for payment; these costs shall be considered as included in the unit price bid for "Permanent Pavement Repair".

"Temporary Pavement Repair" of the type specified will be measured for payment by the actual number of square yards of bituminous concrete pavement repair installed and accepted in accordance with pay limits identified in the associated details on the Contract Plans. Asphalt emulsion tack coat, formation and compaction of subgrade, installation and compaction of processed aggregate base, and sawcutting the existing pavement shall not be measured for payment; these costs shall be considered as included in the unit price bid for "Temporary Pavement Repair" of the type specified.

BITUMINOUS CONCRETE PAVEMENT REPAIR

Due to existing pavement conditions in some areas, the Engineer may direct the Contractor to construct wider pavement repairs to provide suitable joints between new and existing pavement, which shall be measured and paid for in accordance with this Specification.

PAYMENT

The work will be paid for at the contract unit price per square yard for "Permanent Pavement Repair" complete and in place, to the pay limits and dimensions as shown on the plans and details, including all material, labor, tools and equipment incidental to the completion of the work and resetting of all storm basins, manholes and utility structures including any pavement around the structures. It shall include all excavation, asphalt emulsion tack coat, formation and compaction of subgrade, installation and compaction of processed aggregate base, sawcutting the existing pavement and bituminous concrete pavement.

The work will be paid for at the contract unit price per square yard for "Temporary Pavement Repair" of the type specified complete and in place, to the pay limits and dimensions as shown on the plans and details, including all material, labor, tools and equipment incidental to the completion of the work and resetting of all storm basins, manholes and utility structures including any pavement around the structures. It shall include all asphalt emulsion tack coat, formation and compaction of subgrade, installation and compaction of processed aggregate base, and sawcutting the existing pavement.

Due to existing pavement conditions in some areas, the Engineer may direct the Contractor to construct wider pavement repairs to provide suitable joints between new and existing pavement, which shall be measured and paid for in accordance with this Specification.

Pay Item	Pay Unit
Permanent Pavement Repair	Square Yard

ASPHALT ADJUSTMENT COST

DESCRIPTION

"Asphalt Adjustment Cost" will be based on the variance in price for the performance-graded binder component of hot mix asphalt (HMA), Polymer Modified Asphalt (PMA), and Ultra-Thin Bonded Hot-Mix Asphalt mixtures completed and accepted during the Contract in accordance with this Specification

METHOD

The Asphalt Price is available on the Department of Transportation web site at:

http://www.ct.gov/dot/asphaltadjustment

The adjustment shall not be considered as a changed condition in the contract because of this provision and because the Contractors are being notified before submission of bids.

An adjustment will only be made if the difference between the posted Asphalt Base Price and Asphalt Period Price varies by more than $5.00. Asphalt base price shall be defined as the asphalt base price that is posted on the DOT website 28 days before the actual posted bid opening date. Asphalt period price shall be the asphalt price that is posted on the DOT website for the period in which the HMA or PMA mixture is placed.

Regardless of the binder used in all HMA and/or PMA mixtures, the Asphalt Adjustment Cost will be based on PG 64-22.

The adjusted price shall be calculated based on the following formula:

Formula: **HMA x [PG%/100] x [(*Period Price - Base Price*)] = $ ____**

where:
Performance-Graded Binder percentage (PG%)

1. For HMA or PMA mixes:

   PG% = 4.5
   For Superpave 1.5 inch (37.5mm), Superpave 1.0 inch (25.0mm), PMA S1, HMA S1, and Class 4

   PG % = 5.0
   For Superpave 0.50 inch (12.5mm), HMA S0.5, PMA S0.5, and Class 1

   PG % = 6.0
   For Superpave 0.375 inch (9.5mm), HMA S0.375, PMA S0.375, Superpave 0.25 inch (6.25mm), HMA S0.25, PMA S0.25, Superpave #4 (4.75mm) and Class 2

2. For Ultra-Thin Bonded HMA mixes:

ASPHALT ADJUSTMENT COST

PG% = Design % PGB (Performance Graded Binder) in the approved job mix formula, expressed as a percentage to one decimal point (e.g. 5.1%)

MEASUREMENT AND PAYMENT

"Asphalt Adjustment Cost" will be measured for payment in accordance with the method herein described. A payment will be made for an increase in costs or a deduction from monies due the Contractor will be made for a decrease in costs.

The sum of money shown on the estimate, and in the itemized proposal as "Estimated Cost", for this item will be considered the bid price although payment will be made as described above. The estimated cost figure is not to be altered in any manner by the bidder. If the bidder should alter the amount shown, the altered figure will be disregarded and the original cost figure will be used to determine the amount of the bid for the Contract.

Pay Item	Pay Unit
Asphalt Adjustment Cost	Est.

CONCRETE SIDEWALK AND CONCRETE SIDEWALK RAMPS

DESCRIPTION

"Concrete Sidewalk" of the thickness specified includes the construction of concrete sidewalk on a prepared processed aggregate base course in conformance with the lines, grades, dimensions and details as shown on the Plans, or as directed by the Engineer. It shall also include the sawcutting, removal and disposal of existing sidewalk, steps, ramps or pavement within the excavation limits for "Concrete Sidewalk".

"Concrete Sidewalk and Curb Monolithic" of the thickness specified includes the construction of concrete curb and sidewalk, monolithically poured, on a prepared processed aggregate base course in conformance with the lines, grades, dimensions and details as shown on the Plans, or as directed by the Engineer. It shall also include the sawcutting, removal and disposal of existing sidewalk, steps, ramps or pavement within the excavation limits for "Concrete Sidewalk and Curb Monolithic".

"Reinforced Concrete Sidewalk" of the thickness specified includes the construction of concrete sidewalk reinforced with welded wire fabric on a prepared processed aggregate base course in conformance with the lines, grades, dimensions and details as shown on the Plans, or as directed by the Engineer. It shall also include the sawcutting, removal and disposal of existing sidewalk, steps, ramps or pavement within the excavation limits for "Reinforced Concrete Sidewalk".

"Concrete Sidewalk Ramp" of the thickness specified includes the construction of a concrete ramp on a prepared processed aggregate base course in conformance with the lines, grades, dimensions and details as shown on the Plans, or as directed by the Engineer. It shall also include the sawcutting, removal and disposal of existing sidewalk, steps, ramps or pavement within the excavation limits and installation of Town-furnished detectable warning tiles for "Concrete Sidewalk Ramp".

MATERIALS

1. Concrete
    a. The concrete furnished shall conform in respects to composition, transportation, mixing and placing to Class "F" Concrete as specified in Section M.03 of Form 817 or as modified herein.
    b. Test concrete in accordance with AASHTO or ASTM Standard Test Methods as listed herein.
    c. All concrete mixes shall include air entraining and water reducing admixtures and, as needed, a retarder or accelerator. All admixtures must be on the Connecticut DOT approved list.
    d. Entrained air contents shall be maintained as follows:

Nominal Max Aggregate Size	Average Air Content
3/8"	7.5%
1/2"	7.0%
3/4"	6.0%

A range of ±1.5% from the required average is permissible for field tests.

Slump at the point of placement shall be 4" ±1".

e. No additional materials will be added to the concrete mix at the job site without the prior approval of the Engineer.

2. Reinforcing

a. Welded Wire Mesh: WWM shall be used in all driveways and specified sidewalk locations. The WWM shall be W1.4xW1.4 and conform to the latest AASHTO M 55M/M 55 "Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement."

Written requests may be made to substitute synthetic fibers such as Fibermesh or approved equal for welded wire mesh with written approval of the Engineer. The addition rate shall be 1.5 lb/cu yard.

b. Smooth Metal Dowels: Smooth metal dowels shall be ⅝" in diameter and 18 inches in length. All metal dowels shall conform to the requirements of AASHTO M31-92, Grade 60.
c. Deformed Bars: Deformed bars shall conform to AASHTO M31-92, Grade 60.
d. Bond breaker shall be Reed Wax #100 Emulsion as manufactured by Roger A. Reed, Inc., Reading, MA (1-781-944-4640) or approved equal.

3. Construction/Isolation Joint Material

Joint material shall be one-half (2) inch in thickness, equal in width to the slab thickness and conform to AASHTO M33, Asphaltic Expansion Joint Materials.

4. Forms

The forms used shall be straight and firmly supported and staked to the line and grades as shown on the plans or as directed by the Engineer. The forms shall be free from warp and shall be of sufficient strength to resist springing out of shape. All forms shall be cleaned and oiled before use.

5. Curing Materials

A liquid membrane curing compound such as Masterkure by Master Builders or approved equal and meeting AASHTO M148 shall be applied in accordance with the manufacturer's instructions over the completed concrete surface area.

6. Processed Aggregate Base

Processed aggregate base shall conform to the requirements of "Processed Aggregate Base" elsewhere in these Specifications.

7. Granite Stone Transition Curb

   Granite stone transition curb and associated concrete and mortar shall conform to the requirements of "Granite Stone Curb" elsewhere in these Specifications.

8. Detectable Warning Tiles

   Prefabricated detectable warning tiles will be furnished by the Town.

CONSTRUCTION DETAILS

1. Excavation

   Excavation, including the removal and disposal of any type of existing sidewalk, curb, ramp, steps or pavement, shall be made to the required depths below the finished grade as shown on the plans or as directed. All soft and yielding material shall be removed and replaced with suitable material.

2. Processed Aggregate Base

   The base course shall be placed in layers not to exceed six inches (6") in depth and to such a depth that after compaction it shall be at the specified depth below the finished grade of the walk.

3. Forms

   Forms shall be straight, free from warp and of sufficient strength to resist springing from the pressure of the concrete. Forms shall be of minimum 5" depth and shall have a flat surface on the top. Forms shall be securely staked, braced and held firmly to the required line and grade and shall be sufficiently tight to prevent leakage of mortar. All forms shall be cleaned and oiled or wetted before concrete is placed against them. Sheet metal templates one-eighth (⅛) inch in thickness, of the full depth and width of the walk, shall be spaced at intervals of fifteen feet (15') or as directed by the Engineer. If the concrete is placed in alternate sections, these templates shall remain in place until concrete has been placed on both sides of the template. As soon as the concrete has obtained its initial set, the templates shall be removed.

4. Joints

   a. Construction Joints: At maximum intervals of thirty feet (30'), install a construction joint as detailed on the drawings. Install dowels as shown on the drawings. Minimum embedment on each side of the joints shall be six inches (6"). All dowels shall be straight, square on the ends with no burrs. Locate 12" from the edge of the slab. Bars must be carefully aligned and square with the form face. Prevent bonding to the concrete on one side of the joint by using a plastic sleeve over the dowel or coat with an approved bond breaker. Alternate protected end on each side of the joints.

      Dowels are also to be installed between new and existing concrete slabs. Where new or repaired walks abut existing concrete sidewalks, the contractor shall drill

holes measuring 3/4 of an inch in diameter and twelve (12) inches in depth at 24" on centers into the existing concrete slab. The dowels, dipped in a liquid asphalt and coated with an approved bond breaker or plastic sleeve shall be set into the existing sidewalk slab prior to the placement of concrete. The dowels are to be level with the latitude pitch of the sidewalk and shall conform to the details of these specifications. Any variations in dowel installation procedures must be approved by the Engineer.

Other locations to which dowels may be required will be directed by the Engineer.

b. Control Joints: Follow joint spacing as shown on the drawings. At intervals of approximately fifteen (15) feet, a full control joint shall be provided. A tooled joint, to the depth of 3/8 of an inch, shall be installed at approximately five (5) foot intervals along the sidewalk. The resulting areas should be as square as practical. All joints shall be installed using straight guides set at right angles to the longitudinal direction of the walk.
c. Isolation Joints will be installed wherever concrete is placed against already installed concrete of structures such a curbing, building, or other, previously existing paving.

If it becomes necessary to adjust the locations, horizontal or vertical dimensions of the above listed items due to interference with utilities or for other valid reasons, the Contractor, with the approval of the Engineer, shall construct said items to the modified dimensions and locations.

5. Concrete Placement and Finishing

a. Subgrade preparation: The subgrade shall be approved by the Engineer prior to placement of concrete. The grade will be free of soft areas, roots, rubble and large stones. It shall be fully compacted and graded to provide the specified slab thickness within ±¼".
b. Forms: Align forms as shown on drawings and secure to provide straight edges and uniform curves. Remove only after the concrete has gained sufficient strength to prevent chipping or raveling of the edges.
c. Where required, install welded wire mesh. Support the mesh on concrete bricks or other supports so that it will remain in the upper third of the slab.
d. Moisten the subgrade before starting concrete placement to eliminate water loss.
e. Place continuously, using construction joints at locations shown on the drawings or as approved by the Engineer. If an interruption occurs of a duration that may cause a cold joint, install a construction joint as described in this specification.
f. Water may be added to the truck mixer to adjust the slump when the discharge begins, only if the concrete is below the specified water cement ratio and maximum slump upon arrival at the job site. Water shall not be added to the batch at any later time. If higher slumps are required, use a high range water reducer such as Rheobuild 1000 by Master Builders or equal as approved by the Engineer.

g. Screed the concrete to grade, bull float or darbie, consolidate formed edges by spading with a hand float, and leave until edging can begin. Allow to harden sufficiently so that a foot leaves only a slight imprint. Floating should not begin until the water sheen has disappeared. The surface shall be worked and floated with a wooden, aluminum or magnesium float or finishing machine using float blades. The outside edges of the slab shall be edged with one-quarter (¼) inch radius tool. The slab shall then be broomed crosswise with a fine hair broom leaving the surface free from all tool marks.

h. Immediately upon the disappearance of the water sheen following the final finishing and before any marked dehydration or checking occurs, the curing compound shall be applied using an approved spraying device. The sprayer shall deliver a fine spray with uniform coverage. Coverage rate shall be that recommended by the curing compound manufacturer.

i. The Contractor shall have on the job, at all times, sufficient polyethylene film or waterproof paper to provide complete coverage in the event of rain. Protect the surface if rain occurs before final set or use for curing in the event of a breakdown of the spray equipment.

j. If rain falls on the newly coated sidewalk before the curing film has dried sufficiently to resist damage, or if the film is damaged in any other manner, the contractor shall reapply same. Treated surfaces shall be protected from all foot or vehicular traffic for a sufficient period of time to prevent damage.

6. Reinforcing

Reinforcing of the type specified shall be used in all concrete sidewalk ramps and at concrete sidewalks which cross driveways. Welded wire fabric for concrete reinforcement shall be embedded at mid-depth in the slab.

7. Detectable Warning Tile

All sidewalk ramps shall have detectable warning tiles as shown on the Plan or as directed by the Engineer. The detectable warning tile shall be set directly in poured concrete according to the Plans, the manufacturer's specifications or as directed by the Engineer. The Contractor shall place two 25 pound concrete blocks or sandbags on each tile to prevent the tile from floating after installation in wet concrete. Detectable warning tiles shall be furnished by the Town.

8. Special Conditions

a. Low Temperature Placements: No concrete is to be placed when air temperature is below 50°F unless additional precautions are taken and prior approval is given by the Engineer. The Engineer must approve all placements below 50°F. No concrete will be placed on frozen sub-grade or at temperatures below 20°F. Concrete exposed to temperatures below 40°F after placement must be protected through the use of insulating blankets, a six (6) inch layer of straw that is maintained in a dry condition by a covering of plastic sheeting, or other

appropriate methods. Any concrete placed during cold weather that is damaged because of freezing shall be replaced at the Contractor's own expense.

b. Special consideration for high temperature placements and rapid drying conditions should be discussed with the Engineer. No additional materials will be added to the concrete mix at the job site without the prior approval of the Engineer.
c. Where reconstruction of an existing approach walk is required, the reconstructed portion of the approach walk shall match the existing approach walk in color, texture and appearance.

9. Curb Transitions

Curb transitions shall be provided when sidewalk ramps are adjacent to existing and proposed curb. Granite stone curb transitions shall be provided adjacent to granite curb and concrete curb transitions shall be provided adjacent to concrete curb and bituminous concrete curb unless approved otherwise by the Engineer.

10. Backfilling and Removal of Surplus Material

The sides of all finished concrete work shall be backfilled to the limits shown on the drawings or as directed by the Engineer, with suitable material thoroughly compacted and finished flush with the top of the concrete. All surplus material shall be removed and the site left in a neat and presentable condition to the satisfaction of the Engineer.

11. Protection

The Contractor shall protect newly poured concrete surfaces so as to prevent damage from falling objects, vandalism, etc. The Contractor shall repair or remove and replace any damaged or defaced concrete surface at his own expense. Determination to repair or remove and replace will be at the sole discretion of the Engineer.

12. Utility Adjustments

If an existing utility box, valve box or manhole is located within the limits of the new sidewalk or ramp, the Contractor shall be responsible for the coordination and scheduling with the owner of the facility, for the adjustment of the facility to grade, if necessary.

13. Signs

Unless otherwise shown on the Plan or directed by the Engineer, the Contractor shall remove existing signs located within the limits of the sidewalk or ramp construction, erect them on temporary support posts during the construction of new sidewalk or ramp, and reinstall them at their original location in a PVC sleeve set flush to the grade of the new sidewalk.

CONCRETE SIDEWALK AND CONCRETE SIDEWALK RAMPS

MEASUREMENT

"Concrete Sidewalk" will be measured by the actual number of square feet of completed and accepted concrete sidewalk of the thickness specified.

"Concrete Sidewalk and Curb Monolithic" will be measured by the actual number of square feet of completed and accepted concrete sidewalk of the thickness specified measured from face of curb to back of walk.

"Reinforced Concrete Sidewalk" will be measured by the actual number of square feet of completed and accepted reinforced concrete sidewalk of the thickness specified.

"Concrete Sidewalk Ramps" will be measured by the actual number of square feet of completed and accepted concrete ramps of the thickness specified.

The following items will not be measured separately for payment, but shall be considered as included in the unit price bid for "Concrete Sidewalk", "Reinforced Concrete Sidewalk", "Concrete Sidewalk and Curb Monolithic" or "Concrete Sidewalk Ramp" of the thickness specified:

1. Excavation and backfill;
2. Furnishing and installing processed aggregate base;
3. Forming and compacting of subgrade;
4. Expansion joint material, dowels and other reinforcement;
5. Sawcutting and removal of existing sidewalks, ramps and/or bituminous concrete pavement within the limits of the new sidewalk or ramp;
6. Installing Town-furnished detectable warning tiles;
7. Installing curb transitions;
8. Adjustment of existing valve boxes, utility boxes, or handholes to grade;
9. Removing, temporarily erecting and re-installing existing signs within the limits of new sidewalk or ramps;
10. Cast-in-place concrete curbing associated with sidewalk ramps;

PAYMENT

This work will be paid for at the contract unit price per square foot for "Concrete Sidewalk", "Reinforced Concrete Sidewalk", "Concrete Sidewalk and Curb Monolithic" or "Concrete Sidewalk Ramp", of the thickness specified, complete in place, which prices shall include all excavation; formation of subgrade; sawcutting, removal and disposal of existing sidewalk, ramps and pavement; processed aggregate base; concrete curb transitions; backfill, reinforcement, expansion joints, curing, disposal of surplus material, installation of detectable warning tiles, relocation and temporary support of existing signs, equipment, tools, materials and labor incidental thereto.

Granular fill used to replace unsuitable material or used as borrow material to bring the sidewalk subbase to grade will be paid under the item "Granular Fill" elsewhere in these Specifications. Granular fill will only be paid for if directed by the Engineer.

CONCRETE SIDEWALK AND CONCRETE SIDEWALK RAMPS

Pay Item	Pay Unit
4” Concrete Sidewalk	Square Foot
5” Concrete Sidewalk	Square Foot
5” Concrete Sidewalk and Curb Monolithic	Square Foot
6” Reinforced Concrete Sidewalk	Square Foot
6” Concrete Sidewalk Ramp	Square Foot

CONCRETE DRIVEWAY APRON

DESCRIPTION

"(Size) Concrete Driveway Apron" includes the construction of concrete driveways and concrete driveway aprons on a prepared processed aggregate base in the locations and to the dimensions and details shown on the Plans, as directed by the Engineer, and in accordance with these Specifications.

MATERIALS

Portland cement, fine and coarse aggregate, air-entraining admixtures and water shall conform to the requirements of Section M.03.01 of Form 817 for Class "F" Concrete.

Processed aggregate base shall conform to the requirements of "Processed Aggregate Base" elsewhere in these Specifications.

Reinforcement shall conform to the requirements of Section M.06.01 of Form 817 for concrete pavement.

Granite stone transition curb and associated concrete and mortar shall conform to the requirements of "Granite Stone Curb" elsewhere in these Specifications.

CONSTRUCTION DETAILS

Construction methods shall conform to the requirement of the Item, "Concrete Sidewalk and Concrete Sidewalk Ramps". The surface shall be finished and marked off as directed. The driveways shall be reinforced as indicated on the Plans. The concrete shall contain not less than five (5) nor more the seven (7) percent entrained air at the time the concrete is deposited in the forms.

The Contractor shall sawcut the existing pavement and excavate as necessary to perform the work under this item as shown on the Plans.

Curb transitions shall be provided when concrete driveway aprons are adjacent to existing and proposed curb. Granite stone curb transitions shall be provided adjacent to granite curb and concrete curb transitions shall be provided adjacent to concrete curb and bituminous concrete curb unless approved otherwise by the Engineer.

MEASUREMENT

"(Size) Concrete Driveway Apron" will be measured for payment by the actual number of square feet of completed and accepted concrete driveway and concrete driveway apron.

The following items will not be measured separately for payment, but shall be considered as included in the unit price bid for "Concrete Driveway Apron":

1. Excavation
2. Sawcutting of existing concrete or bituminous surface
3. Processed Aggregate Base

4. Curb transitions
5. Dowels and other reinforcement
6. Removal of existing sidewalks, ramps, driveway or roadway within the driveway excavation limits

PAYMENT

This work will be paid for at the contract unit price per square foot for "(Size) Concrete Driveway Apron" of the type specified, complete in place, which price shall include excavation, sawcutting, removal and disposal of existing driveway and/or sidewalk, concrete, reinforcement, granite stone or concrete curb transitions, formation of subgrade and all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
6" Concrete Driveway Apron	Square Foot

BITUMINOUS CONCRETE DRIVEWAY

DESCRIPTION

"Bituminous Concrete Driveway" includes the construction of a bituminous concrete surfaced driveway or driveway apron, constructed on a processed aggregate base course in the locations and to the dimensions and details shown on the Plans, as directed by the Engineer and in accordance with these Specifications.

MATERIALS

Processed Aggregate Base shall conform to the requirements of "Processed Aggregate Base" elsewhere in these Specifications.

Bituminous concrete shall meet the requirements of Section M.04, HMA S0.375, of Form 817.

Tack coat to be used on all cold joints shall conform to the requirements of Section M.04.01.5 of Form 817.

Joint seal shall conform to the requirements of Section M.04.01.8 of Form 817.

CONSTRUCTION DETAILS

1. Excavation: Excavation, including removal of any existing sidewalk, driveway, or driveway apron shall be made to the required depth below the finished grade, as shown on the Plans or as directed by the Engineer. All soft and yielding material shall be removed and replaced with suitable material.

2. Forms: When the bituminous concrete is spread by hand, forms shall be used. Forms shall be of metal or wood, straight, free from warp and of sufficient strength to resist springing from the impact of the roller. If of wood, they shall be of two (2) inch surfaced plank except that at sharp curves thinner material may be used; if of metal, they shall be of an approved section. All forms shall be of a depth equal to the depth of the sidewalks or driveways and shall be securely staked, braced, and held firmly to the required line and grade. All forms shall be cleaned and oiled each time they are used.

3. Base Course: Processed Aggregate Base for the base course shall be uniformly spread upon the subgrade to the required depth and thoroughly compacted with a roller weighing not less than 500 pounds.

4. Bituminous Concrete Surface: This surface shall be constructed in accordance with the requirements of Section 4.06 of Form 817, except that the material may be spread by hand and thoroughly compacted by multiple passes of a roller weighing not less than 500 pounds.

5. Backfilling and Removal of Surplus Material: The sides of the driveway or apron shall be backfilled with suitable material and thoroughly compacted and finished flush with the top of the driveway. All surplus material shall be removed and the site left in a neat and presentable condition to the satisfaction of the Engineer. In sections inaccessible to the

roller, the base course, surface course and backfill shall be hand-tamped with tampers weighing not less than 12 pounds, the face of which shall not exceed 50 square inches in area.

6. Where a joint is formed, the old pavement shall be sawcut square with the pavement in a vertical and horizontal direction. The exposed edge shall receive a thin coating of RS-1 or other approved bitumen. The joint between the new and old pavement shall be sealed with an approved joint sealant.

MEASUREMENT

"Bituminous Concrete Driveway" will be measured by the actual number of square yards of "Bituminous Concrete Driveway" constructed and accepted.

The following items will not be measured separately for payment, but shall be considered as included in the unit price bid for "Bituminous Concrete Driveway":

1. Excavation
2. Processed Aggregate Base
3. Removal and disposal of existing sidewalks or pavement within the driveway or apron excavation limits
4. Tack Coat
5. Sawcutting
6. Joint Sealant

PAYMENT

This work will be paid for at the contract unit price for "Bituminous Concrete Driveway", which price shall constitute full compensation for excavation, removal and disposal of existing sidewalk or driveway, sawcutting, processed aggregate base, formation of subgrade, tack coat, joint seal, and all materials, equipment and labor necessary to complete the work as specified on the Plans or as directed by the Engineer.

Driveways damaged due to carelessness on the part of the Contractor shall be restored by the Contractor, as directed by the Engineer, at no expense to the Town.

Item	Pay Unit
Bituminous Concrete Driveway	Square Yard

EXTRUDED CONCRETE CURB

DESCRIPTION

"Extruded Concrete Curb" includes the furnishing and installation of slip formed concrete curbing, straight or curved, placed on a prepared bituminous concrete roadway in accordance with the dimensions and details shown on the Plans or as directed by the Engineer.

MATERIALS

Concrete: Furnished concrete shall conform to Class "F" Concrete as specified in Article M.03.01 of Form 817 or as modified herein with respect to composition, transportation, mixing and placing. Concrete shall contain a minimum of one pound of fiber reinforcement per cubic yard. All concrete shall be produced in accordance with ASTM C94 Ready Mixed Concrete. Cement and fine aggregate material shall conform to Article M.3.01 of Form 817.

Adhesive: Adhesive shall be based upon the manufacturer's recommendation for the intended installation.

CONSTRUCTION DETAILS

Concrete shall be of such consistency that, after extrusion, it will maintain the shape of the curb section without support or slumping. It shall have a clean, uniform appearance, free from surface pits larger than 3/16" in diameter.

The pavement surface shall be thoroughly cleaned using high pressure washing, if necessary, prior to curb installation.

The curb shall be bonded to the existing pavement with an approved concrete to asphalt adhesive or a two-component epoxy in accordance with the manufacturer's instructions.

The top of the finished curb shall be true to line and shall follow the contour of the pavement.

Control joints shall be cut, as soon as possible, through one-third of the cross section of concrete. The joint shall be tooled and finished to a neat and uniform appearance. Control joints shall be installed at nine foot (9') intervals on tangent sections and three foot (3') intervals on radii.

The finished curb shall be coated with a curing compound, designed to seal the surface and form a water proofing membrane to retard the loss of water from the fresh concrete.

After the completion of curbing, traffic shall be kept at a safe distance for a period of not less than 24 hours and until the curbing has set sufficiently to prevent damage to the work. Fill material shall be placed behind the curb immediately thereafter.

MEASUREMENT

"Extruded Concrete Curb" will be measured for payment along the top of the curb and will be the actual number of linear feet of extruded concrete curbing, completed and accepted.

EXTRUDED CONCRETE CURB

The following will not be measured for payment, but shall be considered as included in the unit price bid for "Extruded Concrete Curb":

1. Removal and disposal of existing curb
2. Surface cleaning and preparation of existing bituminous concrete roadway
3. Adhesive
4. Curing compound

PAYMENT

Payment for this work will be made at the contract unit price per linear foot for "Extruded Concrete Curb" complete in place, which price shall include the removal and disposal of existing curb, the cleaning and surface preparation of existing bituminous concrete roadway, adhesive, curing compound, all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Extruded Concrete Curb	Linear Foot

CULVERTS

DESCRIPTION

"Culvert" of the size and type specified includes the furnishing and installing of new pipe culverts and/or relaying existing pipe culverts of the type, size and length called for on the Plans at the locations and to the lines and grades designated on the Plans, or as directed by the Engineer. This item includes other incidental work associated with the installation of pipe culverts, including trench excavation, stockpiling and placement of approved native material as backfill, disposal of native material, furnishing and installing granular fill bedding material, trench support systems, making connections to existing culverts, modifying existing structures to accommodate new pipe, and trench backfilling to the lines and grades designated on the Plans, or as directed by the Engineer.

"Culvert End" of the size and type specified includes the furnishing and installing of new culvert ends at the locations and to the lines and grades designated on the Plans, or as directed by the Engineer, and in conformity with these Specifications. This item includes other incidental work associated with the installation of culvert ends, including excavation, furnishing and compaction of bedding material, and connecting to existing culverts.

"Plug Pipe" shall consist of the plugging of existing pipes with cement masonry where shown on the Plans or as directed by the Engineer.

"Abandon Pipe" shall consist of the abandonment of existing pipes by bulkheading both ends and filling the remainder of the pipe with flowable concrete.

"Remove Pipe" shall consist of the removal and disposal of existing pipes and the proper backfilling of the associated trench. Only pipes called out on the plans to be removed will be measured and paid for under this item. Existing pipes to be removed that fall within the excavation limits of new pipe will not be measured separately for payment, but shall be considered as included in the unit price bid for the new pipe.

MATERIALS

Reinforced Concrete Pipe shall conform to Section M.08.01.07 of Form 817. Joint sealant shall conform to the requirements of Section M.08.01.17, "Flexible, Watertight, Rubber-Type Gaskets". Portland cement mortar or bituminous sealers shall not be used for sealing pipe joints.

High density polyethylene (H.D.P.E.) pipe and flared ends shall have a smooth interior and conform to requirements for Corrugated Polyethylene Pipe in Section M.08.01.18 of Form 817.

Ductile iron pipe shall meet the requirements of the latest revision of AWWA C151 (ANSI A21.51). Joint restraints are not required and all joints shall be rubber gasket push-on type manufactured in accordance with the latest revision of AWWA C111 (ANSI A21.11). Pipe shall be supplied with the standard exterior bituminous coating of either coal tar or asphalt base approximately one mil thick. The interior shall be double cement lined in accordance with the latest revision of AWWA C104 (ANSI A21.4), and pipe shall be of thickness Class 52 unless otherwise indicated. Pipe shall be manufactured by American Pipe, Griffin, U.S. Pipe, McWane

CULVERTS

Ductile or approved equal.

Reinforced concrete culvert ends (R.C.C.E.) shall conform to Section M.08.01.11 of Form 817.

Bedding material for reinforced concrete pipe shall conform to the requirements of Section M.08.03 of Form 817.

Bedding material for plastic pipe shall be granular fill that conforms to the requirements of Section M.02.01 of Form 817.

Class "A" Concrete shall conform to the requirements of Article M.03.01 of the Form 817.

Flowable concrete fill used for abandoning pipelines shall be excavatable with a maximum 28-day compressive strength of 150 psi. Concrete mix design shall be submitted to the Engineer for review and approval.

Granular fill shall conform to the requirements of the specification “Granular Fill” elsewhere in these Specifications.

Processed Aggregate Base shall conform to the requirements of the specification “Processed Aggregate Base” elsewhere in these Specifications.

Steel sheeting for trench stabilization, if required, shall conform to the requirements of ASTM A328, ASTM A572 or ASTM A690 as appropriate.

CONSTRUCTION DETAILS

Unless otherwise directed by the Engineer, all new or relaid pipe culverts shall be installed in bedding material in accordance with the details and these specifications.

Pipe with an internal diameter of less than 48 inches, including pipe-arch of an equivalent horizontal span, shall be installed in a Type I installation. All plastic pipe and other pipe materials of 48 inches internal diameter or more, including pipe-arch of equivalent horizontal span, shall be installed in a Type II installation.

Type I installation shall consist of installing the pipe, or pipe-arch, in bedding material with a thickness directly under the pipe of four (4) inches (12 inches in rock) and pre-shaped to a height of ten (10) percent of the total height of the pipe. After the pipe has been installed, the trench shall be backfilled with bedding material to a height of twenty-five (25) percent of the total height of the pipe.

Type II installation shall consist of installing the pipe or pipe-arch in bedding material, with a thickness directly under the pipe of four (4) inches (12 inches in rock) and pre-shaped to a height of ten (10) percent of the total height of the pipe. After the pipe has been installed, the trench shall be backfilled with bedding material to a minimum height of twelve (12) inches above the top of the pipe.

CULVERTS

Reinforced concrete pipe shall be Class IV with a minimum cover of 2 feet. Class V reinforced concrete pipe shall be installed in locations where 1.5 to 2 feet of cover is achievable and ductile iron pipe shall be installed for pipe with less than 1.5 feet of cover with the approval of the Engineer. All pipe shall have one (1) foot minimum cover.

Where pipe is to be laid below the ground lines, a trench shall be excavated to the required depth, the bottom of which shall be graded to the elevation of the bottom of the bedding material. When rock is encountered, it shall be excavated to not less than 12 inches below the bottom of the pipe, and this depth shall be refilled with compacted bedding material.

Where pipe is to be laid in a fill area, the embankment shall be placed and compacted to an elevation 12 inches above the top of the proposed pipe, whereupon the trench excavation shall be made and the pipe installed.

Where the nature of the foundation is poor, the culvert shall be relocated in firm material if possible. Where this cannot be done, the poor material shall be removed and replaced with a layer of bedding of such depth as the Engineer may direct; or special construction of the character shown on the plans, special provisions or as ordered by the Engineer, may be employed.

The placement of pipe shall start at the downstream end and progress upstream. All pipe shall be carefully laid, true to the lines and grades given, hubs upgrade and with spigot ends fully entered into the adjacent hubs.

The joints in concrete pipe shall be sealed with flexible, watertight rubber-type gaskets conforming to the requirements of Subarticle M.08.01.17. Where shown on the plans or directed by the Engineer, the Contractor shall connect the proposed drainage system(s) with existing drainage structures or pipes. This work shall be performed in a skillful and competent manner.

Pipes shall extend through structure walls for a sufficient distance beyond the outside surface to allow for satisfactory connections and the concrete or masonry shall be constructed around them neatly to prevent leakage along their outer surfaces. The pipe shall be cut flush with the inside face of the structure walls, headwalls and endwalls, or as shown on the plans.

Where shown on the plans or directed by the Engineer, the Contractor shall plug or abandon existing pipes with cement masonry.

Where shown on the plans to remove pipe, the Contractor shall remove and dispose of existing pipes to the limits shown on the Plans or as directed by the Engineer.
Trenches shall be backfilled above the bedding material with material approved by the Engineer. All excavated materials not required or unsuitable for backfill, (i.e., clay, silt, sand, muck, gravel, hardpan, loose shale, loose stone in masses and boulders greater than 5” in diameter) shall be removed and properly disposed of by the Contractor. Unsuitable soils that exhibit obvious evidence of heavy contamination or have been identified as containing elevated concentrations of contamination should be removed and stockpiled for characterization and possible off-site

disposal. If contaminated soils are stockpiled best management practices must be employed to reduce human and environmental exposure to the stockpiled materials. Granular fill shall be used to replace all unsuitable material.

Any utility service or lateral damaged by the Contractor shall be repaired or replaced at the Contractor's expense.

The Contractor shall furnish, put in place and maintain such trench support systems (i.e., trench boxes, steel plates, steel sheeting, etc.) as may be necessary to support the sides of the excavation and to prevent any movement of earth other than that intended to be accomplished by the excavation. Trench support systems shall be designed to support earth pressures, hydrostatic pressures, equipment and construction loads, and other surcharge loads, to allow safe and expeditious construction with minimal movement or settlement of ground, to prevent damage to, or movement or settlement of, adjacent buildings, structures, or utilities. Such systems shall be installed as may be necessary for the protection of the Work and for the safety of personnel, and shall comply with the safety precautions as outlined in the Associated General Contractors of America, "Manual of Accident Prevention in Construction," the "Occupational Safety and Health Act" of 1970 (OSHA) of latest revision and OSHA Reference: U.S. Dept. Of Labor O.S.H.A. Safety and Health Standards (29 CFR 1926/1910) revised March 5, 1990, Subpart P-Excavations, Trenching & Shoring Selection of Protective Systems, 1926-652 Appendix F.

MEASUREMENT

1. New and Re-laid Pipe Culverts and Pipe-Arch Culverts will be measured for payment by the actual number of linear feet of pipe or pipe-arch culvert of the size and type specified, completed and accepted and measured in place along the invert to the inside face of manholes or other structures. Coupling bands and fittings for culvert pipe and pipe-arches will not be measured for payment.

2. Trench Excavation will not be measured for payment, but the cost thereof shall be included in the contract unit price per linear foot for the size and type of pipe being installed. Removal of existing pipe within the trench excavation limits will not be measured separately for payment, but its costs shall be considered as included in the unit price for the new pipe.

3. Trench Excavation in defined rock or ledge will be measured for payment under the item "Rock in Trench Excavation" elsewhere in these Specifications.

4. Bedding Material will not be measured for payment, but the cost thereof shall be included in the contract unit price per linear foot for the size and type of pipe being installed.

5. Granular Fill, used for trench backfill or bedding material shall not be measured for payment, but the cost shall be included in the contract unit price per linear foot for the size and type of pipe being installed.

6. Granular Fill, if required by the Engineer to replace unsuitable material below the limits

of bedding material as shown on the plans, will be measured for payment as specified in the "Granular Fill" specification.

7. There will be no measurement for payment for the cost of connecting proposed drainage systems with existing systems and/or modifying existing structures as required, but the cost thereof shall be included in the contract unit price per linear foot for the size and type of pipe being installed.

8. New Culvert Ends will be measured for payment by the actual number of culvert ends installed and accepted.

9. Plug Pipe will be measured for payment by the actual number of pipe plugs installed and accepted.

10. Abandon Pipe will be measured for payment by the actual number of linear feet of pipe abandoned.

11. Remove Pipe will be measured for payment by the actual number of linear feet of pipe removed. When pipe to be removed is within the same excavation limits of new pipe (i.e. pipe replacement in same trench), the removal of the existing pipe will not be measured separately for payment, but its costs shall be considered as included in the unit price for the new pipe.

12. Pavement Restoration will be measured for payment under the Item "Temporary Pavement Repair", "Permanent Pavement Repair" or "HMA" of the type specified elsewhere in these Specifications.

13. Lawn Restoration will be measured for payment under the Item "Restoration of Lawn Areas" elsewhere in these Specifications.

PAYMENT

1. New Pipe Culverts and Pipe-Arch Culverts will be paid for at the contract unit price per linear foot for pipe or pipe-arch of the type and size specified, complete in place, including all materials, equipment, tools and labor incidental thereto.

2. Trench Excavation will not be measured for payment, but the cost thereof shall be included in the contract unit price per linear foot for "Culvert" of the size and type installed.

3. Trench Excavation in defined rock or ledge will be paid under the Item "Rock in Trench Excavation" as specified elsewhere in these Specifications.

4. Bedding Material will not be measured for payment, but the cost thereof shall be included in the contract unit price per linear foot for the size and type of pipe being installed.

CULVERTS

5. Granular Fill, used for trench backfill or bedding material shall not be measured for payment, but the cost shall be included in the contract unit price per linear foot for the size and type of pipe being installed.

6. Granular Fill, if required by the Engineer to replace unsuitable material below the limits of bedding material as shown on the plans, shall be measured for payment as specified in the "Granular Fill" specification.

7. There will be no direct payment for the connecting of proposed drainage systems with existing systems, but the cost thereof shall be included in the contract unit price per linear foot for the size and type of pipe being installed.

8. Culvert Ends will be paid for at the contract unit price each for culvert ends of the type and size specified, complete in place, including all materials, equipment, tools and labor incidental thereto.

9. Plug Pipe will be paid for at the contract unit price each for "Plug Pipe", complete in place, including all materials, equipment, tools and labor incidental thereto.

10. Abandon Pipe will be paid for at the contract unit price per linear foot for "Abandon Pipe", complete in place, including all materials, equipment, tools and labor incidental thereto.

11. Remove Pipe will be paid for at the contract unit price per linear foot for "Remove Pipe", complete in place, which price includes all materials, equipment, tools and labor incidental thereto. Imported granular fill used to backfill the void left from the removal of the pipe will not be measured separately for payment, but its price shall be considered as included in the contract unit price for "Remove Pipe".

12. Pavement Restoration will be paid for as specified under the Item "Temporary Pavement Repair", "Permanent Pavement Repair" or "HMA" of the type specified elsewhere in these Specifications.

13. Lawn Restoration will be paid for as specified under the Item "Restoration of Lawn Areas" elsewhere in these Specifications.

14. There will be no direct payment for any trench support systems required to complete any of the work outlined herein.

Pay Item	Pay Unit
12" Ductile Iron Pipe (Storm)	Linear Foot
15" R.C.P.	Linear Foot
Abandon Pipe	Linear Foot

CATCH BASINS AND STORM MANHOLES

DESCRIPTION

"Catch Basin" and "Double Grate Catch Basin" of the type and depth specified shall consist of the construction of a new catch basin and catch basin top in accordance with the Plans and Specifications. It also includes the removal of existing catch basins within the excavation limits or in conflict with the new catch basin location.

"Reset Catch Basin Top (Type) (New Top)" includes removal of existing catch basin tops and furnishing and installing a new catch basin top in accordance with the Plans and Specifications. It also includes reconstructing the existing structure walls as necessary to accommodate the proposed elevations. Curb inlets for new catch basin tops shall match dimensions of adjacent curb.

"Reset Catch Basin Top (Type) (Existing Top)" includes the resetting of the existing catch basin top to grade. It also includes reconstructing the existing structure walls to accommodate the proposed elevations.

"Convert Catch Basin to Manhole" includes all work necessary to reconstruct an existing catch basin to a manhole in accordance with the Plans and Specifications.

"Modify Drop Inlet to Combination Catch Basin/Manhole" includes all work necessary to reconstruct an existing drop inlet structure as shown on the Plans to accommodate a new catch basin top. It also includes furnishing and installing a new manhole top, frame and cover.

"Reconstruct Drainage Structure" includes all work necessary to reconstruct an existing drainage structure as shown on the Plans.

"Storm Manhole" of the type and depth specified includes the construction of a new precast concrete manhole in accordance with the Plans and Specifications.

"Remove Drainage Structure" shall consist of the removal and disposal of an existing drainage structure called out on the plans and backfilling with granular fill.

"Abandon Drainage Structure" shall consist of the abandonment of existing drainage structures where shown on the Plans or directed by the Engineer.

Work under these items shall also include the sawcutting of existing pavement and curb, excavation, backfill and adjustment of existing structures to accommodate resetting of catch basin tops.

MATERIALS

Materials used for construction shall be those indicated on the Plans or as directed by the Engineer and shall conform to Section M.08.02 of Form 817.

CATCH BASINS AND STORM MANHOLES

Concrete inlets for Type “C” catch basin tops shall be formed to match the adjacent curb dimensions.

Manhole covers shall be cast with the words "TOWN OF MANCHESTER DRAIN” or “MANCHESTER DRAIN”.

Protective compound material shall conform to Section M.03.09 of Form 817.

Mortar shall conform to Section M.11.04 of Form 817.

Pervious material shall conform to Section M.02.05 of Form 817 and 3/4" size on the Gradation Table in Section M02.06 of Form 817.

Materials for damp-proofing shall conform to Section M.12.05 of Form 817.

Granular Fill, if required by the Engineer to replace unsuitable material below the excavation limits shown on the plans, shall conform to the requirements of “Granular Fill” elsewhere in these Specifications.

Sand for filling structures to be abandoned shall conform to the requirements of Article M.08.03 of Form 817.

Steel sheeting for excavation support systems, if required, shall conform to the requirements of ASTM A328, ASTM A572 or ASTM A690 as appropriate.

CONSTRUCTION DETAILS

These structures shall be constructed in accordance with the requirements contained herein for the character of work involved. The provisions of Section 6.02.03 of Form 817 pertaining to bar reinforcement shall apply except that shop drawings need not be submitted for approval.

The surfaces of the tops of all catch basins, junction boxes and drop inlets shall be given a coat of protective compound material immediately upon completion of the concrete curing period at the rate of .04 gallons per square yard.

All masonry units shall be laid in full mortar beds of at least ½” thickness.

Metal fittings for catch basins, junction boxes, manholes or drop inlets shall be set in full mortar beds or otherwise secured as shown on the plans.

Inlet and outlet pipes shall extend through the walls for a sufficient distance beyond the outside surface to allow for satisfactory connections and the concrete or masonry shall be constructed around them neatly to prevent leakage along their outer surfaces. The pipe shall be cut flush with the inside face of the wall, or as shown on the plans.

CATCH BASINS AND STORM MANHOLES

If unsuitable material is encountered during the excavation at the base of a structure, then a minimum of 12 inches of granular fill shall be used as a base for the structure or as directed by the Engineer.

All structures shall be precast and shall be constructed with at least one row of concrete block between the structure walls and the precast top to accommodate future adjustment.

Frames, covers and tops which are to be reset shall be removed from their present beds, the walls or sides of the basin shall be rebuilt as required to accommodate the new top. The limits of reconstruction of the structure side walls shall be 3' (measured vertically) unless determined otherwise by the Engineer. At least one row of concrete block shall be placed between the structure walls and the newly placed top.

When directed by the engineer, frames and covers for new manholes located within limits of road reconstruction shall be temporarily set at the binder course elevation and raised to the final course elevation immediately prior to paving.

Structures to be abandoned shall have frames, covers, tops and grates removed and properly disposed of off-site. All pipes in the structure shall be plugged with concrete. The Contractor may substitute bricks with permission of the Engineer. The existing structure shall be removed to a level a minimum of two (2) feet below the surface. The remaining structure shall be filled with sand and compacted. The remaining void shall be backfilled with granular fill to the subgrade elevation of the surface restoration treatment. The portions of the structure removed shall not be used for any other Work performed on this project.

The Contractor shall furnish, put in place and maintain such excavation support systems (i.e. trench boxes, steel plates, steel sheeting, etc.) as may be necessary to support the sides of the excavation and to prevent any movement of earth other than that intended to be accomplished by the excavation. Trench support systems shall be designed to support earth pressures, hydrostatic pressures, equipment and construction loads, and other surcharge loads, to allow safe and expeditious construction with minimal movement or settlement of ground, to prevent damage to, or movement or settlement of, adjacent buildings, structures, or utilities. Such systems shall be installed as may be necessary for the protection of the Work and for the safety of personnel, and shall comply with the safety precautions as outlined in the Associated General Contractors of America, "Manual of Accident Prevention in Construction," the "Occupational Safety and Health Act" of 1970 (OSHA) of latest revision and OSHA Reference: U.S. Dept. Of Labor O.S.H.A. Safety and Health Standards (29 CFR 1926/1910) revised March 5, 1990, Subpart P-Excavations, Trenching & Shoring Selection of Protective Systems, 1926-652 Appendix F.

MEASUREMENT

"Catch Basins" of the types specified; "Convert Catch Basin to Manhole", "Reconstruct Drainage Structure" and "Modify Drop Inlet to Combination Catch Basin/Manhole" will all be measured for payment by the actual number of structures, completed and accepted.

CATCH BASINS AND STORM MANHOLES

"Reset Catch Basin Top" of the type specified will be measured for payment by the actual number of structure tops completed and accepted.

"Remove Drainage Structure" is only used when the removal of an existing catch basin falls outside the excavation limits for a new drainage structure. When removal of an existing drainage structure falls within the excavation limits for a new drainage structure, the removal of the drainage structure shall be considered as included in the contract unit price bid for the new structure of the type specified. Only drainage structures called out on the Plan as "Remove Drainage Structure" will be measured for payment by the actual number of existing structures removed and backfilled in accordance with the Specifications.

"Abandon Drainage Structure" will be measured as the actual number of drainage structures abandoned, complete in place and accepted.

There will be no measurement or direct payment for excavation, backfill, excavation support systems, or the application of the protective compound material, but the cost of this work shall be considered as included in the contract unit prices for the appropriate item.

Granular Fill, if required by the Engineer to replace unsuitable material below the excavation limits shown on the plans, will be measured for payment under the item "Granular Fill" elsewhere in the Specifications.

The backfilling of abandoned drainage structures with sand and granular fill will not be measured separately for payment; the cost shall be considered as included in the contract unit price for "Abandon Drainage Structure".

PAYMENT

"Catch Basin", "Double Grate Catch Basin", "Convert Catch Basin to Manhole", "Reconstruct Drainage Structure", "Storm Manhole", "Modify Drop Inlet to Combination Catch Basin/Manhole", "Remove Drainage Structure", "Abandon Drainage Structure", "Reset Manhole to Grade" and "Reset Catch Basin Top" of the types specified will be paid for at the contract unit price each of the type specified, complete in place, which price shall constitute full compensation for all materials, equipment, tools and labor incidental thereto.

Granular Fill, if required by the Engineer to replace unsuitable material below the excavation limits shown on the plans will be paid under the item "Granular Fill."

The backfilling of abandoned drainage structures with sand and granular fill will not be paid for separately; the cost shall be considered as included in the contract unit price for "Abandon Drainage Structure".

The following items will not be paid for separately, but the cost thereof shall be included in the contract unit price for the appropriate item.

CATCH BASINS AND STORM MANHOLES

1. Excavation for drainage structures
2. Excavation support systems
3. Removal and disposal of existing structure if in excavation limits for new structure
4. Removal and disposal of existing frames, covers, tops, grates and upper portions of structures to be abandoned
5. Reconstruction of existing structure side walls (up to 3' in depth) for reset items
6. Damp-proofing
7. Storm Manhole Frames and Covers
8. Catch Basin Frames and Grates
9. Connecting and sawcutting of Existing Pipes when installing new structures
10. Sawcutting of pavement around existing or when installing new drainage structures
11. Sawcutting of curb adjacent to drainage structures
12. Granular Fill used to backfill for abandoned or removed drainage structures
13. Pervious material used for backfill
14. Granite or concrete curb inlets

For reset items, when the work requires reconstruction of existing structure side walls greater than 3' (measured vertically), then the Engineer will determine if the additional reconstruction will be paid for as extra work or if the entire structure is to be replaced and paid for under the appropriate specification.

Pay Item	Pay Unit
Type "C" Catch Basin with Concrete Curb Inlet	Each
Reset Type "C" Catch Basin Top (New Top)	Each
Storm Manhole	Each
Remove Drainage Structure	Each

RESET MANHOLE TO GRADE

DESCRIPTION

"Reset Manhole (Type)" includes the removal of an existing manhole frame and cover and furnishing, installing and adjusting a new manhole frame and cover to grade. It also includes reconstructing the existing structure walls and modifying riser sections as required to accommodate proposed elevations. The Engineer will identify manholes requiring installation of new frame and covers in the field during construction.

MATERIALS

Materials used for reconstruction shall be those indicated on the Plans or as directed by the Engineer and shall conform to Section M.08.02 of Form 817.

Storm manhole covers shall be cast with the words "TOWN OF MANCHESTER DRAIN" or "MANCHESTER DRAIN".

Sanitary sewer manhole frames and covers shall be heavy duty and shall be Model 1027C as manufactured by Campbell Foundry Company, Model 2927E as manufactured by Laperle Foundry Company or Model/Product Numbers 00133872 and 00124811 as manufactured by East Jordan Ironworks.

Sanitary sewer manhole covers shall be cast with the words "MANCHESTER SEWER" and shall be coated with a bitumastic coating. Cast iron shall conform to ASTM A-48 Class 30B or its latest revisions.

Protective compound material shall conform to Section M.03.09 of Form 817.

Mortar shall conform to Section M.11.04 of Form 817.

Materials for damp-proofing shall conform to Section M.12.05 of Form 817.

CONSTRUCTION DETAILS

Frames and covers which are to be removed or reset shall be removed from their present beds, the walls or risers of the manhole shall be reconstructed in accordance with the requirements contained herein for the character of work involved to accommodate the new frame elevation. The limits of reconstruction of the structure walls and risers shall be 3' (measured vertically) unless determined otherwise by the Engineer.

All masonry units shall be laid in full mortar beds of at least ½" thickness.

Steel frames shall be set in full mortar beds or otherwise secured as shown on the plans.

All new manhole risers sections shall be precast concrete. Manholes shall be reconstructed with at least one precast concrete riser ring between the structure walls and the manhole frame to accommodate future adjustment. Concrete block or bricks may be used with the approval of the Engineer.

RESET MANHOLE TO GRADE

When directed by the engineer, frames and covers for new manholes located within limits of road reconstruction shall be temporarily set at the binder course elevation and raised to the final course elevation immediately prior to paving at no additional cost.

MEASUREMENT

"Reset Manhole (Type)" will be measured for payment by the actual number of manhole frame and covers furnished, installed and accepted.

PAYMENT

"Reset Manhole (Type)" will be paid for at the contract unit price for each frame and cover furnished, installed and adjusted, complete in place, which price shall constitute full compensation for all materials, equipment, tools and labor incidental thereto.

The following items will not be paid for separately, but the cost thereof shall be included in the contract unit prices for "Reset Manhole (Type)":

1. Removal and disposal of existing frame and covers to be replaced
2. Removal and disposal of upper portions of structures to be abandoned
3. Reconstruction or replacements of existing manhole riser sections (up to 3' in depth)
4. Damp-proofing
5. Sawcutting of pavement around existing manholes as required
6. Adjusting manhole frame and covers from binder course elevation to final grade

When the work requires reconstruction of existing structure side walls and risers greater than 3' (measured vertically), then the Engineer will determine if the additional reconstruction will be paid for as extra work or if the entire structure is to be replaced and paid for under the appropriate specification.

Pay Item	Pay Unit
Reset Manhole (Storm)	Each
Reset Manhole (Sanitary Sewer)	Each

SANITARY SEWER MANHOLES

DESCRIPTION

"Sanitary Manhole" of the size and type specified shall consist of the furnishing and construction of all sanitary sewer manholes in conformity with the lines, grades, dimensions and details shown on the plans.

"Remove Sanitary Manhole" shall consist of the complete removal of existing sanitary sewer manhole and the backfilling and compacting of the remaining void with granular fill. Only manholes specifically called out on the Plans to be removed will be measured for payment under this item; existing manholes removed within the excavation limits of new pipe and manholes will not be measured for payment, but its costs are considered included in the unit price for "Sanitary Sewer Main" and "Sanitary Manhole", respectively.

"Abandon Sanitary Manhole" shall consist of the abandonment of existing sanitary sewer manholes where shown on the Plans or directed by the Engineer.

MATERIALS

Precast manhole sections shall be similar or equal to that shown on the Plans and shall conform to ASTM C-478 and C-443 (joint).

Precast concrete masonry units shall meet the requirements of ASTM C139.

Concrete shall be Class "A" and shall conform to the requirements of Section M.03 of Form 817.

Brick shall conform to ASTM Specifications C-32 for sewer brick. Brick for manhole shelves and inverts shall be dense, hard-burned brick and shall conform to grade SS. All other brick shall conform to grade MS.

Standard mortar shall consist of one (1) part cement and two (2) parts clean sand. No lime shall be added to the mortar.

Manhole frame adjustment rings shall be pressure injected molding consisting of a polypropylene/fiberglass mixture, precast concrete, concrete block or brick. Polypropylene/fiberglass adjustment rings shall be manufactured by the Turner Company of Raleigh, NC or Markham, Ontario.

Manhole frames and covers located within paved areas shall be heavy duty and shall be Model 1027C with an 8" high frame as manufactured by Campbell Foundry Company, Model 2927E as manufactured by Laperle Foundry Company or Model/Product Numbers 00133872 and 00124811 as manufactured by East Jordan Ironworks.

Manhole frames and covers located within unpaved areas shall be heavy duty and water-tight (bolted and gasketed) with ½" stainless steel bolts and shall be Model 1009 as manufactured by Campbell Foundry Company, Model 6502 as manufactured by Laperle Foundry Company or Model/Product Numbers 00124872 and 0124872W03 as manufactured by East Jordan

SANITARY SEWER MANHOLES

Ironworks.

The cover shall be cast with the words "MANCHESTER SEWER". Cast iron shall conform to ASTM A-48 Class 30B or its latest revisions. Frames and covers shall be coated with a bitumastic coating.

Flexible joints shall be used where indicated on the plans and details for all manhole to pipe connections and shall be Kor-N-Seal as manufactured by NPC, Inc., Milford, New Hampshire, "Press Wedge II" as manufactured by Press Seal Gasket Corp., Fort Wayne, Indiana or "Lock Joint Flexible Manhole Sleeve" as manufactured by Interpace Corp., Parsippany, New Jersey.

Pipe and fittings for manhole drops shall conform to the requirements of the associated detail pertinent section of these Specifications.

Coating for exterior surfaces of all manhole components shall be bituminous waterproofing material. The material shall be Minwax Fibrous Brush Coat made by Minwax Co., New York, New York; Tremco 121 Foundation Coating made by the Tremco Manufacturing Company, Cleveland, Ohio; Bitumastic Black Solution made by the Koppers Company, Inc., Pittsburgh, Pennsylvania; or approved equal product.

Sand for filling manholes to be abandoned shall conform to the requirements of Article M.08.01-21 of Form 817.

Granular Fill shall conform to the requirements of "Granular Fill" elsewhere in these Specifications.

Steel sheeting for excavation support systems, if required, shall conform to the requirements of ASTM A328, ASTM A572 or ASTM A690 as appropriate.

CONSTRUCTION DETAILS

Trench excavation shall conform to the requirements of the "Excavation" section of these Technical Specifications.

Bases shall be precast concrete. The precast riser and cone sections shall be installed truly plumb.

The Contractor's attention is directed to the requirement for neoprene gaskets or bituminous sealer for joints, which shall be installed in accordance with manufacturer's recommendations. After assembly of all sections is completed, the joints shall be pointed with mortar on both inside and outside surfaces of the manhole. All lifting holes shall be filled with mortar.

Inverts shall be constructed of precast concrete or cast-in-place concrete and shall conform accurately to the size of the adjoining pipes. Brick and mortar inverts shall be installed where directed by the Engineer.

SANITARY SEWER MANHOLES

Side inverts shall be curved and main inverts, where direction changes, shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerlines of the adjoining pipelines.

Manhole frames shall be set with the tops conforming to the finished grade of the pavement, ground surface or as directed by the Engineer.

Precast concrete, concrete blocks and/or bricks, or polypropylene/fiberglass grade adjustment rings shall be installed as directed by the Engineer, with a minimum 4 inch and a maximum 12 inch height, to adjust the manhole to the grade as shown on the drawings and to accommodate future adjustment. Frames shall be set concentric with the top of the concrete or brick riser section and in a full bed of mortar so that the space between the top of the riser and the bottom flange of the frame shall be completely filled and made watertight.

A thick ring of mortar extending to the outer edge of the riser section shall be placed all around and on the top of the bottom flange for manholes in unpaved areas. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.

The exterior surfaces of all manhole components shall be given two (2) coats of bituminous waterproofing material acceptable to the Engineer. The material shall be applied by brush or spray in accordance with the manufacturer's recommendations. Sufficient time shall be allowed between coats so that application of the second coat shall not affect the first coat. At least one (1) coat shall be applied after the manhole has been constructed in the field, paying particular attention to the joints.

Manhole drops shall be constructed as shown on the plans and in the details in conformance with the applicable sections of these specifications.

Where called for on the plans, directed by the Engineer, or necessary for the new construction, existing manholes and pipe shall be modified as required. Modified joints and inverts in sanitary manholes shall conform with the pertinent sections of these specifications.

Manholes to be abandoned shall have the frame and cover removed and properly disposed of off-site. All pipes in the manhole shall be plugged with concrete. The Contractor may substitute bricks with permission of the Engineer. The existing manhole shall be removed to a level a minimum of two (2) feet below the surface. The remaining manhole structure shall be filled with sand and compacted. The remaining void shall be backfilled with granular fill to the subgrade elevation of the surface restoration treatment. The portions of the manhole removed shall not be used for any other Work performed on this project.

Manholes to be removed shall have all components of the manhole (i.e. frames and covers, cones, risers, base, etc.) removed and properly disposed of off-site. None of these components shall be utilized for any other work performed on this Project. The void left by the removal of the manhole shall be backfilled with granular fill and compacted.

SANITARY SEWER MANHOLES

When directed by the engineer, frames and covers for new manholes located within limits of road reconstruction shall be temporarily set at the binder course elevation and raised to the final course elevation immediately prior to paving.

The Contractor shall furnish, put in place and maintain such excavation support systems (i.e. trench boxes, steel plates, steel sheeting, etc.) as may be necessary to support the sides of the excavation and to prevent any movement of earth other than that intended to be accomplished by the excavation. Trench support systems shall be designed to support earth pressures, hydrostatic pressures, equipment and construction loads, and other surcharge loads, to allow safe and expeditious construction with minimal movement or settlement of ground, to prevent damage to, or movement or settlement of, adjacent buildings, structures, or utilities. Such systems shall be installed as may be necessary for the protection of the Work and for the safety of personnel, and shall comply with the safety precautions as outlined in the Associated General Contractors of America, "Manual of Accident Prevention in Construction," the "Occupational Safety and Health Act" of 1970 (OSHA) of latest revision and OSHA Reference: U.S. Dept. Of Labor O.S.H.A. Safety and Health Standards (29 CFR 1926/1910) revised March 5, 1990, Subpart P-Excavations, Trenching & Shoring Selection of Protective Systems, 1926-652 Appendix F.

TESTING

Vacuum testing shall be performed on selected manholes at the direction of the Engineer after backfilling. If said testing indicates any problems, additional testing may be ordered by the Engineer. The Contractor shall have the option of pre-testing prior to backfilling to help facilitate repairs. However, this does not relieve the Contractor from testing after backfilling.

All lift holes shall be plugged with an approved non-shrink grout. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.

The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendations. A vacuum of ten (10) inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop nine (9) inches. The manhole will pass if the time is greater than sixty (60) seconds for 48" diameter and ninety (90) seconds for 72" diameter manholes.

If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.

MEASUREMENT

"Sanitary Manholes" will be measured as the actual number of manholes of the size, type and depth specified, complete in place and accepted. Units measured under this item shall include both the installation of new manholes and the replacement of existing manholes. Flat top manholes and doghouse manholes will also be measured under this item. The depth of sanitary manholes shall be measured as the depth from the top of the roadway to the manhole invert.

SANITARY SEWER MANHOLES

"Abandon Sanitary Manhole" will be measured as the actual number of manholes abandoned, complete in place and accepted.

"Remove Sanitary Manhole" will be measured as the actual number of manholes removed. Only manholes specifically called out on the Plans to be removed will be measured for payment under this item; existing manholes removed within the excavation limits of new pipe will not be measured for payment, but its costs are considered included in the unit price for "Sanitary Sewer Main".

Connection of existing pipe to the manhole will not be measured separately but will be considered included in the contract unit price for "Sanitary Manhole" of the size and type specified.

The handling of existing sewage flows will not be measured for payment; but will be considered included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Rock excavation will be measured for payment as described in the "Excavation" section of these Specifications.

Trench excavation, backfill, filter fabric and bedding material will not be measured for payment; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Pipe, fittings and concrete for drop inlets will not be measured for separate payment; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Pavement and lawn restoration will be measured as described in the pertinent section of these Technical Specifications.

Testing of manholes will not be measured for payment; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Excavation support systems will not be measured for payment; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified or "Remove Sanitary Manhole".

The backfilling of abandoned manholes with sand and granular fill will not be measured separately for payment; the cost shall be considered as included in the contract unit price for "Abandon Sanitary Manhole".

PAYMENT

Sanitary sewer manholes will be paid for at the contract unit price each for "Sanitary Manhole" of the size, type and depth specified, complete in place which price shall include excavation, backfill, flexible joints, frame and cover, testing and handling of sewage flows, including all

materials, equipment, tools, labor, and incidentals necessary to complete the Work.

Abandoned sanitary sewer manholes will be paid for at the contract unit price each for "Abandon Sanitary Manhole", complete in place which price shall include excavation, backfill, removal and disposal of frame, cover and top of structure, and handling of sewage flows, including all materials, equipment, tools, labor, and incidentals necessary to complete the Work.

Removed sanitary sewer manholes will be paid for at the contract unit price each for "Remove Sanitary Manhole", complete in place which price shall include excavation, backfill, removal and disposal of all components of existing manhole, and handling of sewage flows, including all materials, equipment, tools, labor, and incidentals necessary to complete the Work. Only manholes specifically called out on the Plans to be removed will be paid for under this item; existing manholes removed within the excavation limits of new pipe will not be paid for separately, but its costs are considered included in the unit price for "Sanitary Sewer Main".

Connection of existing pipe to the manhole will not be paid for but will be considered included in the contract unit price for "Sanitary Manhole" of the size and type specified.

The handling of existing sewage flows will not be paid for; but will be considered included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Rock excavation will be paid for as described in the "Excavation" section of these Specifications.

Trench excavation, backfill, filter fabric and bedding material will not be paid for separately; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Pipe, fittings and concrete for drop inlets will not be paid for separately; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Pavement and lawn restoration will be paid for as described in the pertinent section of these Technical Specifications.

Testing of manholes will not be paid for separately; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified.

Excavation support systems will not be paid for separately; the cost shall be considered as included in the contract unit price for "Sanitary Manhole" of the size and type specified or "Remove Sanitary Manhole".

Pay Item	Pay Unit
48" Sanitary Manhole (0'-10' Deep)	Each

WATER MAIN

DESCRIPTION

"Water Main" of the size and type specified shall consist of the furnishing and installation water pipe; and disinfection, flushing and testing of all ductile iron water pipe, fittings, valves, joint restraint and other appurtenances as indicated on the Plans or directed by the Engineer. Placement and compaction of backfill, filter fabric, bedding material, trench support systems, abandonment of existing water mains, valves, blow-offs, and salvage of indicated items shall also be included as part of this item. Existing water mains located within the excavation limits of new main will not be measured separately for payment, but shall be considered as included in the unit price bid for the new water main.

Fittings, valves and joint restraints of the size and type specified shall consist of furnishing and installing these appurtenances where shown on the plans or as directed by the Engineer.

"Cut and Cap Water Main" shall include excavation; cutting and capping of existing pipe to remain in service; and backfilling where shown on the plans or as directed by the Engineer.

Refer to the General Conditions elsewhere in these specifications for licensing requirements for any person involved in the installation of a water main and/or appurtenances.

MATERIALS

Unless otherwise specified by the Engineer, the pipe, fittings, valves and appurtenances to be utilized in this work shall be new and unused, shall be of the types and materials specified herein and shall meet the requirements specified herein. All material found during the progress of the work to have cracks, flaws or other defects will be rejected by the Engineer. All defective materials shall be promptly removed from the work site and replaced at no additional expense to the Town.

Ductile Iron Pipe: Ductile iron pipe shall meet the requirements of the latest revision of AWWA C151 (ANSI A21.51). Joints shall be "Tyton Joint" or "Fastite Joint" design, rubber gasket push-on type manufactured in accordance with the latest revision of AWWA C111 (ANSI A21.11). Pipe shall be supplied with the standard exterior bituminous coating of either coal tar or asphalt base approximately one mil thick. The interior shall be double cement lined in accordance with the latest revision of AWWA C104 (ANSI A21.4), and pipe shall be of thickness Class 52 unless otherwise indicated. Pipe shall be manufactured by Griffin, U.S. Pipe, McWane Ductile, American or approved equal.

Joint Restraint: Restrained bell and spigot push on joints for ductile iron pipe shall meet the requirements of the latest revision of AWWA C151 (ANSI A21.51). Each restrained bell and spigot joint shall be achieved using a single rubber FIELD LOK 350 gasket, a Series 1700 Megalug push on pipe bell restraint harness as manufactured by Ebaa Iron, Inc., Eastland, Texas, a Fast-Grip Gasket, or approved equal, manufactured in accordance with the latest revision of AWWA C111 (ANSI A21.11). The bell and spigot push

on joint restraint provided shall be sufficient to restrain working pressures of 350 psi.

Mechanical joint thrust restraining glands, for valves and fittings, shall be the Megalug Series 1100, manufactured by Ebaa Iron, Eastland, Texas, Ford series 1400, or approved equal.

Tiebolts, tiebolt nuts, rod couplings, threaded rods and rod nuts, retainer clamps, and round flat washers may be used for restrained joints and shall be steel meeting the requirements of ASTM A 36-77a. These components shall be similar or equal to the following figure numbers manufactured by Star National Products.

ITEM	STAR FIGURE
Tiebolt	7, 7-5, or SST 7
Tiebolt and Rod Nut	8
Rod Coupling	10
Retainer Clamp	11
Threaded Rod	12
Round Flat Washer	17

Gate Valves: All gate valves shall be resilient wedge gate valves and shall meet the requirements of AWWA C509 of latest revision. Valves shall have non-rising stems, mechanical joint ends meeting the requirements of AWWA C111 of latest revision and have O-ring stem seals. Each valve shall be supplied with two (2) sets of mechanical joint retainer glands. Valves shall be wrench-operated and rated at a minimum working pressure of 200 psi. **Valves shall be right opening (clockwise) or left opening (counterclockwise) as indicated on the plans or as directed by the Engineer, which is dependent on where they are located in Town.**

Wedge shall be encapsulated in molded rubber. Valve shall be coated with a fusion bonded epoxy-resin both inside and outside. Coating shall be a minimum of 10 mils thick and be in full compliance with (i.e. meet or exceed) all requirements of the latest revision of AWWA C550.

Resilient wedge gate valves shall be only those models and manufacturers listed below.

Manufacturer	Model
American Flow Control	Series 2500
AVK	Series 25
Clow	F-6100
M & H	Style 4067
Mueller	A-2362 (Ductile Iron Body)
U.S. Pipe	A-USPO-23

WATER MAIN

Butterfly Valves: Valves shall be wrench operated, non-rising stem with O-ring stem seals and have mechanical joints on both ends. Each valve shall be supplied with two (2) sets of mechanical joint retainer glands. Valves shall meet or exceed the requirements of the latest revision of AWWA C504. Valves shall have epoxy coated cast iron bodies with mechanical joint ends complying with the latest revisions of ANSI A21.11 (AWWA C111). Valves shall be a minimum Class 150B and suitable for a maximum nonshock shutoff pressure of 140 psi. The valves shall provide bubble-tight shutoff at 150 psi when tested in accordance with AWWA C504. Valve discs shall seat at an angle of 90 degrees to the axis of the pipe.

Valve seats shall be molded natural rubber. Rubber seats may be attached to the body or the disc. If the rubber seat is attached to the disc, the seat ring on the body shall be of stainless steel. The valve disc shall be of either case Ni-Resist of cast iron Class 40 conforming to ASTM A48. Rubber seats mounted on the disc shall be securely clamped to the disc. All clamps, retaining rings, and their fasteners shall be Series 300 stainless steel.

The valve shaft shall be Type 300 stainless steel or carbon steel with stainless steel joints. The valve disc and shaft connection shall be by means of mechanically secured taper pins extending through the disc and shaft. Taper pins, lockwashers and nuts shall be 18-8 stainless steel. The shaft seals shall be designed for the use of standard "O" -ring seals.

The manual operating mechanism shall be firmly fixed to the valve body and shall be rated at 450 lb. The operator shall be permanently lubricated, shall be totally enclosed with a cast iron case. The operator shall be suitable for submersion. The operator shall have adjustable threaded collars at each end of stroke. **Valves shall be right opening (clockwise) or left opening (counterclockwise) as indicated on the plans or as directed by the Engineer, which is dependent on where they are located in Town.**

Valves shall be only those models and manufacturers listed below.

Manufacturer	Model
Mueller	Lineseal III
M & H	Style 450

Tapping Sleeve and Valve TYPE I (CIP): Tapping sleeves shall consist of a full body two-piece ductile iron or cast iron sleeve/tee with mechanical joint ends on the run and a flanged end on the branch. Each sleeve shall be supplied with two (2) sets of mechanical joint retainer glands. Tapping valves shall be resilient wedge gate valves

meeting the requirements described below. The tapping valve shall have one flanged end and one mechanical joint end.

Valves shall be wrench operated, non-rising stem with O-ring stem seals. Each valve shall be supplied with one (1) set of type I-Mechanical Joint Retainer Glands. **Valves shall be right opening (clockwise) or left opening (counterclockwise) as indicated on the plans or as directed by the Engineer, which is dependent on where they are located in Town.**

Wedge shall be encapsulated in molded rubber.

Valve shall be coated with a fusion bonded epoxy-resin both inside and outside. Coating shall be a minimum of 10 mils thick and be in full compliance with (i.e. meet or exceed) all requirements of the latest revision of AWWA C550.

Valves and joints shall be in full compliance with (i.e. meet or exceed) all requirements of the latest revision of AWWA C509 and AWWA C111 respectively.

Valves shall be only those models and manufacturers listed below.

Manufacturer	Model
American Flow Control	Series 2500
AVK	Series 25
Clow	F-6114
M & H	Style 4067
Mueller	A-2362 (Ductile Iron Body)
U.S. Pipe	A-USPO-23

Tapping sleeves shall be manufactured by U.S. Pipe, Mueller, American Flow Control or approved equal.

Tapping Sleeve and Valve TYPE II (DIP): Tapping sleeve shall consist of a stainless steel body with either a stainless steel or carbon steel integral mechanical joint outlet flange. Gasket shall be full circumference. Tapping valves shall be resilient wedge gate valves meeting the requirements described below. The tapping valve shall have mechanical joint ends.

Valves shall be wrench operated, non-rising stem with O-ring stem steals. Each valve shall be supplied with two (2) sets of mechanical joint retainer glands. **Valves shall be right opening (clockwise) or left opening (counterclockwise) as indicated on the plans or as directed by the Engineer, which is dependent on where they are located in Town.**

Wedge shall be encapsulated in molded rubber.

Valve shall be coated with a fusion bonded epoxy-resin both inside and outside. Coating shall be a minimum of 10 mils thick and be in full compliance with (i.e. meet or exceed) all requirements of the latest revision of AWWA C550.

Valves and joints shall be in full compliance with (i.e. meet or exceed) all requirements of the latest revision of AWWA C509 and AWWA C111 respectively.

Valves shall be only those models and manufacturers listed below.

Manufacturer	Model
American Flow Control	Series 2500
AVK	Series 25
Clow	F-6114
M & H	Style 4067
Mueller	A-2362 (Ductile Iron Body)
U.S. Pipe	A-USPO-23

Tapping sleeves shall be only those models and manufacturers listed below.

Manufacturer	Model
Ford	FAST-MJ
JCM	439 or 469
Smith-Blair	662-MJ or 663-MJ

Blow offs: Blow offs shall be 2” in diameter with a 30” pipe length, as manufactured by Wedge Manufacturing, Ansonia, CT., or approved equal.

Valve Boxes: Valve boxes shall be 5-1/4”, consisting of a base and adjustable slide type top section with top flange and cover that is adjustable from 4' to 5'. Valve boxes shall be made of centrifugally spun iron with ¼” uniform wall thickness. Box cover shall have the word "WATER" cast on top. Valve boxes shall be coated with heavy bituminous coating and be manufactured in the United States or Canada by Water Quality Products, Bibby Ste. Croix, Charlotte, Tyler, Bingham and Taylor, or approved equal.

Fittings: Fittings, including mechanical joint plugs and caps, shall be ductile iron meeting the requirements of AWWA C110 (ANSI A21.10) with mechanical joints in conformance with AWWA C111 (ANSI A21.11). Fittings shall have a minimum pressure rating of 350 psi and shall have an inside lining of cement-mortar in accordance with AWWA C104 (ANSI

A21.4). Compact fittings meeting the requirements of AWWA C153 (ANSI A21.53) of latest revision may be used. Fittings shall have an asphalt coating both inside and outside, and be manufactured in the United States or Canada by Griffin, Tyler, U.S. Pipe, Sigma, Clow, Union or approved equal.

Sleeves: Sleeves for connecting new mains to existing mains shall be mechanical joint solid sleeves with the mechanical joint ends restrained by the means of retainer glands. Solid sleeves shall meet the requirements of the latest revision of AWWA C110 (ANSI A21.10) and shall be Model F-1014 as manufactured by the Clow Corporation, Oak Brook, Illinois, or approved equal.

Connecting sleeves for connecting new water mains to existing metal lined cement mains (stovepipe) shall be Model 227 as manufactured by Rockwell, Pittsburgh, PA or approved equal.

Couplings: Couplings for connecting new main to oversized cast iron pipe shall be Rockwell Model 441 Cast Transition Couplings, or approved equal. These couplings shall be used only when oversized cast iron pipe is encountered which does not allow the use of solid sleeves.

Concrete: Concrete for thrust blocks, pipe cradles, sealing abandoned pipe, etc., shall conform to the requirements of the pertinent section of these Specifications.

Polyethylene Wrap: Polyethylene wrap for fittings with poured concrete thrust blocks shall meet the requirements for the latest revision of AWWA C105.

Pipe Insulation: Insulation boards for water main pipe shall be closed cell, extruded polystyrene foam meeting ASTM C578, manufactured by Thermal Foams Inc., Buffalo, NY., or 2" thick Cellular Glass Insulation meeting the requirements of the latest revision of ASTM C552 with an aluminum jacket. Insulation shall be Foamglas Cellular Glass manufactured by Pittsburgh Corning, Pittsburgh, PA., or approved equal.

Bedding Material: Bedding material shall be as indicated on the Plans and shall meet the requirements of Article M.08.01-21 for sand, Article M.02.01-1 for crushed stone, and Article M.02.01-2 (Grading "C") of Form 817 for bank run gravel.

Backfill: Backfill material above bedding material shall be suitable material from the excavation which is free from large or frozen lumps of soil, wood or other extraneous material or, if directed by the Engineer, shall be approved

backfill material meeting the requirements of Article M.02.06 (Grading "B") of Form 817.

Filter Fabric: Filter fabric shall be a non-woven fabric similar or equal to Mirafi 140 as manufactured by Celanese Fibers Marketing Company, Bidim C22 as manufactured by Monsanto Textiles Company or approved equal.

Warning Tape: Underground pipe warning (marking) tape shall be plastic and metallic-coated to permit detection by a magnetic sensing device. The tape shall be blue in color, not less than 3 inches in width, and shall have the words "CAUTION - BURIED WATER MAIN BELOW" repeated along the full length of the tape in letters not less than 1" high permanently fused into the tape. Pipe marking tape shall be "Terra-Tape" detectable pipe marking tape as manufactured by Reef Industries, Inc., Houston, Texas or approved equal.

Steel Sheeting: Steel sheeting for trench stabilization, if required, shall conform to the requirements of ASTM A328, ASTM A572 or ASTM A690 as appropriate.

Pavement Markings: Pavement markings installed to replace disturbed markings shall be painted, match the size and color of existing markings, and meet the requirements of "Painted Pavement Markings" as defined in the pertinent sections of these Specifications.

CONSTRUCTION DETAILS

General

Trench excavation and surface restoration shall conform to the requirements of the pertinent section of these Specifications. Water mains shall only be installed in trench conditions; embankment conditions will not be permitted.

Ductile iron pipe, fittings and valves shall be installed as detailed and directed, and in full accordance with the latest revision of AWWA C600, manufacturer's recommendations, and accepted best practice, with the below listed qualifications and clarifications. The methods employed in performing the work, and all equipment, tools and machinery used in handling material and executing any part of the work shall be subject to the approval of the Engineer before the work is started and, whenever found unsatisfactory, shall be changed and improved as required by the Engineer. All equipment, tools and machinery used shall be maintained in a satisfactory working condition.

It shall be the responsibility of the Contractor to coordinate his work schedule, where required, with that of the Manchester Water Department through the Engineer. The Contractor shall provide a minimum seventy-two (72) hour notice for all water main shutdowns required to complete the proposed work.

WATER MAIN

At all installations where connection is to be made by gating off sections of main which are normally open, the excavation may be required to be made the day before work is to start on the installation with all material on hand. The work shall be done as quickly as possible so that normal operation of the system will be interrupted a minimum amount of time. Any required operating of valves for this work will be performed by personnel of the Manchester Water Department, and ample notice shall be given to the Engineer so that a minimum of two (2) full working days notice may be given to any user whose service will be discontinued for any reason. **BECAUSE OF THE NATURE AND SCHEDULES OF CERTAIN CUSTOMERS, IT MAY BE NECESSARY FOR WORK TO BE DONE OUTSIDE OF NORMAL WORKING HOURS IF SERVICE INTERRUPTION IS REQUIRED.** The Contractor shall be responsible for coordinating his work with said customers and the Manchester Water Department with the approval of the Engineer. If the work extends beyond normal working hours of the Water and Sewer Department, the Contractor shall be responsible for paying Department employees at their prevailing overtime wage rate, as well as prevailing usage rate for vehicles and other equipment which are utilized.

Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings and valves shall be lowered into the trench with a suitable device that will not damage protective coatings and lining. Under no circumstances shall water main material be dropped or dumped into the trench. Any damaged lining, coating or wrapping shall be satisfactorily repaired or replaced.

Every precaution shall be taken to prevent foreign matter from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size be placed over each end and left there until the connection is to be made to the adjacent pipe. If necessary, the line shall be swabbed or flushed out to remove all foreign matter prior to testing.

Before joining lengths of push-on pipe, the inside of the bell and the outside of the spigot shall be thoroughly cleaned to remove oil, grit, excess coating and other foreign matter.

Pipe shall be laid with bell ends being in the direction of laying unless otherwise directed by the Engineer. When pipe is laid on a grade of 10 percent or greater, laying shall start at the bottom and shall proceed upward with the bell ends of the pipe upgrade.

The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe.

The deflection at pipe joints to accommodate changes in horizontal or vertical alignment shall be in accordance with the recommendations of the manufacturer. Where bends are called for on the plans, a standard bend may be used with any additional deflection required accomplished by deflecting joints on adjacent pipes.

WATER MAIN

Bends shall be used only at the locations shown on the plans or at other locations approved by the Engineer.

Underground valves shall rest on concrete masonry units. Valve boxes shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve. The valve box cover shall be flush with the surface of the finished pavement or such other level as may be directed.

Valves set with a depth to operating nut greater than 6 feet shall be equipped with extension stems providing an operating nut depth of 4.5 feet. Extension stems shall be installed such as to preclude accidental disconnection from the valve, shall stand plumb and shall be supported at the upper end with a centering device attached to the stem or valve box.

Water main installed with less than 4.5 feet of cover must be insulated unless approved otherwise by the Engineer. Insulated water main must have 2.5 feet of minimum cover.

Water main shall be installed with a minimum 2 feet of clearance from existing structures unless indicated otherwise on the plans or directed by the Engineer.

Care shall be taken not to excavate below the depths required to perform the Work. The Contractor shall furnish and employ such trench boxes, steel plates, shores, braces, sheeting, pumps, etc., as may be necessary for the protection of property, proper completion of the Work and the safety of the public and employees of the Contractor and the Town. All bracing, sheeting, etc., shall be removed when no longer required for the construction or safety of the Work.

All excavated materials not required or unsuitable for backfill, (i.e., clay, silt, sand, muck, gravel, hardpan, loose shale, loose stone in masses and boulders greater than 5" in diameter) shall be removed and properly disposed of by the Contractor. Unsuitable soils that exhibit obvious evidence of heavy contamination or have been identified as containing elevated concentrations of contamination should be removed and stockpiled for characterization and possible off-site disposal. If contaminated soils are stockpiled best management practices must be employed to reduce human and environmental exposure to the stockpiled materials. Granular fill shall be used to replace all unsuitable material.

The trench shall be excavated to the depth required and so as to provide a uniform and continuous bearing and support for the pipe on solid and undisturbed ground except that bell depressions shall be provided at each joint to permit the joint to be made properly. Further, it will not be permissible to disturb and otherwise damage the finished surface over a maximum length of eighteen (18) inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle. Any part of the bottom of the trench excavated below the specified grade shall be corrected with approved material and thoroughly compacted as directed by the Engineer. The finished trench bottom shall be prepared accurately by means of hand tools.

WATER MAIN

The Contractor shall furnish, put in place and maintain such trench support systems (i.e. trench boxes, steel plates, steel sheeting, etc.) as may be necessary to support the sides of the excavation and to prevent any movement of earth other than that intended to be accomplished by the excavation. Trench support systems shall be designed to support earth pressures, hydrostatic pressures, equipment and construction loads, and other surcharge loads, to allow safe and expeditious construction with minimal movement or settlement of ground, to prevent damage to, or movement or settlement of, adjacent buildings, structures, or utilities. Such systems shall be installed as may be necessary for the protection of the Work and for the safety of personnel, and shall comply with the safety precautions as outlined in the Associated General Contractors of America, "Manual of Accident Prevention in Construction," the "Occupational Safety and Health Act" of 1970 (OSHA) of latest revision and OSHA Reference: U.S. Dept. Of Labor O.S.H.A. Safety and Health Standards (29 CFR 1926/1910) revised March 5, 1990, Subpart P-Excavations, Trenching & Shoring Selection of Protective Systems, 1926-652 Appendix F.

To insure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices with which to intercept and/or remove promptly and dispose properly of all water entering excavations. Excavations shall be kept dry until the structures, pipes and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged. All water pumped or drained from the Work shall be disposed of in a suitable manner without undue interference with other work or damage to pavements, other surfaces or property. Prior to discharge, the Contractor shall be responsible for removing all particulate matter which may be deposited in a stream or storm drainage system. The Contractor shall submit his proposed methods or procedures to the Engineer for approval. The Contractor shall be responsible for complying with all Federal, State and Town regulations which may be associated with said discharges.

Bedding material installed in all trenches shall be backfilled by hand from the bottom of the trench to the centerline of the pipe in layers of three (3) inches, compacted by tamping to at least ninety-five percent (95%) of maximum dry density at optimum moisture content as determined in accordance with the requirements of Method D of ASTM Test Method D-1557 (latest revision). Bedding material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously. Care shall be taken that the fill is made compact and tight under the rounded lower half of the pipe. Iron tools suitable for tamping material under and on sides of pipe shall be used, and sufficient space for this tamping shall be provided. In general, wooden sticks, shovel handles and similar make-shift devices will not be considered as suitable tamping tools for use on sides of pipe.

From the centerline of the pipe, fittings and appurtenances to a depth of one (1) foot above the top of the pipe, the trench shall be backfilled by hand or by approved mechanical methods. Compaction shall not be less than ninety five percent (95%) of maximum dry density as determined by ASTM Test Method D-1557 (latest revision). The Contractor shall use special care in placing this portion of the backfill so as to avoid damaging or moving the pipe. This layer of backfill shall be consolidated by means of hand held vibratory compactors.

From one (1) foot above the pipe, the remainder of the backfill shall be placed and compacted in one (1) foot lifts. Each layer shall be compacted to not less than ninety five percent (95%) of maximum dry density as determined by ASTM Test Method D-1557 (latest revision).

Compaction methods shall be submitted in writing to and approved by the Engineer prior to commencement of any work.

There is no guarantee that all excavation can be done by use of machinery. In some cases, the pipe location may preclude the use of machinery. In this event, the Contractor will be required to perform this Work at the same unit price bid in his proposal.

Thrust Restraint

Poured concrete thrust blocks shall be provided at all horizontal bends, mechanical joint caps and tees and all locations indicated on the plans. Joints at fittings where thrust blocks are poured shall be wrapped with polyethylene. All mechanical joints (i.e., valves and fittings) shall be restrained by means of ductile iron retainer glands except where rod type restraint is specifically called for on the plans or ordered by the Engineer. Push-on joint restrainers shall be used on all push-on pipe joints for a distance of 27 feet on each side of all retainer glands. No more than one pipe joint shall be allowed within that 27 feet of pipe. Concrete shall be mixed and placed in accordance with the pertinent section of these Specifications.

Restraint of push-on joints shall be accomplished by means of using FIELD LOK 350 gaskets or approved equal push-on joint restrainers. The push-on pipe joint restrainers shall be installed in accordance with the manufacturer's recommendations.

Mechanical joint restrainer glands shall be installed by first tightening the tee head bolts and then making the set screws finger-tight against the pipe. All set screws shall be torqued to manufacturer's recommendations, proceeding alternately on opposite sides of the pipe.

At mechanical joints to be restrained by rods, the proper number of tee head bolts for the particular pipe size shall be removed and replaced with tiebolts. Tiebolts with washers shall be used on bell flange slots. The mechanical joint gland shall be restrained by nuts on the threaded portion of the tiebolts. Joint restraint shall be accomplished by placing threaded rods through corresponding tiebolts at glands on each end of the length to be restrained and by running nuts on the rods until tension is obtained. Four-inch, six-inch and eight-inch joints shall be restrained by two rods; 10-inch, 12-inch and 16-inch joints shall be restrained by four rods.

The Contractor shall be responsible for providing any temporary thrust restraint which may be required.

Connections to Existing Mains

Where connections are to be made between new water mains and existing water mains, any unspecified materials required shall be utilized only after inspection and approval by the Engineer. All connections between new mains and existing mains shall be made only at such times as, and in a manner, approved by the Engineer. The approximate locations of connections

between new mains and existing mains are shown on the drawings; the exact locations will be determined in the field by the Engineer.

The cutting of an existing water main where connection is to be made to a new water main shall be done in a neat manner so as to leave a smooth end at right angles to the axis of the pipe. The open end of the section of existing water main to be abandoned shall be sealed with concrete before backfilling a minimum of 5' from the new facilities.

Abandonment of Existing Facilities

Abandonment of water facilities shall be as described on the plans. All open ends of abandoned pipelines or conduits which are created or exposed by the Contractor and will not be removed from the roadway, shall be sealed with concrete before backfilling. Valves to be abandoned shall be closed (unless otherwise indicated on the Plans) and the valve box tops shall be removed and properly disposed of. Where the plans call for salvaging existing water main and appurtenances, materials shall be delivered to the Water Department at the former Line Street Water Treatment Plant.

Leakage Testing

Leakage testing shall be performed on all cleaned and lined water mains as well as new installations where it is not possible to perform a pressure test. Leakage testing shall consist of a visual inspection of all new facilities and connections under system pressure. The Contractor shall furnish any temporary thrust restraint required for testing and any other apparatus and personnel necessary to conduct the test at no cost to the Town. All visual leaks shall be repaired by the Contractor at his own expense regardless of the amount of leakage. Any defective pipe, fitting, valve or hydrant discovered as a consequence of this test shall become the property of the Contractor and shall be removed from the job site and replaced at the Contractor's expense with sound material. When hydrants are in the test section, the test shall be made against the closed hydrant valve with the auxiliary gate valve open.

Any section failing the test shall be retested after the repairs have been made. The test shall be repeated until satisfactory to the Engineer. The main shall be disinfected again if so directed by the Engineer.

Any required coordination between the Contractor and the Manchester Water Department shall be coordinated through the Engineer and shall be the responsibility of the Contractor.

Disinfection

Disinfection shall be carried out in accordance with Method 2 under Methods of Disinfecting Pipe in the Connecticut State Department of Health's Bulletin, "Protection and Disinfection of Water Works Pipes and Structures", as required by Section 19-13-B47 of the Connecticut State Sanitary Code.

Coordination with the Manchester Water Department through the Engineer will be necessary and shall be the responsibility of the Contractor.

Water mains less than 24-inches in diameter and up to 2,500 feet in length may be disinfected using the Tablet Method instead of the Continuous Feed Method. Disinfection using the Tablet Method shall be performed in accordance with the most current version of AWWA Standard C651. Chemicals used in the Tablet Method shall meet the requirements of AWWA B300 of latest revision and shall be certified to ANSI/NSF Standard 60. The Tablet Method shall not be used if trench water or foreign material has entered the main.

When disinfecting using the Continuous Feed Method, mains shall be completely flushed after the leakage test until all evidence of sediment is removed. A sodium hypochlorite solution or a mixture of calcium hypochlorite and water shall be applied, with a proper regulating device at the beginning of the pipe section to be disinfected, through a corporation stop in the newly lined pipe. Hypochlorites utilized in this work shall meet the requirements of AWWA B300 of latest revision.

Water from the existing distribution system entering the newly lined pipe shall be controlled to flow slowly during the application of hypochlorite. The rate of sodium hypochlorite application shall be in such proportion to the rate of water flowing through the pipe that the treated water entering the newly lined pipe will have a concentration of chlorine residual of 50 parts per million. There shall be a retention period of at least twenty-four (24) hours and preferably more. The non-spore forming organisms shall be destroyed, and the chlorine residual after the retention period at the extremity of the pipe shall be at least ten parts per million. When disinfecting newly lined and/or installed water pipe involving more than one valved section, all valves shall be operated while the pipeline is filled with the disinfecting agent. Hydrants and other appurtenances shall also be operated for disinfection.

Final Flushing and Testing

After disinfecting for the minimum retention period, the pipe section shall be flushed until, upon test, the quality of the water, both chemically and bacteriologically, is equal to the quality of the water served to the public from the existing water supply. The procedure shall be repeated if necessary until the water from the pipe section is satisfactory.

Care must be exercised when disposing of water with high free chlorine residuals and shall be performed in a manner that will not adversely impact the environment. Disposal of highly chlorinated water to storm sewers shall be avoided without neutralization of the chlorine residual. Neutralization of the chlorine residual remaining in the water can be accomplished by application of a neutralization chemical. Chlorine neutralization methods and equipment shall be submitted to the Engineer for approval. Discharge of highly chlorinated water directly to the sanitary sewer maybe permitted in cases where surface discharge will pose a safety risk to the general public.

Tests to determine the chlorine residual and the quality of the water in the new pipeline will be performed by the Manchester Water Department. It shall be the responsibility of the Contractor to coordinate with the Water Department to arrange for the testing at the proper time. No less than twenty-four (24) hour notice shall be given when tests are to be performed.

Where connections are to be made between new water mains and existing water mains after disinfection and flushing are completed, new materials shall be swabbed with a suitable hypochlorite solution.

Pressure Testing

Newly installed water mains shall be pressure tested as directed by the Engineer. Pressure testing and leakage testing shall be carried out in accordance with the appropriate paragraphs of Section 4 of the latest revision of ANSI/AWWA C600 with the following clarifications and qualifications.

All testing shall be performed after backfilling the completed pipeline. Before testing, the Contractor shall submit in writing to the Engineer, his proposed method of testing the completed pipeline. Testing shall begin only after approval by the Engineer of the proposed methods. Any required coordination with the Water Department shall be conducted through the Engineer and shall be the responsibility of the Contractor.

All new sections of water main shall be hydrostatically tested at a pressure of 150 pounds per square inch for a period of at least two hours. "Pressurization" and "air removal" shall be accomplished as specified in Sections 4.1.2 and 4.1.3 of the latest revision of ANSI/AWWA C600. After the test pressure is applied, any defective pipe, fitting, valve or hydrant discovered as a consequence of this pressure test shall become the property of the Contractor and shall be removed from the job site and replaced at the Contractor's expense with sound material. The test shall be repeated until satisfactory to the Engineer.

A leakage test shall be conducted concurrently with the pressure test. The Contractor shall furnish all material, equipment, tools, labor and incidentals necessary to conduct the test.

Leakage will be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{133{,}200}$$

L= Allowable leakage in gallons per hour
S= Length of the pipe tested, in feet
D= The nominal diameter of the pipe in inches
P= The average test pressure during the leakage test in pounds per square inch, gage (use 150 pounds per square inch)

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallons per hour per inch of nominal valve size will be allowed.

When hydrants are in the test section, the test shall be made against the closed hydrant valve (with the auxiliary gate valve open).

If any test of pipe laid discloses leakage greater than that specified above, the Contractor shall, at his own expense, locate and repair the defective materials until the leakage is within the specified allowance. All visible leaks shall be repaired regardless of the amount of leakage.

Any temporary thrust restraint required for testing sections of completed water main installation and later removed as directed by the Engineer shall be provided by the Contractor at no additional cost to the Town.

MEASUREMENT

"Water Main" of the size and type specified will be measured by the linear foot of pipe installed complete in place and accepted. Measurement will be along the centerline of pipe and fittings. Water main used to replace hydrant tees will not be measured for separate payment.

Ductile iron bends, tees, offsets, plugs and other such fittings of the size and type specified will be measured by the unit of the particular type and size complete and accepted.

Gate valves of the size and type specified will be measured by the unit of the particular size complete in place and accepted, including connecting sleeves, valve box and extension stem, if required.

Butterfly valves of the size and type specified will be measured by the unit of the particular size complete in place and accepted, including connecting sleeves, valve box and extension stem, if required.

Tapping sleeves and valves of the size and type specified will be measured by the unit of the particular size complete in place and accepted, as described in the pertinent section of these Specifications.

Cutting and capping of existing water mains that are to remain in service shall be measured by the unit and shall be the actual number of water mains excavated, cut, capped, backfilled and accepted.

Concrete thrust blocks will be measured by the actual cubic yards of concrete placed in accordance with the plans and these Specifications. Thrust blocks to be measured for payment include only those placed at bends, tees and capped/plugged ends of live mains. Thrust blocks for temporary joint restraint, fire hydrants and abandonment of existing mains will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Permanent and temporary pavement repair will be measured for payment as described in the pertinent section of these Specifications.

WATER MAIN

Retainer glands, push-on joint restrainers and rod-type joint restraint will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified..

Sleeves for connecting new water main to existing water main will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Disinfection, flushing and testing of water mains and appurtenances and providing temporary thrust restraint associated with testing will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Abandonment of valves will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Abandonment of blow-offs will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Removal from the job site, salvage and disposal of existing materials, as indicated on the plans or as directed by the Engineer, will not be measured for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Open ends of abandoned pipelines or conduits that will not be removed from the roadway, shall be sealed with concrete before backfilling and will not be measured for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Cutting and capping of existing water mains to remain in service will be paid for at the contract unit price each for "Cut and Cap Water Main", which price shall include excavation, cutting existing pipe, cap, backfill, including all materials, equipment, tools, labor, and incidentals necessary to complete the Work.

Trench excavation, backfill, filter fabric, bedding material and trench support systems will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Granular fill for replacement of unsuitable material within the trench excavation will be measured for payment as described in the pertinent section of these Specifications.

Rock in trench excavation will be measured as described in the "Excavation" section of these Technical Specifications.

WATER MAIN

Removal of existing mains, valves and valve boxes, and salvage and disposal of existing materials as indicated on the plans, within the limits of trench excavation or where directed by the Engineer will not be measured for payment; the cost shall be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Pavement markings installed to replace disturbed markings will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

PAYMENT

Furnishing and installation of water main will be paid for at the contract unit price per linear foot for "Water Main" of the size and type specified complete in place and accepted, which price shall include trench excavation, backfill, filter fabric, bedding material, pipe, retainer glands, push-on joint restrainers, rod restraint, solid sleeves, temporary restraint, disinfection, flushing and testing, and all materials, equipment, tools, labor and work incidental thereto.

Ductile iron bends, tees, offsets, and other such fittings will be paid for at the contract unit price each for the type and size of fitting complete in place, shall include trench excavation, backfill, filter fabric, bedding material, pipe, retainer glands, push-on joint restrainers, rod restraint, solid sleeves, temporary restraint, testing and disinfection, and all materials, equipment, tools, labor and work incidental thereto.

Gate valves, including connecting sleeves, extension stems and valve boxes, will be paid for at the contract unit price each for "Gate Valve" of the particular size complete in place, shall include trench excavation, backfill, filter fabric, bedding material, pipe, retainer glands, push-on joint restrainers, rod restraint, solid sleeves, temporary restraint, disinfection, flushing and testing, and all materials, equipment, tools, labor and work incidental thereto.

Butterfly valves, including connecting sleeves, extension stems and valve boxes, will be paid for at the contract unit price each for "Butterfly Valve" of the particular size complete in place, shall include trench excavation, backfill, filter fabric, bedding material, pipe, retainer glands, push-on joint restrainers, rod restraint, solid sleeves, temporary restraint, disinfection, flushing and testing, and all materials, equipment, tools, labor and work incidental thereto.

Tapping sleeves and valves will be paid for at the contract unit price each for "Tapping Sleeve and Valve " of the particular size complete in place, and shall include trench excavation, backfill, filter fabric, bedding material, temporary restraint, disinfection, flushing and testing, and all materials, equipment, tools, labor and work incidental thereto.

Cutting and capping of existing water mains to remain in service will be paid for at the contract unit price each for "Cut and Cap Water Main", which price shall include excavation, cutting existing pipe, cap, backfill, including all materials, equipment, tools, labor, and incidentals necessary to complete the Work.

Blow offs, including connecting sleeves, valve boxes, and MJ caps will be paid for at the

contract unit price each for "Blow Off Assembly" of the particular size complete in place, which price shall include trench excavation, backfill, bedding material, pipe, retainer glands, rod restraint, solid sleeves, and all materials, equipment, tools, labor and work incidental thereto.

Granular fill for replacement of unsuitable material within the trench excavation will be paid for as described in the pertinent section of these Specifications.

Concrete for thrust blocks will be paid for as described in the pertinent section of these Specifications.

Permanent and temporary pavement repair will be paid for as described in the pertinent section of these Specifications.

Retainer glands, push-on joint restrainers and rod type joint restraint will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Connecting sleeves will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Abandonment of valves will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Disinfection, flushing and testing of water mains and providing thrust restraint associated with testing will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Removal from the job site, salvage and disposal of existing materials will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Trench excavation, backfill, filter fabric, bedding material and trench support systems, will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Rock in trench excavation will be paid for as described in the “Excavation” section of these Technical Specifications.

Removal of existing mains, valves and valve boxes, and salvage and disposal of existing materials as indicated on the plans, within the limits of trench excavation or where directed by the Engineer will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

Open ends of abandoned pipelines or conduits that will not be removed from the roadway, shall be sealed with concrete before backfilling and will be considered as included in the contract unit price bid for “Water Main” of the size and type specified.

WATER MAIN

Abandonment of blow offs will be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Pavement markings installed to replace disturbed markings will be considered as included in the contract unit price bid for "Water Main" of the size and type specified.

Pay Item	Pay Unit
8" Ductile Iron Pipe	Linear Foot
8" – 1/8 Ductile Iron Bend	Each
8" – 1/16 Ductile Iron Bend	Each
8" Gate Valve	Each
8" x 8" Ductile Iron Tee	Each
8" x 6" Ductile Iron Reducer	Each

WATER SERVICE

DESCRIPTION

"Copper Service" of the size specified, includes the furnishing and installation of new water services where shown on the plans or as directed by the Engineer. It includes, but is not limited to, furnishing and installing corporation stops, service saddles, curb stops, curb boxes and copper tubing; testing and disinfection; tapping of the water main; abandonment or removal of existing service; and excavation and backfill.

"Copper Service to Building/Replumb Meter" of the size specified, includes furnishing and installing new copper piping and fittings and relocating and replumbing existing water meter within existing buildings as necessary to connect new copper services, abandonment of existing water service entrance in basement as directed by the Engineer, and all of the work defined above for "Copper Service". It also includes, but is not limited to, securing a "Building Permit" for the work internal to the building.

"Reconnect Copper Service" includes reconnecting ¾", 1" and 2" existing services to a new water main. It includes, but is not limited to furnishing and installing corporation stops and service saddles; tapping of water main; abandonment or removal of existing service (between old main and new main); excavation and backfill; and extension of existing copper services to a new main with the use of couplings only where approved by the Engineer.

"Abandon Water Service" includes the abandoning of existing water services **only where specifically shown on the Plan**. It is intended to be used only where the existing service to be abandoned is not located close to the new service being installed or the existing service to be abandoned is no longer required. Abandoning or removing existing services located within the trench excavation limits for new services will not be measured separately for payment, but its costs shall be considered as included in the unit price bid for "Copper Service" of the size specified or "Copper Service to Building/Replumb Meter" of the size specified.

"Abandon Water Service in Building" shall consist of the abandonment of existing water service pipes within building structures by furnishing and installation all required fittings, valves and other appurtenances, removing pipes, supporting pipes to remain and capping pipe ends as directed by the Engineer.

Refer to the General Conditions elsewhere in these specifications for licensing requirements for any person involved in the installation of a water main and/or appurtenances.

MATERIALS

Corporation Stop: Corporation Stops shall have a male iron pipe thread inlet, pack or quick joint connection for copper tubing outlet, a ball style valve, and shall meet the requirements of ANSI/AWWA C800 with latest revisions. Brass shall be "no-lead brass" meeting the requirements of USEPA's Reduction of Lead in Drinking Water Act. The corporation stop shall be a one (1) inch or two (2) inch: Model No. FB1100-4-NL, FB1100-4-Q-NL, FB1100-7-NL or FB1100-7-Q-NL as manufactured by the Ford Meter Box Co., Inc.,

Wabash, IN.; Model No. P-25028N or B-25028N as manufactured by Mueller Co., Decatur, IL.; or Model No. NL 74704B-22, NL 74704BT or NL 74704BQ as manufactured by A.Y. McDonald Mfg. Co., Dubuque, IA.

Service Saddle: The service saddle shall have a double strap with a one (1) inch or two (2) inch iron pipe thread tapping, meeting the requirements of ANSI/AWWA C800 with latest revisions. Service saddles shall be Model F-202 manufactured by the Ford Meter Box Company, Inc., Wabash, Indiana, Model JCM 402 by JCM Industries, Inc., Nash, Texas, Model 313 by Smith-Blair, Inc., Texarkana, Arkansas, or Model 202S by Romac Industries, Inc., Bothell, WA.

Copper Tubing: Water service lines shall be Type K seamless copper tubing of one (1) inch or two (2) inch nominal diameter. Tubing shall meet the requirements of ASTM Specification B 88 of latest revision.

Couplings: Couplings for reconnecting existing ¾", 1", 1¼", 1½" and 2" copper, brass or galvanized steel services shall be compression couplings meeting the requirements of ANSI/AWWA C800 with latest revisions. Brass shall be "no-lead brass" meeting the requirements of the USEPA's Reduction of Lead in Drinking Water Act. Couplings shall be Model No. C44-XX-NL or C44-XX-Q-NL as manufactured by Ford Meter Box Co., Inc., Wabash, IN.; Model No. P-15403N or H-15403N as manufactured by Mueller Co., Decatur, IL.; Model No. 74758-22, 74758T or 74758Q as manufactured by A.Y. McDonald Mfg. Co., Dubuque, IA. Couplings used for connections to other pipe sizes and materials shall be approved by the Engineer.

Curb Stop: Curb Stops shall meet the requirements of ANSI/AWWA C800 with latest revisions. Brass shall be "no-lead brass" meeting the requirements of the USEPA's Reduction of Lead in Drinking Water Act. The curb stop shall be a one (1) inch or two (2) inch: Model No. B44-444-NL, B44-444-Q-NL, B44-777-NL or B44-777-Q-NL as manufactured by Ford Meter Box Co., Inc., Wabash, IN.; Model No. P-25209N or B-25209N as manufactured by Mueller Co., Decatur, IL.; or Model No. 76100-22, 76100T or 76100Q as manufactured by A.Y. McDonald Mfg. Co., Dubuque, IA.

Curb Box: The curb box shall be the extension type with a 42" or 45" stationary rod. Box shall be adjustable from 4' to 5' and be provided with a foot piece for 2" services. Curb boxes shall be manufactured in North America by Mueller, Ford, A.Y. McDonald, Sames, Trumball, Bibby St. Croix, Fonderie La Roche or approved equal. Only curb boxes manufactured in North America will be accepted. The upper sections of slide type curb

boxes shall have drop type cover with the word "WATER" or "W" cast on top and shall be a 2-hole Erie style. Valve boxes shall be installed for curb boxes located in paved areas and sidewalk, and for blow offs, and shall meet the requirements of "Valve Boxes" as defined in the pertinent sections of these Specifications.

Backflow Preventer: Backflow preventers shall be Watts Series 009 with air gap assembly or approved equal.

Pavement Markings: Pavement markings installed to replace disturbed markings shall be painted, match the size and color of existing markings, and meet the requirements of "Painted Pavement Markings" as defined in the pertinent sections of these Specifications.

CONSTRUCTION DETAILS

The Contractor shall be responsible for all materials and work required for water service installations, but he will coordinate all activities with the Manchester Water Department. When temporary discontinuance of service is required to accomplish service replacement, the Contractor shall notify the customer and the Manchester Water Department two (2) full work days in advance of the discontinuance. He shall have all materials on hand necessary to do the work and shall perform as much excavation and installation of new materials as possible in advance to minimize the time water will be shut off.

Trench excavation, backfill, testing, disinfection and surface restoration required for water service installation shall be carried out in accordance with the pertinent section of these Technical Specifications.

Tapping ductile iron pipe, installation of corporation stops, curb stops, curb boxes and backflow preventers, and appurtenant work, shall be done in conformity with manufacturer's recommendations and accepted best practice and shall be subject to approval by the Engineer.

Valve boxes shall be installed for curb boxes located in paved areas and sidewalk, and for blow offs, and shall be installed as specified for "Valve Boxes" as defined in the pertinent sections of these Specifications.

Copper tubing shall be installed as indicated on the plans and in accordance with the pertinent sections of these Technical Specifications. There shall be no couplings installed on the water service between the water main and the building being served unless approved otherwise by the Engineer.

The location of couplings installed on the water service shall be approved by the Engineer prior to installation. Couplings shall not be located below any building or structure foundation, sidewalk, steps, decks or in other locations that may inhibit access to the water service for future maintenance and repair.

WATER SERVICE

Where existing water services are to be replaced in place, the Contractor shall have the option of pulling the new copper service through the existing service. The copper service pipe which is pulled shall be a continuous length of pipe; no couplings shall be utilized to join together two or more lengths of pipe which are to be pulled. Any service which has been installed by pulling shall be subjected to a pressure test of 150 psi for 15 minutes prior to acceptance. Methodology for installation shall be approved by the Engineer.

Where existing water services are to be replaced, the existing curb stop shall be replaced, and a new copper service installed to the new water main at a minimum depth of 4.5 feet as indicated on the plans.

Where excavations are to be made in grass covered areas, loam and topsoil shall be carefully removed and separately stored to be used again. If the Contractor prefers not to separate surface materials he shall furnish, as directed by the Engineer, loam and topsoil at least equal in quality to that excavated.

The Contractor shall be fully responsible for damage done to trees and shrubs as a result of this work. It shall be the Contractor's responsibility to preserve existing trees and shrubs, including those temporarily removed where necessary. All trees and shrubs that are removed, killed, or that have, in the opinion of the Engineer, suffered significant permanent damage shall be replaced, at no additional costs, in an acceptable manner with trees or shrubs approved by the Engineer.

Where it appears as though permanent damage to existing trees and shrubs is unavoidable, the Contractor may petition the Engineer to request moving the curb stop and box from the location specified. The Contractor shall not be allowed to vary the curb stop and box location from that specified herein and as shown on the Plans without specific permission of the Engineer.

Where existing water services are to be abandoned, the existing corporation stop shall be closed and the existing pipe shall be disconnected from the corporation stop.

Reconnection of existing copper services shall apply to ¾", 1" or 2" services only. Any reconnection shall consist of the tapping of a new corporation in accordance with the pertinent sections of these Technical Specifications. Whenever possible, the existing copper tubing shall be reused for reconnection to the new corporation. If for any reason the existing copper cannot be reused without the insertion of a coupling, the Engineer shall be notified immediately.

Reconnection of existing copper services shall also include installing copper tubing and couplings to extend existing copper services that are deemed to be in good condition from the old main to the new main. This work shall only be allowed where approved by the Engineer.

The Contractor will be responsible for obtaining a "Building Permit" from the Town of Manchester Building Department for work associated with the items "Copper Service" and "Copper Service to Building/Replumb Meter".

WATER SERVICE

MEASUREMENT

"Copper service" of the size specified will be measured for payment as a unit, complete and accepted. Measurement will include tapping the water main, furnishing and installing a service saddle, corporation stop, copper tubing, curb stop, curb box and making connection to the existing service, if required. It shall include all fittings, adapters and other appurtenant material necessary to complete the Work. Protection, removal and replacement of existing features such as, but not limited to, walls, fences, trees, shrubs and plants required for installation of water services will not be measured for payment; the cost will be considered to be included in the contract unit price for "Copper Service" of the size specified.

"Copper service to Building/Replumb Meter" of the size specified will be measured for payment as a unit, complete and accepted. Measurement will include tapping the water main; furnishing and installing a service saddle, corporation stop, copper tubing, curb stop, and curb box; and furnishing and installing new copper piping and fittings; and relocating and replumbing existing water meter within existing buildings as necessary to connect new copper services. It shall include all fittings, adaptors and other appurtenant material necessary to complete the Work. Protection, removal and replacement of existing features such as, but not limited to, walls, fences, trees, shrubs and plants required for installation of water services will not be measured for payment; the cost will be considered to be included in the contract unit price for "Copper service to Building/Replumb Meter" of the size specified.

"Reconnect Copper Service" will be measured for payment as a unit, complete and accepted. Measurement will include tapping the water main, furnishing and installing copper tubing and a service saddle, corporation stop and connection to the existing service. It shall include all fittings, adaptors and other appurtenant material necessary to complete the Work.

"Abandon Water Service" will be measured by the unit **only at locations shown on the Plan**. Abandoning of services located within the trench excavation limits for new services will not be measured for payment, but its cost shall be considered as included in the unit price bid for "Copper Service" or "Copper Service to Building/Replumb Meter" of the size specified.

"Abandon Water Service in Building" will be measured by the unit **only at locations shown on the Plan,** complete and accepted.

Trench excavation and backfill, testing, disinfection, trench support systems, and protection of trees and shrubs will not be measured for payment; the cost shall be considered as included in the unit price for "Water Service" of the size and type specified.

Rock in trench excavation will be measured for payment as described in the "Excavation" section of these Technical Specifications.

Surface restoration will be measured for payment as described in the pertinent section of these Technical Specifications.

Pavement markings installed to replace disturbed markings will not be measured separately for

payment; the cost shall be considered as included in the contract unit price bid for "Copper Service" and "Reconnect Copper Service" of the size and type specified, and for "Abandon Service".

PAYMENT

"Copper Service" of the size specified will be paid for at the contract unit price for each service installed, which price shall include tapping water main, service saddle, corporation stop, copper tubing, curb stop, curb box, backflow preventer and connection to existing service (if required), and all materials, equipment, tools, labor and incidentals necessary to complete the Work. This price shall also include protection, removal and replacement of existing features such as, but not limited to, walls, fences, trees, shrubs and plants required for installation of copper service of the size specified.

"Copper service to Building/Replumb Meter" will be paid for at the contract unit price each for "Copper Service to Building/Replumb Meter" of the size specified, which price shall include tapping water main, service saddle, corporation stop, copper tubing, curb stop, curb box, backflow preventer (if required), and furnishing and installing new copper piping and fittings; and relocating and replumbing existing water meter within existing buildings as necessary to connect new copper services, abandonment of existing water service entrance in basement as directed by the Engineer, and all materials, equipment, tools, labor and incidentals necessary to complete the Work. This price shall also include protection, removal and replacement of existing features such as, but not limited to, walls, fences, trees, shrubs and plants required for installation of copper service of the size specified.

"Reconnect Copper Service" will be paid for at the contract unit price for each reconnection, which price shall include tapping water main, furnishing and installing copper tubing, service saddle, corporation stop, bushings, couplings (only where approved by the Engineer), connection to the existing service and all materials, equipment, tools, labor and incidentals necessary to complete the Work.

"Abandon Water Service" will be paid for at the contract unit price each for abandonment **only at locations shown on the Plan**, which price shall include excavation, backfill, closing the existing corporation stop and disconnecting the existing service pipe from the corporation stop and all materials, equipment, tools, labor and incidentals necessary to complete the Work. Abandoning of services located within the trench excavation limits for new services will not be paid for separately; the cost shall be considered as included in the unit price bid for "Copper Service" or "Copper Service to Building/Replumb Meter" of the size specified.

"Abandon Water Service in Building" will be paid for at the contract unit price each for abandonment within a building structure **only at locations shown on the Plan**, which price shall include furnishing and installation all required fittings, valves and other appurtenances, removing pipes, supporting pipes to remain and capping pipe ends as directed by the Engineer and all materials, equipment, tools, labor and incidentals necessary to complete the Work.

Trench excavation and backfill, testing, disinfection, trench support systems, and protection of

trees and shrubs will not be paid for separately; the cost shall be considered as included in the contract unit price for “Copper Service” and “Copper Service to Building/Replumb Meter” of the size specified.

Pavement markings installed to replace disturbed markings will be considered as included in the contract unit price bid for “Copper Service” and “Reconnect Copper Service” of the size and type specified, and for “Abandon Service”.

Pay Item	Pay Unit
1” Copper Service	Each
Reconnect Copper Service	Each

HYDRANT ASSEMBLY

DESCRIPTION

"Hydrant Assembly – New Main" of the type required includes the furnishing and installation of new fire hydrant assemblies on a new water main where shown on the plans or directed by the Engineer. It shall include, but not be limited to, trench excavation and backfill, furnishing and installation of the hydrant lead complete with hydrant tee, thrust block, pipe, fittings, auxiliary gate valve, mechanical joint restrainer glands, push-on joint restrainers, furnishing and installation of the hydrant with concrete masonry units, drainage stone and painting after installation.

"Hydrant Assembly – Existing Main" of the type required includes the furnishing and installation of new fire hydrant assemblies on an existing water main where shown on the plans or directed by the Engineer. It shall include, but not be limited to, trench excavation and backfill, cutting, removal and disposal of existing water main, furnishing and installation of the hydrant lead complete with hydrant tee, thrust block, pipe, fittings, auxiliary gate valve, mechanical joint restrainer glands, push-on joint restrainers, furnishing and installation of the hydrant with concrete masonry units, drainage stone and painting after installation.

"Hydrant Assembly with Tapping Sleeve and Valve" of the size and type required includes the furnishing and installation of new fire hydrant assemblies on an existing water main by means of installing a tapping sleeve and valve where shown on the plans or as directed by the Engineer. It shall include, but not be limited to, trench excavation and backfill, furnishing and installation of the hydrant lead complete with tapping sleeve and auxiliary gate valve, thrust block, pipe, fittings, mechanical joint restrainer glands, push-on joint restrainers, furnishing and installation of the hydrant with concrete masonry units, drainage stone and painting after installation.

"Remove Hydrant Assembly" includes the partial removal of existing hydrant assemblies where shown on the plans or as directed by the Engineer. It shall include, but not be limited to, trench excavation and backfill, removing and salvaging the existing hydrant; removing the existing hydrant tee from the main and replacing with new cement-lined ductile iron pipe connected via solid sleeves; removing the valve box from the road and sealing the open ends of the abandoned hydrant lead with concrete.

"Replace Hydrant Assembly" of the type required includes the furnishing and installation of new fire hydrant assemblies to replace existing where shown on the plans or as directed by the Engineer. It shall include, but not be limited to, trench excavation and backfill, removing the existing hydrant assembly and salvaging the existing hydrant, furnishing and installation of the hydrant lead complete with hydrant tee, thrust block, pipe, fittings, auxiliary gate valve, mechanical joint restrainer glands, push-on joint restrainers, furnishing and installation of the hydrant with concrete masonry units, drainage stone and painting after installation.

"Replace Hydrant" of the type required includes the furnishing and installation of new fire hydrants to replace existing where shown on the plans or as directed by the Engineer. It shall include, but not be limited to, trench excavation and backfill, removing and salvaging the existing hydrant, furnishing and installation of the hydrant lead from the existing auxiliary valve to the new hydrant complete with pipe, fittings, mechanical joint restrainer glands, push-on joint

restrainers, furnishing and installation of the hydrant with concrete masonry units, drainage stone and painting after installation.

"Relocate Hydrant" includes moving an existing fire hydrant in close proximity to the original location where shown on the plans or directed by the Engineer. It shall include, but not be limited to, trench excavation and backfill, removal and disposal of existing hydrant lead and auxiliary valve, removal, storage, protection and reinstallation of the existing fire hydrant, furnishing and installation of the hydrant lead from the existing hydrant tee to the relocated hydrant complete with pipe, fittings, auxiliary gate valve, mechanical joint restrainer glands, push-on joint restrainers, and reinstallation of the existing hydrant with concrete masonry units, drainage stone and painting after installation.

MATERIALS

Hydrants: Hydrants shall be dry-barrel, post-type hydrants, with compression shut-offs which open with the pressure. Hydrants shall meet the requirements of AWWA C502. They shall have a main valve opening of 5-1/4 inches and have a 6-inch mechanical joint inlet. Bury length shall be 5-1/2 feet. Two 2-1/2 inch hose and one 4-1/2 inch pumper nozzles shall be provided in standard nozzle arrangement. Outlet nozzle threads shall meet the requirements of ANSI B26, "National Standard Fire-Hose Coupling Screw Threads." Hydrants shall be of break flange construction, shall have 0-ring seals and **shall be right opening (clockwise).**

Interior and exterior coatings shall meet the requirements of the latest revision of AWWA C502, and the color for that portion of the hydrant above the ground line shall be as directed by the Manchester Water Department.

In addition, that portion of each hydrant below finished grade shall be given a coating of hot bitumastic material, equal to that used for exterior coating of pipe and fittings, prior to installation. A drain outlet is required. Hydrants shall be Eddy Model F-2640 manufactured by Clow Corporation, Bensenville, Illinois, the Pacer Model WB-67 with 16" traffic section manufactured by Waterous, South St. Paul, Minnesota, the Metropolitan 250-Model 94 manufactured by U.S.Pipe and Foundry Co., Birmingham, AL., or Super Centurion 250 by Mueller Co., Decatur, IL. Hydrants shall be installed so as to maintain an 18-inch nozzle height above finished grade without use of extension sections.

The type of hydrant to be installed shall be determined in the field by the Engineer.

Ductile Iron Pipe: Ductile iron push-on joint pipe shall meet the requirements specified in the pertinent section of these Technical Specifications.

HYDRANT ASSEMBLY

Fittings:	Mechanical joint fittings, exterior and interior coatings, and valve boxes shall meet the requirements specified in the pertinent section of these Technical Specifications.
Hydrant Tee:	Mechanical joint hydrant tees (a.k.a. anchor tees or swivel tees) shall be used to connect the hydrant lead to the water main.
Auxiliary Gate Valves:	All auxiliary gate valves shall be resilient wedge gate valves and shall meet the requirements specified in the pertinent section of these Technical Specifications. **Auxiliary gate valves shall be right opening (clockwise).**
Tapping Sleeves and Valves:	All tapping sleeve and valve configurations and installations shall meet the requirements specified in the pertinent section of these Technical Specifications.
Hydrant Paint:	Paint for hydrants shall be high performance industrial coating alkyd enamel. Paint shall have a high gloss finish. Paint colors shall be Yellow (245488) as manufactured by Rust-Oleum Corporation or approved equal. Surface preparation and paint application after hydrant installation shall be in accordance with the manufacturer's recommendations.
Concrete:	Concrete shall meet the requirements of Section M.03.01 of Form 817 for Class "A." Precast concrete masonry units shall meet the requirements of ASTM C139.
Bedding Material:	Three-quarter inch crushed stone shall meet the gradation requirements specified for stone and gravel in Section M.01.01 of Form 817.
Joint Restraint:	Mechanical joint restrainer glands and push-on joint restrainers shall meet the requirements specified in the pertinent section of these Technical Specifications.
Connecting Sleeves:	Sleeves for connecting new water mains to existing water mains shall be as described in the pertinent section of these Technical Specifications.

CONSTRUCTION DETAILS

Trench excavation and backfill, installation of water main and appurtenances, testing, disinfection, pavement repair and surface restoration will be carried out as defined in the pertinent sections of these Technical Specifications.

Fire hydrants shall be provided and located as shown on the plans or as directed by the Engineer. Installation shall be as detailed on the plans and as defined in these Technical Specifications.

HYDRANT ASSEMBLY

Hydrants shall stand plumb with the center a minimum of 2'-6" from the face of curb or edge of road. Hydrant nozzles shall be parallel with, or at right angles to the road, with the pumper nozzle facing the road. Hydrants shall be set to the established grade with a 5-1/2 foot bury and with nozzles 18 inches above the ground or as directed by the Engineer without the use of extension sections. It is the Contractor's responsibility to ensure final nozzle height is based on the finished grades shown on the plans and shall request clarification from the Engineer if proposed grades are unclear.

A mechanical joint offset or two 1/8 bends shall be utilized in the hydrant lead to achieve the proper grade of the fire hydrant when the depth of the water main does not permit these requirements to be met using only straight pipe. Offset or bends shall be located as close to the auxiliary gate valve as field conditions permit.

Auxiliary gate valves shall be set in accordance with the requirements of the pertinent section of these Technical Specifications. Depth of bury shall be as shown on the plans.

Tapping sleeve and auxiliary gate valves shall be installed in accordance with requirements of the pertinent section of these Technical Specifications.

All mechanical joints in hydrant leads shall have ductile iron restrainer glands.

All push-on joints in hydrant leads shall have push-on joint restrainers.

A poured concrete thrust block shall be provided behind the hydrant. The thrust block shall rest against undisturbed earth and shall not obstruct the hydrant drain.

A concrete collar shall be poured around the hydrant barrel as indicated on the plans.
The Contractor shall place and secure a burlap bag or plastic bag over each new hydrant indicating the hydrant is "out-of service" and shall be responsible for maintaining this identification until the hydrant is put into service, at which time the cover shall be removed and disposed of.

All existing hydrants that are removed or replaced shall be salvaged. The hydrants shall be delivered to the Water Department facilities on Line Street, Manchester. The Contractor shall be responsible for properly unloading all salvaged materials.

Where the plans call for existing hydrants to be removed (but not replaced), the existing hydrant shall be salvaged and the existing hydrant tee shall be removed from the main and replaced with new cement-lined ductile iron pipe connected to the existing main using solid sleeves. The valve box shall be removed from the road and the open ends of the abandoned hydrant lead shall be sealed with concrete.

Where the plans call for existing hydrants to be replaced, the existing hydrant shall be salvaged and the existing hydrant tee shall be removed from the main. The existing hydrant assembly shall be replaced with a new hydrant assembly in accordance with the provisions of this section.

HYDRANT ASSEMBLY

Where excavations are to be made in grass covered areas, loam and topsoil shall be carefully removed and separately stored to be used again. If the Contractor prefers not to separate surface materials he shall furnish, as directed by the Engineer, loam and topsoil at least equal in quality to that excavated.

Hydrants shall be painted after installation entirely red or yellow based on the opening direction as specified herein.

MEASUREMENT

"Hydrant Assembly – New Main", "Hydrant Assembly – Existing Main" and "Hydrant Assembly with Tapping Sleeve and Valve" will be measured as units, of the particular type, complete and accepted. Measurement shall be from and inclusive of the hydrant tee (or tapping sleeve) at the water main to back of the hydrant. Units measured under this item shall include the installation of new hydrant assemblies only.

"Remove Hydrant Assembly" will be measured as units, complete and accepted. Units shall be measured under this item only when a new hydrant assembly is not being installed at the location of the existing hydrant assembly. When an existing hydrant to be removed is located within the trench excavation limits of a new hydrant assembly, the removal of the existing hydrant assembly will not be measured for payment, but its costs shall be considered as included in the bid price for "Replace Hydrant Assembly".

"Replace Hydrant Assembly" as indicated on the Plan will be measured as units, complete and accepted. This shall include both the removal of the existing hydrant assembly and the installation of a new hydrant assembly. Measurement shall be from and inclusive of the hydrant tee (or tapping sleeve) at the water main to the back of the hydrant.

"Replace Hydrant" as indicated on the Plan will be measured as units, complete and accepted. This shall include both the removal of the existing hydrant and the installation of a new hydrant. Measurement shall be from the existing auxiliary valve to the back of the hydrant.

"Relocate Hydrant" as indicated on the Plan will be measured as units, complete and accepted. This shall include removal of existing hydrant, storage, protection and reinstallation of the existing hydrant. Measurement shall be from the existing hydrant tee to the back of the hydrant.

Excavation, backfill, storage, protection, salvage and delivery of existing hydrants, removal/ disposal of existing materials (i.e. pipes, tees, valve boxes, hydrant leads etc.), abandonment of existing hydrant leads, thrust blocks, connecting sleeves, nipple pieces, restrainer glands, push-on pipe joint restrainers, rod type joint restraint, hydrant tees, bends, offsets, hydrant leads, auxiliary gate valves, concrete collars and other appurtenances will not be measured separately for payment but the cost shall be considered as included in the price bid for the Work.

Surface restoration will be measured for payment as described in the pertinent section of these Technical Specifications.

HYDRANT ASSEMBLY

PAYMENT

"Hydrant Assembly – New Main" will be paid for at the contract unit price each for "Hydrant Assembly – New Main" installed on a new water main, of the particular type completed and accepted, which price shall include trench excavation, backfill, furnishing and installation of hydrant tee, thrust block, pipe, fittings, auxiliary gate valve and valve box, the hydrant lead including offset (Type B Hydrant Assembly), 1/8 bends (Type C Hydrant Assembly), mechanical joint restrainer glands, push-on pipe joint restrainers, hydrant, concrete masonry units, drainage stone, concrete collar, painting, as well as testing and disinfection, including all materials, equipment, tools, labor and incidentals necessary to complete the Work.

"Hydrant Assembly – Existing Main" will be paid for at the contract unit price each for "Hydrant Assembly – Existing Main" installed on an existing water main, of the particular type completed and accepted, which price shall include trench excavation, backfill, cutting, removal and disposal of existing water main, furnishing and installation of hydrant tee, thrust block, pipe, fittings, auxiliary gate valve and valve box, the hydrant lead including offset (Type B Hydrant Assembly), 1/8 bends (Type C Hydrant Assembly), mechanical joint restrainer glands, push-on pipe joint restrainers, hydrant, concrete masonry units, drainage stone, concrete collar, painting, as well as testing and disinfection, including all materials, equipment, tools, labor and incidentals necessary to complete the Work.

"Hydrant Assembly with Tapping Sleeve and Valve" will be paid for at the contract unit price each for "Hydrant Assembly with Tapping Sleeve and Valve" of the size and type required installed on an existing water main, completed and accepted, which price shall include trench excavation, backfill, furnishing and installation of tapping sleeve and auxiliary gate valve, thrust block, pipe, fittings, valve box, the hydrant lead including offset (Type B Hydrant Assembly), 1/8 bends (Type C Hydrant Assembly), mechanical joint restrainer glands, push-on pipe joint restrainers, hydrant, concrete masonry units, drainage stone, concrete collar, painting, as well as testing and disinfection, including all materials, equipment, tools, labor and incidentals necessary to complete the Work.

"Remove Hydrant Assembly" will be paid for at the contract unit price each for "Remove Hydrant Assembly" complete and accepted, which price shall include trench excavation, backfill, removal, salvage and delivery of existing hydrant, removal and disposal of existing materials (i.e. tees, valve boxes, hydrant leads, etc.), furnishing and installation of replacement pipe, solid sleeves, retainer glands, thrust restraint, testing and disinfection, including all materials, equipment, tools, labor and incidentals necessary to complete the Work. When an existing hydrant to be removed is located within the trench excavation limits of a new hydrant assembly, the removal of the existing hydrant assembly will not be paid for separately; the cost shall be considered as included in the bid price for "Replace Hydrant Assembly".

"Replace Hydrant Assembly" will be paid for at the contract unit price each for "Replace Hydrant Assembly" complete and accepted, which price shall include trench excavation, backfill, removal, salvage and delivery of existing hydrant, removal and disposal of existing materials (i.e. tees, valve boxes, hydrant leads, etc.), furnishing and installation of new hydrant tee, thrust

block, pipe, fittings, auxiliary gate valve and valve box, the hydrant lead including offset (Type B Hydrant Assembly), 1/8 bends (Type C Hydrant Assembly), mechanical joint restrainer glands, push-on pipe joint restrainers, hydrant, concrete masonry units, drainage stone, concrete collar, painting, as well as testing and disinfection, including all materials, equipment, tools, labor and incidentals necessary to complete the Work.

"Replace Hydrant" will be paid for at the contract unit price each for "Replace Hydrant" complete and accepted, which price shall include trench excavation, backfill, removal, salvage and delivery of existing hydrant, removal and disposal of existing hydrant lead and valve box, furnishing and installation of new pipe, fittings, valve box, the hydrant lead from the existing auxiliary valve to the new hydrant including offset (Type B Hydrant Assembly), 1/8 bends (Type C Hydrant Assembly), mechanical joint restrainer glands, push-on pipe joint restrainers, hydrant, concrete masonry units, drainage stone, concrete collar, painting, as well as testing and disinfection, including all materials, equipment, tools, labor and incidentals necessary to complete the Work.

"Relocate Hydrant" will be paid for at the contract unit price each for "Relocate Hydrant" complete and accepted, which price shall include trench excavation, backfill, removal, storage, protection and reinstallation of existing hydrant, removal and disposal of existing hydrant lead, auxiliary valve and valve box, furnishing and installation of new pipe, fittings, auxiliary gate valve and valve box, the hydrant lead from the existing hydrant tee to the relocated hydrant including offset (Type B Hydrant Assembly), 1/8 bends (Type C Hydrant Assembly), mechanical joint restrainer glands, push-on joint restrainers, and reinstallation of the existing hydrant with concrete masonry units, drainage stone, concrete collar, painting, as well as testing and disinfection, including all materials, equipment, tools, labor and incidentals necessary to complete the Work.

Pay Item	Pay Unit
Hydrant Assembly – New Main	Each
Remove Hydrant Assembly	Each
Replace Hydrant Assembly	Each

WATER BYPASS PIPING

DESCRIPTION

"Water Bypass Piping" of the size specified shall consist of the furnishing of all equipment, labor, supervision, incidentals and material necessary for temporarily bypassing the water distribution system around the work area as required for construction. This Work includes maintaining continuous and reliable water service in all water distribution pipes including individual service connections during construction, and disinfection, flushing, testing and removal of the temporary system.

Construction that may require a temporary water bypass system includes, but is not limited to, cleaning and lining of existing water mains, replacement of existing water mains, connection of new water distribution mains to existing mains, booster pump station improvements, installation of valves, fittings and other appurtenances, and disinfection, flushing and testing of new water main. Water bypass piping shall only be used where approved by the Engineer.

Refer to the General Conditions elsewhere in these specifications for licensing requirements for any person involved in the installation of a water main and/or appurtenances.

MATERIALS

Water bypass piping materials and appurtenances shall not cause the water delivered to customers to become non-potable, produce aesthetic problems such as taste and odors, or promote bacterial growth after being placed into service. All bypass pipe materials and products (especially plastic), paints, linings, coatings, adhesives, lubricants, etc. in direct contact with potable water shall be NSF or UL certified to NSF/ANSI Standard 61 and shall meet these minimum standards:

1. The pipe materials shall conform to the same standards as permanent piping.
2. The provision of temporary bypass piping must be made in a reliable and sanitary manner such that impurities are not imparted to the water.
3. Piping, couplings, fittings and appurtenances shall be watertight and pressure rated for 200 psi minimum operating pressure.
4. The pipe and/or hose must be designated or certified for potable/residential water use and must meet the latest revision of NSF Standard 61 certification and or AWWA standards.
5. Disinfection of temporary bypass pipes and hoses must be performed in accordance with AWWA standards.
6. Flexible fire hose shall not be permitted.
7. The allowable pipe materials are as follows:
    (a) Ductile iron pipe
    (b) Steel pipe
    (c) Plastic pipe:
        - Polyvinyl chloride (PVC) pressure pipe
        - Standard polyethylene (PE) pressure pipe and tubing, ½ inch (13 mm) through 3 inches (76 mm)

WATER BYPASS PIPING

- Standard polyethylene–aluminum–polyethylene & cross linked polyethylene–aluminum
- Molecularly oriented polyvinyl chloride (PVCO) pressure pipe, 4 inches through 12 inches
- Others as approved in writing by the Engineer

All provisions of ANSI/AWWA G200-09 Standard for Distribution Systems Operation and Management shall be followed during bypassing of the water distribution system.

CONSTRUCTION DETAILS

Temporary Bypass Piping

The Contractor shall submit to the Engineer a water distribution system bypass schedule required to complete the Work. At a minimum, the schedule will include the proposed sequencing and coordination of cleaning and lining of existing water mains, replacement of existing water mains, connection of new water distribution mains to existing mains, booster pump station improvements, installation of valves, fittings and other appurtenances, disinfection, flushing and testing of new water main and the handling of water flow during all aspects of construction. The Engineer shall approve such schedule prior to implementation.

The Contractor shall prepare a specific, detailed description of the proposed water distribution bypass system (Water Bypass Piping Plan). The Water Bypass Piping Plan shall be submitted at least two (2) weeks prior to its intended use and must be approved by the Engineer prior to the mobilization of any of the equipment included in the Water Bypass Piping Plan. The Water Bypass Piping Plan shall outline all provisions and precautions to be taken by the Contractor regarding handling of existing water flows.

This Water Bypass Piping Plan must be specific and complete, including such items as schedules, locations, materials, disinfection methods, and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of bypass piping from damage.

The inclusion of this Specification and associated bid items in the Contract does not imply a bypass system will be allowed. The Contractor shall schedule work as required to install new water main, services and appurtenances without the need for a bypass system, unless such system is deemed necessary by the Engineer. No construction shall begin until the Water Bypass Piping Plan including all provisions and requirements have been reviewed and approved by the Engineer.

The Water Bypass Piping Plan shall include, but is not limited to, the following details:

1. Plan indicating location, size and type of proposed temporary water bypass piping including all temporary service piping, associated valves, fittings, hydrants, backflow prevention devices and other appurtenances.

WATER BYPASS PIPING

2. Proposed locations of connecting temporary bypass pipe to the active water distribution system.
3. Size and material of the water distribution main to be bypassed.
4. Proposed methods of disinfecting the temporary bypass system.
5. Method of protecting bypass piping from damage.
6. Any temporary pipe supports, anchoring requirements, thrust and restraint block sizes and locations.
7. Calculations for bypass piping sizing.
8. Schedule for installation of and maintenance of bypass piping.
9. Contractor's plan for providing continuous monitoring of the bypass operation as well as the monitoring person's qualifications.

The Contractor shall furnish, install, maintain and remove temporary service pipe of the size required, from which connections shall be made to all water customers. Temporary fire hydrants shall be provided when existing hydrants are out of service due to the work. Temporary service pipe shall not be installed without prior approval of the Engineer. Water distribution systems shall only be bypassed around construction activities when long periods of system shutdown are anticipated and when authorized by the Engineer.

The bypass piping size identified as a Contract bid item is approximate. Bypass piping shall be sized to provide a minimum fire flow of 750 gpm or as required by the Engineer to provide adequate service to customers.

The Contractor shall do all excavating for connections of temporary service pipes to existing live water mains and make all such connections. Whenever possible, two feeds shall be provided to the temporary piping system. The Contractor shall also furnish, install, maintain, connect, disconnect and remove individual service lines to all water customers.

The design, installation, disinfection, operation, repair and maintenance of all temporary bypass systems shall be the responsibility of the Contractor.

The Contractor shall provide a suitable backflow prevention device for all connections of temporary service pipes to existing live water mains. Backflow prevention devices to be used shall be as approved by the Engineer.

The work of providing suitable safety precautions during the temporary service period shall be the responsibility of the Contractor.

Before starting any work that will affect service to customers, the Contractor shall notify the Manchester Water Department in advance so that a minimum of two (2) full working days notice may be given to any user whose service will be interrupted for any reason.

Contractor shall construct, maintain and repair all temporary water bypass piping systems and shall be responsible for providing appropriate conditions for proper installation, disinfection,

WATER BYPASS PIPING

flushing and testing of water pipe during construction. Any required repairs to bypass systems shall be immediately completed to prevent any interruption in service within the water distribution system. The Contractor shall promptly repair and or replace any leaking or faulty temporary service pipe as ordered by the Engineer.

The Contractor shall be responsible for after-hours maintenance of the temporary facilities. He may do so in one of the following manners:

1. Hire an individual who will be available for contact by the Town after normal working hours. This individual must be provided with a pager and be available between the hours of 3:30 p.m. and 7:00 a.m., seven (7) days a week including holidays. His response time shall be one (1) hour or less. The individual shall have all licenses necessary to allow him to work on a public water supply system. The pager number shall be provided to the Town's on-call personnel.

2. Utilize Town of Manchester Water Department personnel for after-hours maintenance. The Town's on-call personnel will assign Department staff on a rotating basis utilizing the Town's overtime list. The contractor will be billed on a "per call" basis in accordance with the current union contracts and the "Schedule of Rates, Charges and Fees" for the Water Division. The Contractor shall be responsible for providing access by Town personnel to a supply of repair materials for the purpose of making after hours repairs. These materials will be supplied at no cost to the Town.

Care shall be exercised throughout to avoid any possible pollution of mains, house services, or temporary service pipe.

Generally, temporary service pipe shall be laid in gutters. At driveways, pipe crossings shall be provided by cold patch cover or other approved method. At street intersections, pipe shall be laid in a shallow trench covered with temporary surfacing. Sanitary precautions shall be satisfactory to the Engineer.

The interior of temporary service pipe shall be disinfected, flushed and tested as described in “Water Main” elsewhere in these Specifications.

All service pipe shall be suitably valved and meet the approval of the Engineer. A valve shall be provided at each tap hole connection. Valves shall be located no further than one (1) block apart when directed by the Engineer.

Whether it is being installed, in service, or being removed, the amount of temporary service pipe kept on the job shall be the minimum that will allow the Work to continue at a reasonable rate.

The Contractor shall be responsible for all consumer connections. The Water Department will enter upon all private property and assist the Contractor in making final service connections. The Contractor shall provide a minimum of twenty-four (24) hours notice to the Water Department so that a man may be available when required.

WATER BYPASS PIPING

Pipe Access Openings

The Contractor shall make openings in the pipeline as necessary to properly perform his Work. Openings in the pipe shall be made by cutting and removing pipe sections. All pipe shall be cut square and true. Except as otherwise approved, all cutting shall be done with a machine suitable for cutting cast iron pipe. Hydraulic squeeze cutters are not acceptable for cutting cast iron pipe. Travel type cutters or rotary type abrasive saws may be used. All cut ends shall be examined for possible cracks caused by cutting.

Any pipe sections removed, damaged and/or not cut square and true shall be replaced with a new pipe section. The section of pipe removed shall become the property of the Contractor.

At openings adjacent to sections under pressure or in service, the Contractor shall install adequate temporary joint restraint devices to prevent movement of closed valves.

At all times when the work is not actually in progress, the openings in the pipe shall be closed by temporary watertight plugs or other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

Closing Pipe Openings

The Contractor shall furnish all labor, materials, tools and equipment necessary to satisfactorily close and make watertight all pipe openings in the mains. Closures shall be made with new cement-lined ductile iron pipe of equivalent wall thickness and diameter as the pipe, which is to be replaced. All couplings and pipe required to close the pipe openings shall conform to the requirements of "Water Main" elsewhere in these Specifications.

Disinfection and Flushing

The Contractor shall disinfect all mains carrying potable water. Disinfection shall be performed as described "Water Main" elsewhere in these Specifications.

Backfilling Operations

As soon as practicable after pipe openings have been closed, backfilling shall be started. All backfilling shall be done in accordance with the requirements of "Water Main" elsewhere in these Specifications. Excavations shall not be backfilled at pipe openings until after those joints created in closing pipe openings have successfully passed leakage tests required.

The Contractor's attention is directed to the fact that he will be responsible for the replacement of pavement. Therefore, in backfilling excavations occurring where pavement is to be replaced, the Contractor will be held responsible for providing a temporary pavement repair in accordance with the requirements of "Pavement Repair" elsewhere in these Specifications.

MEASUREMENT

"Water Bypass Piping" of the size and type specified will be measured by the linear foot of pipe installed complete in place and accepted. Measurement will be along the centerline of pipe,

WATER BYPASS PIPING

including all fittings, valves, temporary hydrants and connections to water customers.

Access openings, disinfection, flushing and testing will not be measured separately for payment; the cost shall be considered as included in the contract unit price bid for “Water Bypass Piping” of the size and type specified.

PAYMENT

“Water Bypass Piping " of the size and type specified will be paid for at the contract unit price per linear foot of pipe furnished and installed, complete in place and accepted, which price shall include trench excavation, backfill, pipe cutting and repair, access openings, installation of temporary piping and temporary hydrants, fitting, valves and connections to all water customers as necessary, disinfection, flushing and testing, and all materials, equipment, tools, labor incidentals necessary to complete the Work.

Pay Item	Pay Unit
2” Water Bypass Piping	Linear Foot

EROSION AND SEDIMENTATION CONTROLS

DESCRIPTION

"Silt Fence" includes the furnishing, placing, maintaining and removal of manufactured geotextile silt fence where shown on the Plans or where directed by the Engineer.

"Hay Bales" includes the furnishing, placing, maintaining and removal of hay bales where shown on the Plans or where directed by the Engineer.

"Silt Sack" includes the furnishing, placing, maintaining and removal of manufactured geotextile silt sacks specifically made to protect catch basins where shown on the Plans or where directed by the Engineer.

"Construction Entrance" includes the furnishing and installation of a temporary crushed stone pad on a geotextile surface located so as to prevent dirt and mud from tracking onto existing pavement. The exact location(s) of "Construction Entrance" shall be determined by the Engineer.

MATERIALS

Geotextile shall conform to Section M.08.01.19 of Form 817.

Silt Sack shall be Hi-Flow Siltsack® Type A (for Type "C-L" catch basin tops) and Type B with curb deflector (for Type "C" catch basin tops or other structure with curb inlets) as manufactured by ACF Environmental, Inc., Richmond, VA (800-448-3636) or approved equal. Silt sack shall be provided with internal overflows and meet the following criteria:

Properties	Test Method	Units
Grab Tensile Strength	ASTM D-4632	265 lbs
Gran Tensile Elongation	ASTM D-4632	20%
Puncture	ASTM D-4833	135 lbs
Mullen Burst	ASTM D-3786	420 psi
Trapezoid Tear	ASTM D-4533	45 lbs
UV Resistance	ASTM D-4355	90%
Apparent Opening Size	ASTM D-4751	#20 U.S. Sieve
Flow Rate	ASTM D-4491	200 gal/min/sq ft
Permittivity	ASTM D-4491	1.5/sec

Crushed stone for Construction Entrances shall conform to "Grading A" of Section M.02.06 of Form 817.

RESPONSIBILITY

It is the Contractor's sole responsibility to provide and continually inspect and maintain all erosion and sedimentation control measures on the site. Failure to do so may result in

enforcement actions by the Town of Manchester or State of Connecticut. The erosion and sedimentation control measures shown on the Plans or in these Specifications are intended as a guideline to show the minimal control measures required based on the intended construction. Additional control measures may be necessary depending upon the Contractor's operations and scheduling of the project.

CONSTRUCTION DETAILS

Geotextile sedimentation control systems may consist of either a prefabricated geotextile fence or a geotextile fence assembled by the Contractor in the field. Geotextile sedimentation control systems shall be installed so that the bottom four (4) inches of the fabric is buried by either trenching or by laying the four (4) inch section horizontally on the ground and burying by ramping the soil up to the control fence. All geotextile fences shall be a least 36 inches in exposed height as installed, with not less than a two (2) degree and not more than a 20 degree inclination toward the potential silt source. Hardwood posts shall have a minimum cross-section size of at least 1.5 inches by 1.5 inches and a minimum length of 30 inches. Steel posts shall be at least 0.5 pound per linear foot with a minimum length of 48 inches. Spacing between posts shall not exceed ten (10) feet, and all posts shall be driven a minimum of 12 inches into the ground. When joints between sections of geotextile sedimentation control systems are necessary, geotextile shall be spliced together only at a support post, with a minimum six (6) inch overlap, and securely sealed.

The installations shall be maintained or replaced until they are no longer necessary for the purpose intended or are ordered removed by the Engineer. Cleanout of accumulated sediment shall be accomplished when one-half of the original height of the sedimentation control system, as installed, becomes filled with sediment or as ordered by the Engineer.

The geotextile fence systems will be completely removed from the project at the completion of the project, unless specifically authorized by the Engineer to be left in place.

Unless a specific type of sedimentation control system is indicated on the plans or directed by the Engineer, the type of system will be at the Contractor's option.

Silt sacks shall be installed in accordance with manufacturer's instructions and shall be emptied when they have collected 6" to 12" of sediment and when directed by the Engineer. Silt sacks shall be inspected every 1 to 2 weeks and after every major rainfall event.

Erosion and sedimentation control measures shall be installed prior to any excavation, grubbing or other operation that disturbs existing ground.

MEASUREMENT

"Silt Fence" and "Hay Bales" will be measured for payment by the actual number of linear feet of "Silt Fence" or "Hay Bales" installed and accepted. Measurement shall be made along the center-line of the system. Replacement systems will not be measured for payment.

EROSION AND SEDIMENTATION CONTROLS

"Silt Sacks" will be measured for payment by the actual number of silt sacks installed and accepted. Different types of silt sacks installed for catch basin tops (with and without curb inlets) and replacement systems will not be measured separately for payment.

"Construction Entrances" will be measured for payment by the actual number of construction entrances installed and accepted. Replacement systems will not be measured for payment.

Any other erosion and sedimentation control systems required as a result of the Contractor's operation will not be measured for payment.

PAYMENT

"Silt Fence" and "Hay Bales" will be paid for at the contract unit price per linear foot for "Silt Fence" or "Hay Bales", complete in place, which price shall include all materials, equipment, tools and labor incidental to the installation, maintenance, replacement, removal and disposal of the system and surplus material. No payment shall be made for the cleanout of accumulated sediment.

"Silt Sack" will be paid for at the contract unit price each for "Silt Sack" complete in place, which price shall include all materials, equipment, tools and labor incidental to the installation, maintenance, replacement, removal and disposal of the system. No separate payment shall be made for the cleanout of accumulated sediment or for different types of silt sacks installed for catch basin tops (with and without curb inlets) and replacement systems.

"Construction Entrance" will be paid for at the contract unit price each for "Construction Entrance" complete in place, which price shall include all materials, equipment, tools and labor incidental to the installation, maintenance, replacement, removal and disposal of the system. No payment shall be made for the cleanout of accumulated sediment.

Pay Item	Pay Unit
Silt Sack	Each

RESTORATION OF LAWN AND WETLAND AREAS AND EROSION CONTROL BLANKET

DESCRIPTION

"Restoration of Lawn Areas" includes all work required to establish turf, including the furnishing and installation of screened topsoil and of a specified slurry mixture of seed, fiber, fertilizer and stabilizer emulsion with hydro-mulch equipment, where shown on the Plans or where directed by the Engineer.

"Restoration of Wetland Areas" includes all work required to establish vegetation, including the furnishing and installation of screened topsoil, and of a specified slurry mixture of seed, fiber, fertilizer and stabilizer emulsion with hydro-mulch equipment, within the wetlands areas identified on the Plan or where directed by the Engineer.

"Erosion Control Blanket" includes the furnishing and installation of a manufactured straw/fiber blanket at the locations shown on the Plans or where directed by the Engineer.

MATERIALS

Fertilizer: 18-18-5, (Nitrogen, Phosphoric Acid, Potassium), water-soluble or an approved equal at a rate of 25-lbs per 1,000-sq. ft. Submit Manufacturer's product specifications and guaranteed purity analysis for fertilizer.

Mulch: Cellulose fiber mulch shall conform to the requirements of Section M.13.05.3 of Form 817. Apply at a minimum rate of 40 lbs/ 1,000 SF.

Tackifier: Organic tackifier shall be applied at rate of 70 lbs./acre

Topsoil: The term topsoil used herein shall mean a soil meeting the soil textural classes established by the United States Department of Agriculture Classification System based upon the proportion of sand, silt, and clay size particles after passing a two (2) millimeter (mm) sieve and subjected to a particle size analysis. The topsoil shall not contain less than 6% nor more than 20% organic matter as determined by loss-on-ignition of oven dried samples dried at 105 degrees centigrade.

The following textural classes shall be acceptable:

Loamy sand, including coarse, loamy fine, and loamy very fine sand
Sandy loam, including coarse, fine and very fine sandy loam
Loam
Silt loam, with not more than sixty (60) percent silt

The topsoil to be furnished by the Contractor shall be loose, friable, reasonably free of admixtures of subsoil, free from refuse, stumps, roots, brush, weeds, rocks, and stones ½ inch and over in all dimensions. The topsoil shall also be free from any material that will prevent the formation of a suitable seedbed or prevent seed germination and plant growth.

RESTORATION OF LAWN AND WETLAND AREAS AND EROSION CONTROL BLANKET

Seed: Shall be fresh and clean and new crop seed composed of an evenly graded mixture by proportion and testing minimum percentages of purity and germination indicated, or as approved by the Engineer.

The seed mixture for lawns <=3:1 slope with mowing required shall have no noxious weeds in mix and shall be CRCOG General Purpose Mix manufactured by Pro Lawn Supply, Inc., Worcester, MA (1-866-554-SEED) or approved equal and shall generally conform to the following requirements:

	Proportion by Weight (Percent)	**Minimum Germination (Percent)**
Catalina Perennial Rye	33.0	90
Boreal Creeping Red Fescue	33.0	87
Part Kentucky Bluegrass	33.0	85
Other Ingredients	1.0	-

The seed mixture for channel embankments and lawns >3:1 slope with mowing not required shall have no noxious weeds in mix and shall generally conform to the following requirements:

	Proportion by Weight (Percent)	**Minimum Germination (Percent)**
Creeping Red Fescue	54.0	85
Redtop	5.0	85
Crown Vetch	40.0	90
Other Ingredients	1.0	-

The seed mixture for wetlands areas shall be submitted to the Engineer for review and approval.

Erosion control blanket: shall be a machine produced mat consisting of 100% coconut fiber. The blanket shall be of consistent thickness with the coconut fiber evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with heavyweight photodegradable polypropylene netting having ultraviolet additives to delay breakdown and an approximate 5/8 inch x 5/8 inch mesh, and on the bottom side with a lightweight photodegradable polypropylene netting with an approximate ½ inch x ½ inch mesh. The blanket shall be sewn together on 1 ½ inch centers with degradable thread.

Coconut fiber erosion control blanket shall be C125 as manufactured by North American Green, or approved equal. The C125 erosion control blanket shall have the following properties:

RESTORATION OF LAWN AND WETLAND AREAS AND EROSION CONTROL BLANKET

Material content

Coconut Fiber	100%
Netting	Both sides, heavyweight UV stabilized (3 lb/1000 sq ft approx wt)
Thread	100% Black Polypropylene

Physical Specifications

Width	6.67 feet
Length	108 feet
Weight	44 lbs +/- 10%
Area	80 sq yds
Stitch spacing	1.5 inches

Wire staples are to be produced from 11 gauge .118 to .120 bright basic industrial quality 1008/1010 wire, minimum cast, light oil protection. The staples shall be produced in a 6" x 1" x 6" U-shaped configuration.

CONSTRUCTION DETAILS

Construction methods shall be those established as agronomically acceptable and feasible and which are approved by the Engineer.

The existing ground shall be graded to a reasonably true surface.

Topsoil shall be spread and shaped to meet existing elevation, after settlement and compaction has occurred, and have a minimum depth of four (4) inches with all stone larger than ½" removed.

In wetland areas, 8" of native topsoil/organic matter shall be stripped, stockpiled and reused for wetlands plantings.

It shall be the Contractor's responsibility to restore to the line, grade and surface all eroded areas with approved material and to keep topsoiled areas in acceptable condition until the completion of the construction work.

Examine work area before proceeding with any work and notify the Engineer in writing on conditions which may prevent the proper execution of this work. Failure to report unsuitable conditions will require the contractor to rectify unacceptable work at no additional cost to the Town.

Allow the planting area soil surface to dry out for one day only prior to the hydroseeding application. Exercise care not to allow the soil surface to be overly saturated with water prior to the hydroseeding installation. At the same time the soil surface should not become too dry during this period. There should be some residual moisture within the first 1/4 inch of the soil surface.

RESTORATION OF LAWN AND WETLAND AREAS AND EROSION CONTROL BLANKET

Notify the Engineer at least 48 hours prior to starting the hydroseeding operation. The Engineer shall be present during the hydroseeding operation and has final determination if conditions are acceptable for hydroseed application.

Application rates for hydroseed shall be as defined by the manufacturer.

Apply the hydroseed in the form of a slurry consisting of organic soil amendments, commercial fertilizer, and any other chemicals that are called out. When hydraulically sprayed onto the soil, the mulch shall form a blotter-like material. Direct the spray operation so that this procedure will drill and mix the slurry components into the soil, the slurry spray will also penetrate the soil surface, thus ensuring maximum impregnation and coverage. The impregnation and mixing of the components will help in retaining moisture while stabilizing soil surface from superficial erosion.

Do not leave the hydroseeding slurry components in the hydroseeding machine for more than two (2) hours because of possible seed destruction. If slurry components are left idle for more than two hours in the machine, add 50% more of the originally specified seed mix to any slurry mixture which has not been applied within the two hours after mixing. Add 75% more of the original seed mix to any slurry mixture which has not been applied eight (8) hours after mixing. All mixtures more than eight (8) hours old, must be disposed, offsite, at the contractor's expense.

Spray the area with a uniform visible coat, using the dark color of the cellulose fiber as a visual guide. The slurry shall be applied in a downward drilling motion via a fan stream nozzle. Insure that all of the slurry components enter and mix with the soil. Insure the uniformity of the hydroseed application.
Exercise special care to prevent any of the slurry from being sprayed onto any hardscape areas including concrete walks, fences, walls, buildings, etc. Remove all slurry sprayed onto these surfaces at the contractor's expense.

Contractor shall save all seed and fertilizer tags and fiber mulch bags for the Engineer to verify compliance with the drawings and specifications.

The Contractor shall maintain the area until sufficient seed growth has occurred to stabilize the soil. This includes the restoration of all eroded areas, and the placing and maintaining of erosion control measures as required to prevent further erosion.

Normal seeding season shall be:

For Grass:
Spring seeding - April 1 through June 15
Fall seeding - August 15 through October 1

For Wildflower:
Spring seeding - March 1 to May 15
Fall seeding - November 15 to December 15

Seeding at other times will be allowed only with permission of the Engineer.

The Contractor may be required to top dress and reseed certain areas to achieve sufficient, uniform turf establishment.

MAINTENANCE

Upon completion of hydroseeding operations, maintain all hydroseeded areas for a period of 90 calendar days as follows:

1. Germination stage irrigation: Approximately 24 hours after hydroseeding the planting areas, initiate the watering sequence. Leave the water on long enough to moisten the soil thoroughly to the depth of the slurry mulch taking care not to super saturate or wash away the slurry and seed. Perform frequent, light irrigation until the seed has germinated. Repair all seed washings and erosion.

2. Establishment stage irrigation: After germination, reduce each watering. The specific watering program shall be approved by the Engineer.

Fertilize all hydroseeded areas with an approved commercial fertilizer approximately thirty (30) calendar days from the start of the maintenance period.

ACCEPTANCE

Final approval and acceptance will be given in writing by the Engineer following a final acceptance inspection. The Engineer reserves the option to extend the maintenance period to achieve complete germination of all turf or other plant materials with a uniform height, color and density throughout all hydroseeded areas. Final acceptance may be given at the end of the 90 calendar day maintenance period if an acceptable germination of turf and adequate plant establishment has been obtained, as determined by the Engineer.

GUARANTEE AND REPLACEMENT

Provide a guarantee for a period of one (1) year after final acceptance, that the installed grass areas be at least the quality and condition as at the time of acceptance. Rehydroseed unacceptable areas during the guarantee period. The guarantee shall not include damage or loss of turf due to acts of God, acts of vandalism or negligence on the part of the Town.

MEASUREMENT

"Restoration of Lawn Areas" and "Restoration of Wetland Areas" will be measured for payment by the actual number of square yards of turf establishment performed in accordance with the Plans and Specifications.

RESTORATION OF LAWN AND WETLAND AREAS AND EROSION CONTROL BLANKET

The following items will not be measured separately for payment, but shall be considered as included in the unit price bid for “Restoration of Lawn Areas” or “Restoration of Wetland Areas”:

1. Excavation
2. Fertilizer, seed or mulch
3. Topdressing and reseeding
4. Water
5. Lawn areas outside the grading limits disturbed by the Contractor

Final payment for this item will not be issued until grass is established to the approval of the Engineer. Partial payments may be made, but in no case will more than 50% of the item be paid until the grass is established to the approval of the Engineer.

“Erosion Control Blanket” will be measured for payment by the actual number of square yards of erosion control matting installed and accepted. Turf establishment under the erosion control blanket will be measured for payment under the “Restoration of Lawn Areas” item.

PAYMENT

This work will be paid for at the contract unit price bid for "Restoration of Lawn Areas" or “Restoration of Wetlands Areas”, which price shall include all the furnishing and fine grading of slope and lawns areas, topsoil, fertilizer, seed, replacement of lawn structures, labor, tools and equipment incidental thereto.

Any disturbance of lawns beyond the grading limits shown on the Plans shall be restored to its original condition by the Contractor at no expense to the Town of Manchester.

Final payment for this item will not be issued until grass is established to the approval of the Engineer. Partial payments may be made, but in no case will more than 50% of the item be paid until the grass is established to the approval of the Engineer.

“Erosion Control Blanket” will be paid for at the contract unit price bid for “Erosion Control Blanket”, which price shall include all materials, labor, tools and equipment necessary to install the erosion control blanket in accordance with the Plans and Specifications.

Pay Item	Pay Unit
Restoration of Lawn Areas	Square Yard

MAINTENANCE AND PROTECTION OF TRAFFIC

DESCRIPTION

"Maintenance and Protection of Traffic" includes the furnishing, installation, maintenance, adjusting, cleaning, storing and removal when no longer required of all temporary signs (sheet aluminum or plywood), sign supports, cones, drums, barricades or other approved traffic control devices necessary to maintain and protect traffic within the project area in accordance with the Plans, Specifications, the Manual of Uniform Traffic Control Devices (MUTCD), the Town of Manchester Traffic Control Ordinance, or as directed by the Engineer.

SUBMITTALS

Unless a Traffic Detour Plan is provided elsewhere in these specifications, all temporary road closures and detours proposed by the Contractor must be approved by the Engineer prior to implementation. In these instances, the Contractor shall submit a plan of the proposed detour, complete with sign patterns, and estimated duration of detour to the Engineer for approval at least seven (7) days prior to execution. Detours will only be considered for infrequent, short-term operations.

MATERIALS

Traffic Drums

The traffic drums shall be manufactured plastic or rubber designed in accordance with the latest edition of the MUTCD. The device shall be stabilized with sandbags or other approved means. The traffic drum shall have, at a minimum, two 4" wide retroreflective orange stripes and two 6" wide retroreflective white stripes. The stripes shall be placed horizontally and alternated with the orange stripe on top. The sections of the traffic drum not covered with retroreflective sheeting shall be orange. Either Type III or Type VI Retroreflective Sheeting, in accordance with Section M.18.09.01 of Form 817 shall be used

Traffic Cones

Traffic Cones shall be constructed of materials to a thickness to withstand impact without damage to cones or to vehicles. The traffic cones shall be 42" tall and of sufficient mass or have bases to which ballast may be added to assure that they will not be blown over or displaced by wind from passing vehicles. Traffic cones shall be reflectorized utilizing Type VI retro reflective sheeting in accordance with Sub article M.18.09.01 of Form 817.

Barricades

Barricades shall conform to the requirements of Section 9.79.02 of Form 817.

Construction Area Signs

Construction Area signs shall be sheet aluminum or plywood with necessary supports. Signs faces shall be of retro reflective sheeting, High Intensity Prismatic (Type III) and conform to section 12.20 of Form 817. When the signs are no longer required on the project, they shall remain the property of the Contractor.

MAINTENANCE AND PROTECTION OF TRAFFIC

Opposing Traffic Lane Dividers

Opposing Traffic Lane Dividers shall conform to the requirements of Section 6F.76 of the MUTCD utilizing Type III Reflective sheeting

Any other traffic control devices shall meet the minimum material requirements of Form 817 and the Manual of Uniform Traffic Control Devices (MUTCD).

RESTRICTIONS

During working hours, the Contractor shall maintain at least one lane of traffic a minimum 10' in width on a gravel or paved surface with certified, uniformed flaggers directing traffic throughout the project area unless otherwise directed by the Engineer. At the end of each work day, the Contractor shall open the roadway to travel in both directions on a gravel or paved surface at least 20' in width with all applicable signs, cones, drums, barricades and lane dividers required by the Engineer.

The Contractor shall schedule operations such that travel by the general public on gravel surfaces is limited to two (2) weeks.

Temporary transverse drop-offs between pavement and milled pavement or between pavement and gravel shall have a maximum 10:1 slope. Temporary longitudinal drop-offs between pavement & milled pavement or between pavement and gravel shall have a maximum 3:1 slope.

REQUIREMENTS

The Contractor shall maintain and protect traffic in the project area in accordance with the requirements and regulations of the Town of Manchester, and these Specifications. Unless otherwise specified, the Contractor must maintain pedestrian and vehicular traffic to permit access to businesses, factories, residences, and intersecting streets.

1. *Advanced Warning:* It shall be the sole responsibility of the Contractor to forewarn the Town's Local Regulatory Agencies (including but not limited to the Public Works, Police and Fire Departments and Board of Education) at least 72 hours in advance of changes in traffic patterns due to reduction of pavement widths or closing of streets.

2. *Access:* The Contractor shall arrange his/her operations to properties along the street including temporary bridges to driveways, and provide access to fire hydrants, manholes, gate boxes, or other utilities. Whenever any trench obstructs traffic in or to any public way, private driveway, or property entrance, the Contractor shall take such steps as required to maintain necessary traffic and access including temporary bridging if required. The Contractor shall confine his/her occupancy of public or traveled ways to the smallest space compatible with the efficient and safe performance of the work.

   The Contractor shall observe and obey all local and state laws, ordinances, regulations and permits in relation to the obstruction of streets and highways, keeping passageways open and protecting traffic where there may be danger from blasting or other construction activities.

If the Contractor's operations interfere with the removal or sanding of snow or ice by the public authorities or adjoining land owners, in an ordinary manner with regular highway equipment, the Contractor shall be required to perform such services for the public authorities or adjoining owners without charge. If the Contractor fails to do so, he shall reimburse the said authorities or adjoining owners or the Town for any additional cost to them for doing such work occasioned by conditions arising from the Contractor's operations, occupancy, or trench surfaces, together with any damage to the equipment of said parties by those conditions, or claims of any parties for damage or injury or loss by reason of failure to remove snow or ice or to sand icy spots under these conditions.

3. *Maintenance:* The Contractor shall maintain all traffic control devices on the project. Traffic control devices shall be cleaned periodically to maintain retroreflectivity. Any damaged traffic control devices shall be immediately removed and replaced. It is the Contractors responsibility to move, adjust or relocate traffic control devices as his operations change.

4. *Non-Performance:* Should the Contractor or his/her employees neglect to maintain traffic control devices as required in these Specifications, the Engineer may shut the work down. If the Contractor fails to take corrective action, the Engineer may immediately and without notice, furnish, install and maintain traffic control devices. The cost thereof shall be borne by the Contractor and may be deducted from any amount due or to become due to the Contractor under this contract.

   The Contractor will be held responsible for any damages that the Town, Engineer, Governmental units, or their heirs or assigns may have to pay as a consequence of the Contractor's failure to protect the public from injury, and the same may be deducted from any payments that are due or may become due to the Contractor under this contract.

TRAFFIC CONTROL PATTERNS

Traffic control patterns shall be used when a work operation requires that all or part of any vehicle or work area protrudes onto any part of a travel lane or shoulder. For each situation, the installation of traffic control devices shall be based on the following:

Speed and volume of traffic
Duration of operation
Exposure to hazards

Traffic control patterns shall be uniform, neat and orderly so as to command respect from the motorist.

In the case of a horizontal or vertical sight restriction in advance of the work area, the traffic control pattern shall be extended to provide adequate sight distance for approaching traffic.

If a lane reduction taper is required to shift traffic, the entire length of the taper should be installed on a tangent section of roadway so that the entire taper area can be seen by the motorist.

MAINTENANCE AND PROTECTION OF TRAFFIC

Any existing signs that are in conflict with the traffic control patterns shall be removed, covered, or turned so that they are not readable by oncoming traffic.

When installing a traffic control pattern, a "buffer area" must be provided which shall be free of equipment, workers, materials and parked vehicles.

When required by the Engineer, the Contractor shall install temporary marking tape to designate traffic lanes until such time permanent pavement markings included in the Contract are installed.

Although each situation must be dealt with individually, conformity with the typical traffic control pattern contained herein is required. In a situation not adequately covered by the typical traffic control plans, the Contractor must contact the Engineer for assistance prior to setting up a traffic control patterns.

ALLOWABLE ADJUSTMENT OF SIGNS & DEVICES ON TRAFFIC CONTROL PLANS

The traffic control patterns contained herein show the location and spacing of signs and devices under ideal conditions. Signs and devices should be installed as shown on these patterns whenever possible.

The proper application of the traffic control patterns and installation of traffic control devices depends on actual field conditions.

Adjustments to the traffic control patterns/plans shall be made only at the direction of the Engineer to improve the visibility of the signs and devices and to better control traffic operations. Adjustments to the traffic control plans shall be based on safety of work forces and motorists, abutting property requirements, driveways, side roads, and the vertical and horizontal curvature of the roadway.

The Engineer may require that the traffic control pattern be located significantly in advance of the work area to provide better sight line to the signing and safer traffic operations through the work zone.

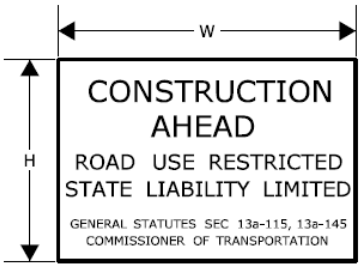
Table I indicates the minimum taper length required for a lane closure based on the posted speed limit of the roadway. These taper lengths shall only be used when the recommended taper lengths shown on the traffic control patterns cannot be achieved.

TABLE I – MINIMUM TAPER LENGTHS

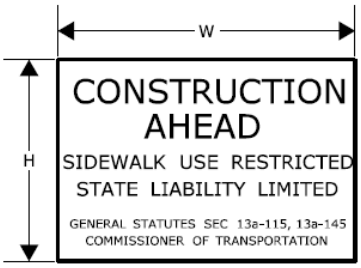
POSTED SPEED LIMIT MILES PER HOUR	MINIMUM TAPER LENGTH IN FEET FOR A SINGLE LANE CLOSURE
30 OR LESS	180
35	250
40	320
45	540
50	600
55	660
65	780

Series 16 signs shall be post mounted at the beginning and end of the project area as applicable.

SERIES 16 SIGNS



		W H
16-E	80-1605	84" x 60"
16-H	80-1608	60" x 42"
16-M	80-1613	30" x 24"



		W H
16-S	80-1619	48" x 30"

THE 16-S SIGN SHALL BE USED ON ALL PROJECTS THAT REQUIRE SIDEWALK RECONSTRUCTION OR RESTRICT PEDESTRIAN TRAVEL ON AN EXISTING SIDEWALK.

SERIES 16 SIGNS SHALL BE INSTALLED IN ADVANCE OF THE TRAFFIC CONTROL PATTERNS TO ALLOW MOTORISTS THE OPPORTUNITY TO AVOID A WORK ZONE. SERIES 16 SIGNS SHALL BE INSTALLED ON ANY MAJOR INTERSECTING ROADWAYS THAT APPROACH THE WORK ZONE. ON LIMITED-ACCESS HIGHWAYS, THESE SIGNS SHALL BE LOCATED IN ADVANCE OF THE NEAREST UPSTREAM EXIT RAMP AND ON ANY ENTRANCE RAMPS PRIOR TO OR WITHIN THE WORK ZONE LIMITS.

THE LOCATION OF SERIES 16 SIGNS CAN BE FOUND ELSEWHERE IN THE PLANS OR INSTALLED AS DIRECTED BY THE ENGINEER.

SIGNS 16-E AND 16-H SHALL BE POST-MOUNTED.

SIGN 16-E SHALL BE USED ON ALL EXPRESSWAYS.

SIGN 16-H SHALL BE USED ON ALL RAMPS, OTHER STATE ROADWAYS, AND MAJOR TOWN/CITY ROADWAYS.

SIGN 16-M SHALL BE USED ON OTHER TOWN ROADWAYS.

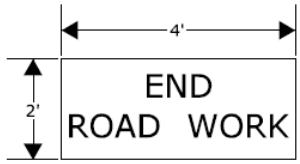
REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

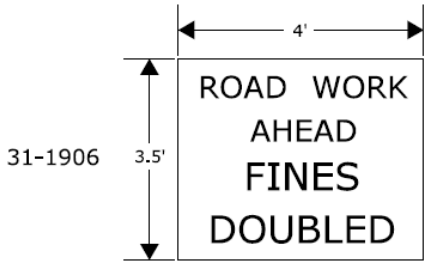
THE REGULATORY SIGN "ROAD WORK AHEAD FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY IN CONNECTICUT WHERE THERE ARE WORKERS ON THE HIGHWAY OR WHEN THERE IS OTHER THAN EXISTING TRAFFIC OPERATIONS.

THE "ROAD WORK AHEAD FINES DOUBLED" REGULATORY SIGN SHALL BE PLACED AFTER THE SERIES 16 SIGN AND IN ADVANCE OF THE "ROAD WORK AHEAD" SIGN.

"END ROAD WORK" SIGN

THE LAST SIGN IN THE PATTERN MUST BE THE "END ROAD WORK" SIGN.





SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
REQUIRED SIGNS

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED _____ PRINCIPAL ENGINEER

Charles S. Harlow
2012.06.05 11:35:43-04'00'

NOTES FOR TRAFFIC CONTROL PLANS

1. IF A TRAFFIC STOPPAGE OCCURS IN ADVANCE OF SIGN (A), THEN AN ADDITIONAL SIGN (A) SHALL BE INSTALLED IN ADVANCE OF THE STOPPAGE.
2. SIGNS (AA), (A), AND (D) SHOULD BE OMITTED WHEN THESE SIGNS HAVE ALREADY BEEN INSTALLED TO DESIGNATE A LARGER WORK ZONE THAN THE WORK ZONE THAT IS ENCOMPASSED ON THIS PLAN.
3. SEE TABLE 1 FOR ADJUSTMENT OF TAPERS IF NECESSARY.
4. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 36 HOURS, THEN TRAFFIC DRUMS SHALL BE USED IN PLACE OF TRAFFIC CONES.
5. ANY LEGAL SPEED LIMIT SIGNS WITHIN THE LIMITS OF A ROADWAY / LANE CLOSURE AREA SHALL BE COVERED WITH AN OPAQUE MATERIAL WHILE THE CLOSURE IS IN EFFECT, AND UNCOVERED WHEN THE ROADWAY / LANE CLOSURE IS RE-OPENED TO ALL LANES OF TRAFFIC.
6. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 36 HOURS, THEN ANY EXISTING CONFLICTING PAVEMENT MARKINGS SHALL BE ERADICATED OR COVERED, AND TEMPORARY PAVEMENT MARKINGS THAT DELINEATE THE PROPER TRAVELPATHS SHALL BE INSTALLED.
7. DISTANCES BETWEEN SIGNS IN THE ADVANCE WARNING AREA MAY BE REDUCED TO 100' ON LOW-SPEED URBAN ROADS (SPEED LIMIT < 40 MPH).
8. IF THIS PLAN IS TO REMAIN IN OPERATION DURING THE HOURS OF DARKNESS, INSTALL BARRICADE WARNING LIGHTS - HIGH INTENSITY ON ALL POST-MOUNTED DIAMOND SIGNS IN THE ADVANCE WARNING AREA.
9. A CHANGEABLE MESSAGE SIGN SHALL BE INSTALLED ONE HALF TO ONE MILE IN ADVANCE OF THE LANE CLOSURE TAPER.
10. SIGN (P) SHALL BE MOUNTED A MINIMUM OF 7 FEET FROM THE PAVEMENT SURFACE TO THE BOTTOM OF THE SIGN.

TABLE 1 - MINIMUM TAPER LENGTHS

POSTED SPEED LIMIT (MILES PER HOUR)	MINIMUM TAPER LENGTH FOR A SINGLE LANE CLOSURE
30 OR LESS	180' (55m)
35	250' (75m)
40	320' (100m)
45	540' (165m)
50	600' (180m)
55	660' (200m)
65	780' (240m)

METRIC CONVERSION CHART (1" = 25mm)

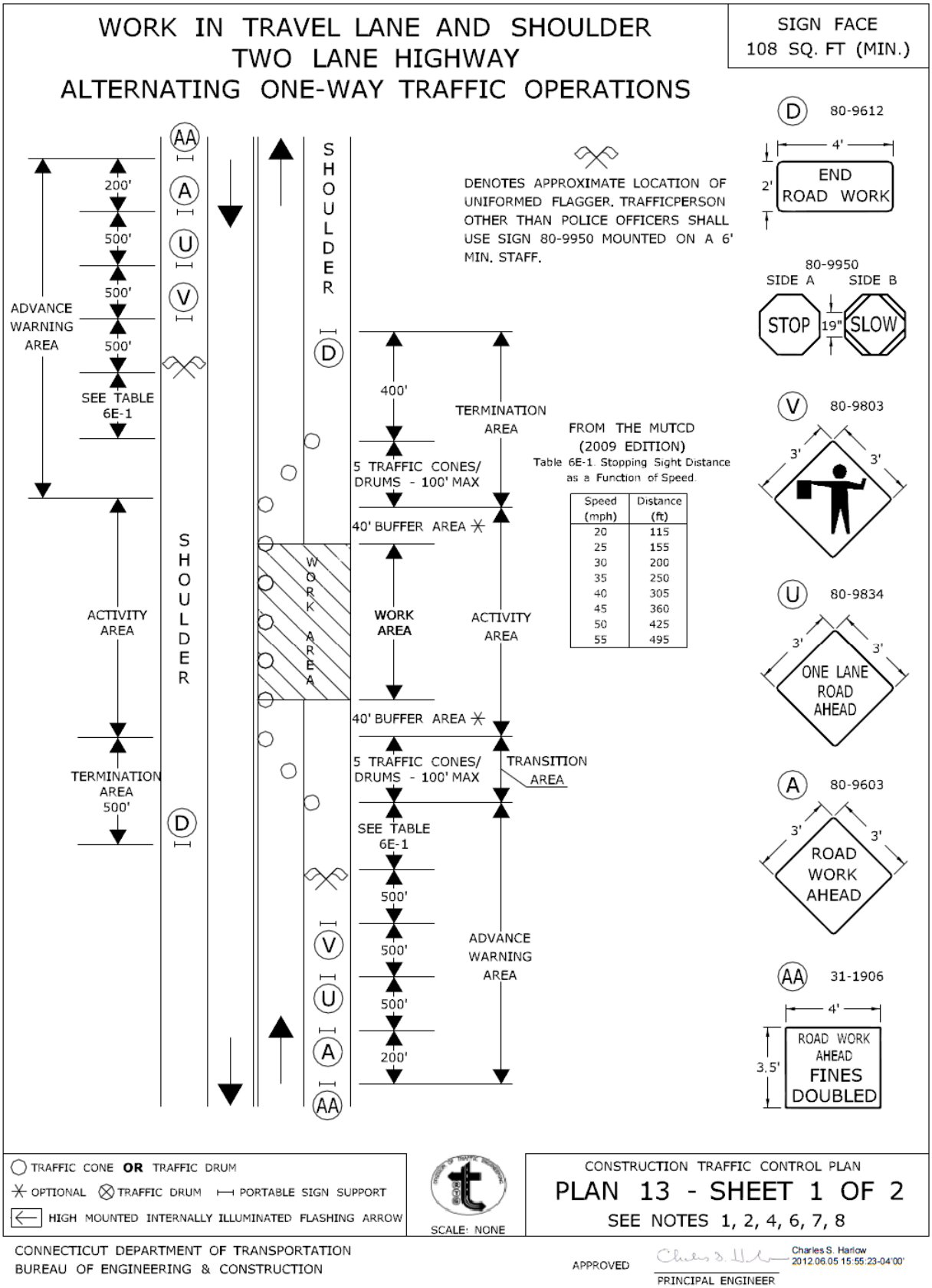
ENGLISH	METRIC	ENGLISH	METRIC	ENGLISH	METRIC
12"	300mm	42"	1050mm	72"	1800mm
18"	450mm	48"	1200mm	78"	1950mm
24"	600mm	54"	1350mm	84"	2100mm
30"	750mm	60"	1500mm	90"	2250mm
36"	900mm	66"	1650mm	96"	2400mm

SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
NOTES

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED Charles S. Harlow 2012.06.05 15:50:35-04'00'
PRINCIPAL ENGINEER


WORK IN TRAVEL LANE AND SHOULDER
TWO LANE HIGHWAY
ALTERNATING ONE-WAY TRAFFIC OPERATIONS
SIGN FACE
108 SQ. FT (MIN.)
DENOTES APPROXIMATE LOCATION OF UNIFORMED FLAGGER. TRAFFICPERSON OTHER THAN POLICE OFFICERS SHALL USE SIGN 80-9950 MOUNTED ON A 6' MIN. STAFF.
ADVANCE WARNING AREA
200'
500'
500'
500'
SEE TABLE 6E-1
ACTIVITY AREA
TERMINATION AREA 500'
SHOULDER
WORK AREA
400'
5 TRAFFIC CONES/ DRUMS - 100' MAX
40' BUFFER AREA
WORK AREA
40' BUFFER AREA
5 TRAFFIC CONES/ DRUMS - 100' MAX
SEE TABLE 6E-1
500'
500'
500'
200'
TERMINATION AREA
ACTIVITY AREA
TRANSITION AREA
ADVANCE WARNING AREA
FROM THE MUTCD (2009 EDITION)
Table 6E-1. Stopping Sight Distance as a Function of Speed
Speed (mph) | Distance (ft)
20 | 115
25 | 155
30 | 200
35 | 250
40 | 305
45 | 360
50 | 425
55 | 495
D 80-9612
4'
2'
END ROAD WORK
80-9950
SIDE A SIDE B
STOP 19" SLOW
V 80-9803
3' 3'
U 80-9834
3' 3'
ONE LANE ROAD AHEAD
A 80-9603
3' 3'
ROAD WORK AHEAD
AA 31-1906
4'
3.5'
ROAD WORK AHEAD
FINES DOUBLED
TRAFFIC CONE OR TRAFFIC DRUM
OPTIONAL TRAFFIC DRUM PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW
SCALE: NONE
CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 1 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION
APPROVED
PRINCIPAL ENGINEER
Charles S. Harlow
2012.06.05 15:55:23-04'00'

WORK IN TRAVEL LANE AND SHOULDER
TWO LANE HIGHWAY
ALTERNATING ONE-WAY TRAFFIC OPERATIONS

SIGN FACE
108 SQ. FT (MIN.)

HAND SIGNAL METHODS TO BE USED BY UNIFORMED FLAGGERS

THE FOLLOWING METHODS FROM SECTION 6E.07, FLAGGER PROCEDURES, IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," SHALL BE USED BY UNIFORMED FLAGGERS WHEN DIRECTING TRAFFIC THROUGH A WORK AREA. THE STOP/SLOW SIGN PADDLE (SIGN NO. 80-9950) SHOWN ON THE TRAFFIC STANDARD SHEET TR-1220 01 ENTITLED, "SIGNS FOR CONSTRUCTION AND PERMIT OPERATIONS" SHALL BE USED.

A. TO STOP TRAFFIC

TO STOP ROAD USERS, THE FLAGGER SHALL FACE ROAD USERS AND AIM THE STOP PADDLE FACE TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FREE ARM SHALL BE HELD WITH THE PALM OF THE HAND ABOVE SHOULDER LEVEL TOWARD APPROACHING TRAFFIC.

B. TO DIRECT TRAFFIC TO PROCEED

TO DIRECT STOPPED ROAD USERS TO PROCEED, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FLAGGER SHALL MOTION WITH THE FREE HAND FOR ROAD USERS TO PROCEED.

C. TO ALERT OR SLOW TRAFFIC

TO ALERT OR SLOW TRAFFIC, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. TO FURTHER ALERT OR SLOW TRAFFIC, THE FLAGGER HOLDING THE SLOW PADDLE FACE TOWARD ROAD USERS MAY MOTION UP AND DOWN WITH THE FREE HAND, PALM DOWN.

○ TRAFFIC CONE **OR** TRAFFIC DRUM
✳ OPTIONAL ⊗ TRAFFIC DRUM ⊢ PORTABLE SIGN SUPPORT
⇦ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

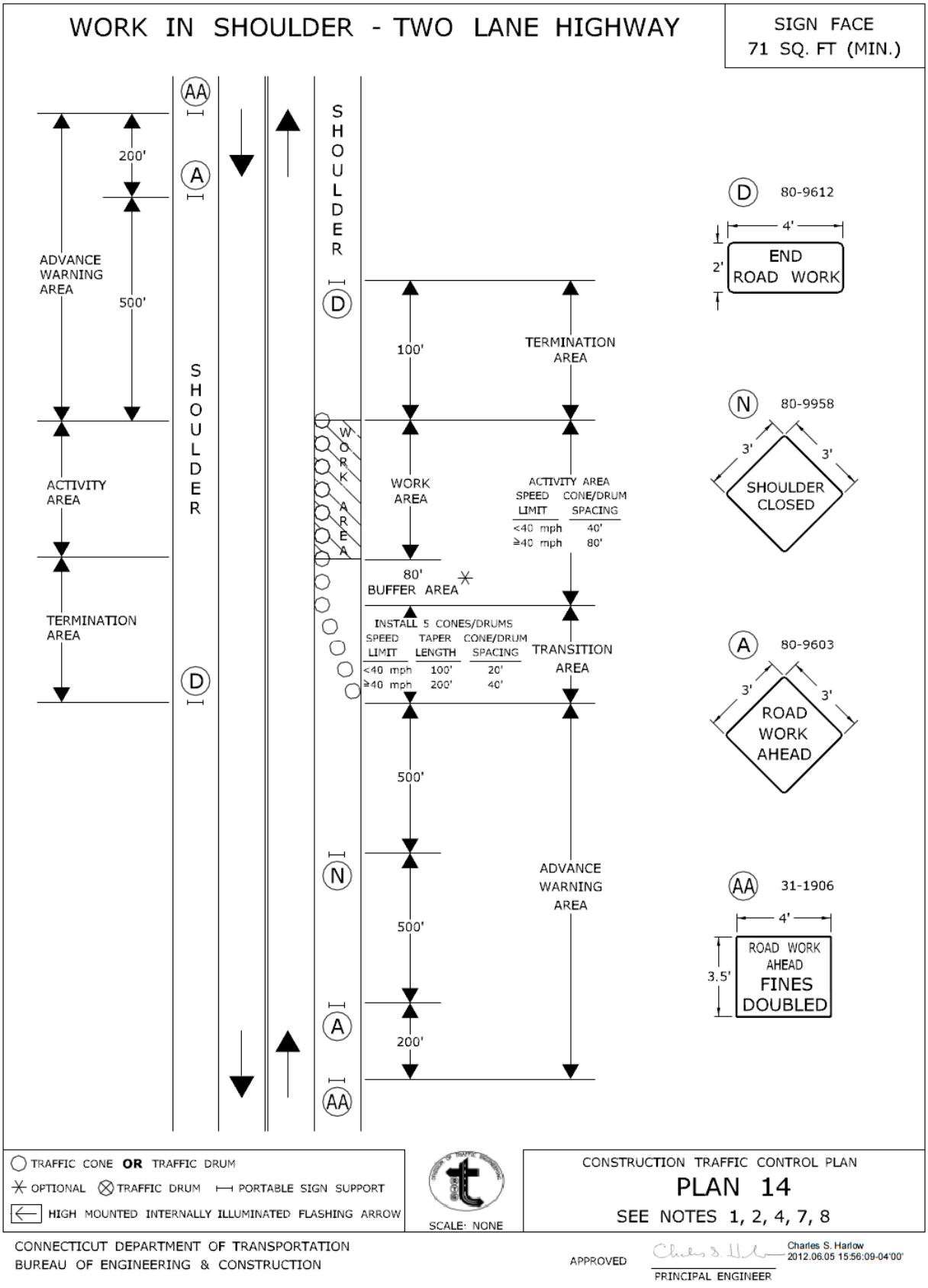
SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 2 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8

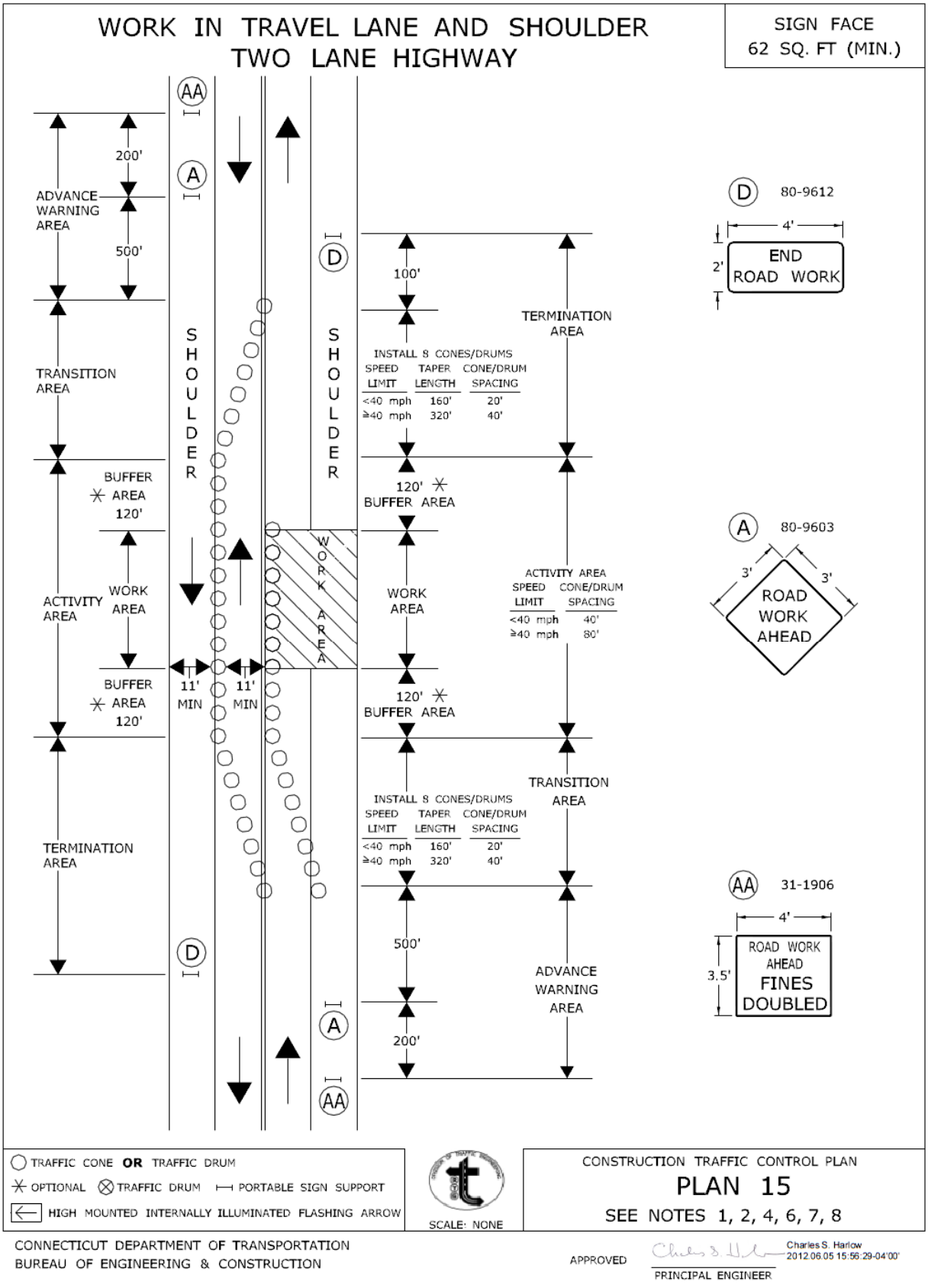
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

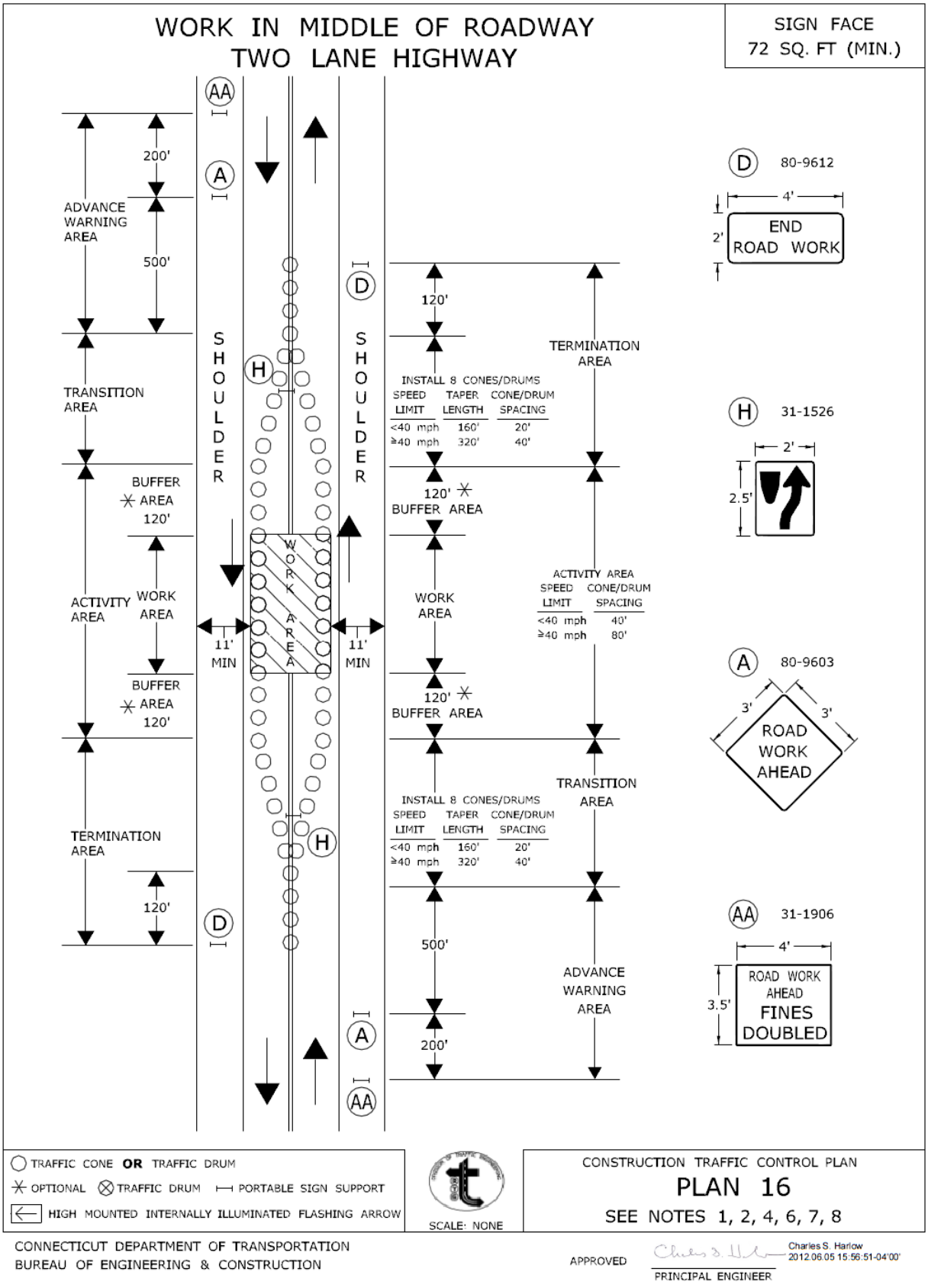
APPROVED Charles S. Harlow 2012.06.05 15:55:45-04'00'
PRINCIPAL ENGINEER

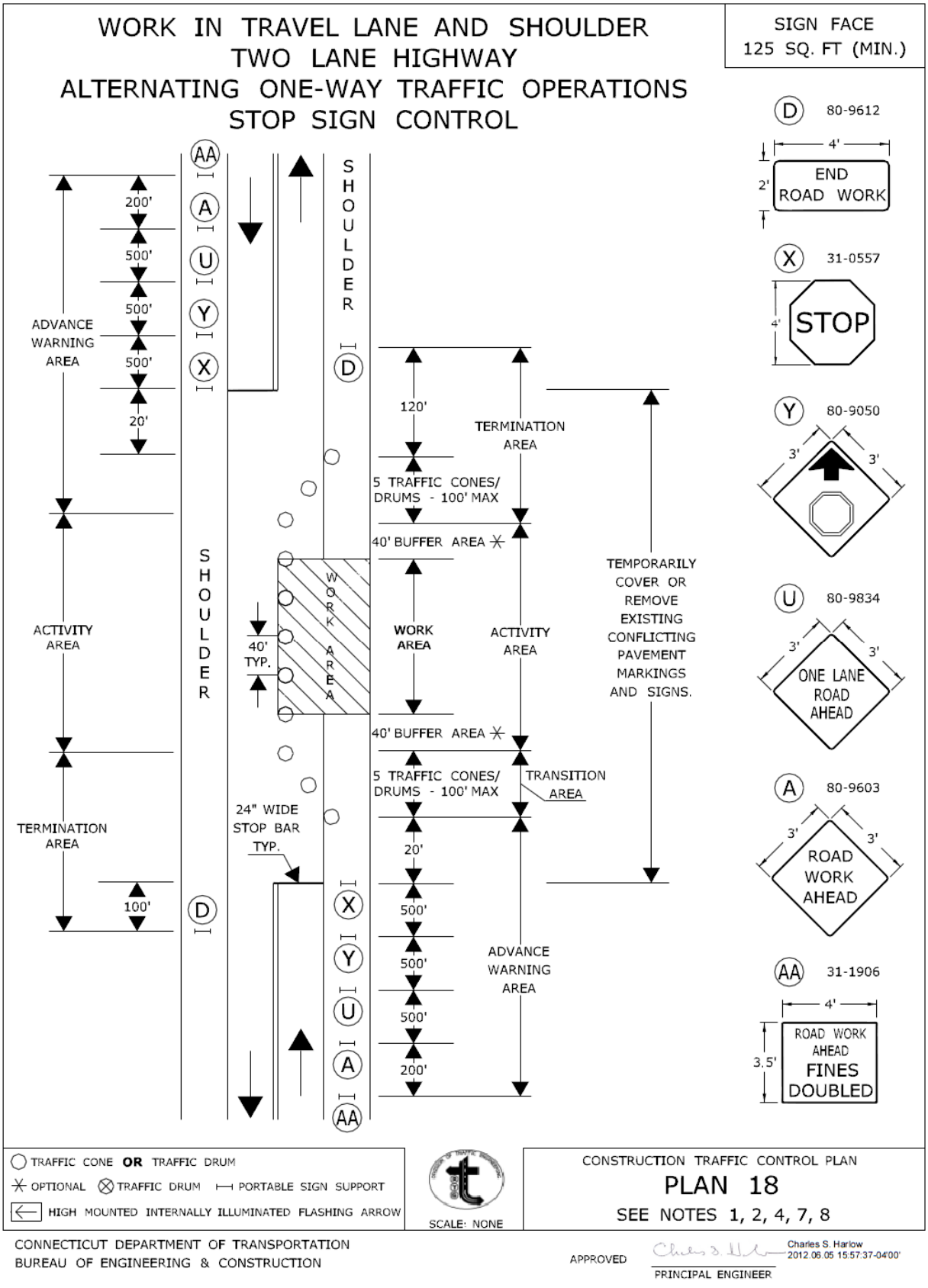
MAINTENANCE AND PROTECTION OF TRAFFIC



MAINTENANCE AND PROTECTION OF TRAFFIC




WORK IN MIDDLE OF ROADWAY
TWO LANE HIGHWAY
SIGN FACE
72 SQ. FT (MIN.)
AA
A
D
H
200'
ADVANCE WARNING AREA
500'
TRANSITION AREA
BUFFER AREA 120'
ACTIVITY AREA
WORK AREA
BUFFER AREA 120'
TERMINATION AREA
120'
SHOULDER
SHOULDER
WORK AREA
11' MIN
11' MIN
120'
TERMINATION AREA
INSTALL 8 CONES/DRUMS
SPEED LIMIT | TAPER LENGTH | CONE/DRUM SPACING
<40 mph | 160' | 20'
≥40 mph | 320' | 40'
120' BUFFER AREA
WORK AREA
ACTIVITY AREA
SPEED LIMIT | CONE/DRUM SPACING
<40 mph | 40'
≥40 mph | 80'
120' BUFFER AREA
TRANSITION AREA
INSTALL 8 CONES/DRUMS
SPEED LIMIT | TAPER LENGTH | CONE/DRUM SPACING
<40 mph | 160' | 20'
≥40 mph | 320' | 40'
500'
ADVANCE WARNING AREA
200'
D 80-9612
4'
2'
END ROAD WORK
H 31-1526
2'
2.5'
A 80-9603
3'
3'
ROAD WORK AHEAD
AA 31-1906
4'
3.5'
ROAD WORK AHEAD
FINES DOUBLED
TRAFFIC CONE OR TRAFFIC DRUM
OPTIONAL
TRAFFIC DRUM
PORTABLE SIGN SUPPORT
HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW
SCALE: NONE
CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 16
SEE NOTES 1, 2, 4, 6, 7, 8
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION
APPROVED
PRINCIPAL ENGINEER
Charles S. Harlow
2012.06.05 15:56:51-04'00'



CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED _____ PRINCIPAL ENGINEER
Charles S. Harlow
2012.06.05 15:57:37-04'00'

MAINTENANCE AND PROTECTION OF TRAFFIC

MEASUREMENT AND PAYMENT

"Maintenance and Protection of Traffic" will be measured and paid for by the actual number of days traffic control devices are in use during active construction within contract time requirements. The contract unit price shall include all materials, labor, tools and equipment incidental to furnishing, maintaining and removing approved traffic control devices as shown on the Plan or as directed by the Engineer, and other pertinent work necessary to comply with this specification, including, but not limited to:

- notifying public authorities of any proposed traffic changes;
- furnishing, installing, relocating, replacing and removal of traffic cones, traffic drums, barricades, construction signs, temporary marking tape, and opposing traffic lane dividers;
- furnishing, installing, and removing the material for a temporary traversable slope in those areas where a longitudinal dropdown exists;
- furnishing, installing, and removing the material for a temporary transition where a transverse dropdown exists;
- temporarily relocating existing signs and sign supports as many times as deemed necessary and furnishing, installing, and removing temporary sign supports and foundations if necessary during construction; and
- removal or sanding of snow or ice or removal of leaves on the roadway or sidewalk if the Contractor's operations interfere with the removal or sanding of snow or ice or the removal of leaves by the public authorities or adjoining land owners in an ordinary manner with regular highway equipment.

"Maintenance and Protection of Traffic" will not be measured for payment for any days in which the Contractor performs work beyond the allotted contract time, adjusted for any change orders.

No claim for additional payment due to unusual construction conditions encountered or delay caused by the Contractor or other outside agencies shall be considered.

Pay Item	Pay Unit
Maintenance and Protection of Traffic	Days

TRAFFICPERSON (UNIFORMED FLAGGERS)

DESCRIPTION

"Trafficperson (Uniformed Flaggers)" includes the furnishing of certified, uniformed flagpersons capable of safely directing traffic around the work area during all lane closures or when directed by the Engineer.

SUBMITTALS

A copy of the proposed flaggers' training certificates shall be submitted to the Engineer prior to any Work.

MATERIALS

Not applicable. (See "Maintenance and Protection of Traffic" item)

CONSTRUCTION METHODS

Construction methods shall conform to Article 9.70.03 of Form 817.

MEASUREMENT

"Trafficperson (Uniformed Flaggers)" will be measured and paid for by the actual number of hours for each certified flagger rendering services approved by the Engineer. Services used beyond the limits approved by the Engineer or in connection with movement of construction equipment will not be measured for payment. The following will not be measured separately for payment but its cost shall be considered as included in the unit price bid for "Trafficperson (Uniformed Flaggers)":

1. Travel time;
2. Mileage fees/Fuel surcharges;
3. Paddles;
4. Safety Equipment;

PAYMENT

Uniformed flaggers will be paid at the contract unit price per hour for "Trafficperson (Uniformed Flaggers)", which price shall constitute all compensation, benefits, equipment and any other incidental costs associated with the furnishing of flagger services.

Pay Item	Pay Unit
Trafficperson (Uniformed Flaggers)	Hour

APPENDIX "A"

TOWN OF MANCHESTER
HOLIDAY SCHEDULE

TOWN OF MANCHESTER, CONNECTICUT
HUMAN RESOURCES DEPARTMENT

HOLIDAYS OBSERVED BY THE TOWN OF MANCHESTER 2020

Town Offices will be closed in observance of the following holidays in calendar year 2020:

NEW YEAR'S DAY	**WEDNESDAY, JANUARY 1, 2020**
MARTIN LUTHER KING DAY	**MONDAY, JANUARY 20, 2020**
***LINCOLN'S BIRTHDAY**	
WASHINGTON'S BIRTHDAY	**MONDAY, FEBRUARY 17, 2020**
GOOD FRIDAY	**FRIDAY, APRIL 10, 2020**
MEMORIAL DAY	**MONDAY, MAY 25, 2020**
INDEPENDENCE DAY	**FRIDAY, JULY 3, 2020**
LABOR DAY	**MONDAY, SEPTEMBER 7, 2020**
COLUMBUS DAY	**MONDAY, OCTOBER 12, 2020**
VETERAN'S DAY	**WEDNESDAY, NOVEMBER 11, 2020**
THANKSGIVING DAY	**THURSDAY, NOVEMBER 26, 2020**
DAY AFTER THANKSGIVING	**FRIDAY, NOVEMBER 27, 2020**
***FLOATING HOLIDAY**	**THURSDAY, DECEMBER 24, 2020**
CHRISTMAS DAY	**FRIDAY, DECEMBER 25, 2020**

Where appropriate these Holidays reflect the schedule observed by the State of Connecticut.

***The Town, at its discretion, retains the right to substitute a floating holiday on a date of its choosing in lieu of the traditional date for celebrating Lincoln's Birthday, provided there is notification of the substitute holiday not later than December 31st for the following year.**

APPENDIX “B”

TOWN OF MANCHESTER

TRAFFIC CONTROL ORDINANCE

Chapter 279. STREETS AND SIDEWALKS
Article II. Traffic Control at Construction Activity
§279-15 Use of municipal flagpersons.

A. If the Chief of Police or his designee, in his sole discretion, determines that the public safety requires the use of a flagperson, and the repair work takes place during normal business hours of 7:00 a.m. to 6:00 p.m., Monday through Saturday; and affects one or more of the following Town principal or minor arterial roads, and the repair work is not de minimis in nature, the Chief of Police shall require that the person engaged in the repair work first utilize officers of the Manchester Police Department as flagpersons.

(1) Principal arterials:

(a) Route 83 (Main Street) — Charter Oak Street to Center Street.
(b) Buckland Street — Tolland Turnpike to South Windsor Town line.

(2) Minor arterials:

(a) Broad Street.
(b) West and East Middle Turnpike — New State Road to Woodbridge Street.
(c) North Main Street — Main Street to Tolland Turnpike.
(d) New State Road — West Middle Turnpike to Adam Street.
(e) Tolland Turnpike — North Main Street to East Hartford Town line.
(f) Adams Street — Center Street to Tolland Turnpike.
(g) Keeney Street — Hartford Road to Glastonbury Town line.
(h) McKee Street.
(i) Woodbridge Street — East Middle Turnpike to Route 83 (Main Street).
(j) Buckland Hills Drive.
(k) Slater Street.
(l) Hale Road.
(m) Parker Street — Tolland Turnpike to Colonial Road.
(n) Pine Street.
(o) Summit Street.
(p) Pavilions Drive.

B. The expense of such police protection shall be paid by the entity engaged in such repair work at rates determined by the Town.

C. Notwithstanding any other provision of this article, any repair work performed by the municipality or any of its offices or agents, or initiated by the municipality or any of its offices or agents and performed by a private contractor, regardless of location, may at the Chief of Police or his designee's discretion utilize properly equipped and trained municipal employees or agents of the municipality as flagpersons. In addition, the Chief of Police or his designee may in his sole discretion recommend to contractors working on state or federal roads that they utilize officers of the Manchester Police Department if a flagperson is needed for public safety.

APPENDIX “C”

CONSTRUCTION WORKDAY CALENDAR AND WEEKLY STATEMENT OF WORKING DAYS FORM

2019

January

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

February

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

March

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24 31	25	26	27	28	29	30

April

S	M	T	W	T	F	S
	1 45	2 46	3 47	4 48	5 49	6
7	8 50	9 51	10 52	11 53	12 54	13
14	15 55	16 56	17 57	18 58	19	20
21	22 59	23 60	24 61	25 62	26 63	27
28	29 64	30 65				

May

S	M	T	W	T	F	S
			1 66	2 67	3 68	4
5	6 69	7 70	8 71	9 72	10 73	11
12	13 74	14 75	15 76	16 77	17 78	18
19	20 79	21 80	22 81	23 82	24 83	25
26	27	28 84	29 85	30 86	31 87	

June

S	M	T	W	T	F	S
						1
2	3 88	4 89	5 90	6 91	7 92	8
9	10 93	11 94	12 95	13 96	14 97	15
16	17 98	18 99	19 100	20 101	21 102	22
23 30	24 103	25 104	26 105	27 106	28 107	29

July

S	M	T	W	T	F	S
	1 108	2 109	3 110	4	5 111	6
7	8 112	9 113	10 114	11 115	12 116	13
14	15 117	16 118	17 119	18 120	19 121	20
21	22 122	23 123	24 124	25 125	26 126	27
28	29 127	30 128	31 129			

August

S	M	T	W	T	F	S
				1 130	2 131	3
4	5 132	6 133	7 134	8 135	9 136	10
11	12 137	13 138	14 139	15 140	16 141	17
18	19 142	20 143	21 144	22 145	23 146	24
25	26 147	27 148	28 149	29 150	30 151	31

September

S	M	T	W	T	F	S
1	2	3 152	4 153	5 154	6 155	7
8	9 156	10 157	11 158	12 159	13 160	14
15	16 161	17 162	18 163	19 164	20 165	21
22	23 166	24 167	25 168	26 169	27 170	28
29	30 171					

October

S	M	T	W	T	F	S
		1 172	2 173	3 174	4 175	5
6	7 176	8 177	9 178	10 179	11 180	12
13	14	15 181	16 182	17 183	18 184	19
20	21 185	22 186	23 187	24 188	25 189	26
27	28 190	29 191	30 192	31 193		

November

S	M	T	W	T	F	S
					1 194	2
3	4 195	5 196	6 197	7 198	8 199	9
10	11	12 200	13 201	14 202	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

2020

January

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

February

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

March

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April

S	M	T	W	T	F	S
			1 203	2 204	3 205	4
5	6 206	7 207	8 208	9 209	10	11
12	13 210	14 211	15 212	16 213	17 214	18
19	20 215	21 216	22 217	23 218	24 219	25
26	27 220	28 221	29 222	30 223		

May

S	M	T	W	T	F	S
					1 224	2
3	4 225	5 226	6 227	7 228	8 229	9
10	11 230	12 231	13 232	14 233	15 234	16
17	18 235	19 236	20 237	21 238	22 239	23
24 31	25	26 240	27 241	28 242	29 243	30

June

S	M	T	W	T	F	S
	1 244	2 245	3 246	4 247	5 248	6
7	8 249	9 250	10 251	11 252	12 253	13
14	15 254	16 255	17 256	18 257	19 258	20
21	22 259	23 260	24 261	25 262	26 263	27
28	29 264	30 265				

July

S	M	T	W	T	F	S
			1 266	2 267	3	4
5	6 268	7 269	8 270	9 271	10 272	11
12	13 273	14 274	15 275	16 276	17 277	18
19	20 278	21 279	22 280	23 281	24 282	25
26	27 283	28 284	29 285	30 286	31 287	

August

S	M	T	W	T	F	S
2	3 288	4 289	5 290	6 291	7 292	1 8
9	10 293	11 294	12 295	13 296	14 297	15
16	17 298	18 299	19 300	20 301	21 302	22
23	24 303	25 304	26 305	27 306	28 307	29
30	31 308					

September

S	M	T	W	T	F	S
		1 309	2 310	3 311	4 312	5
6	7	8 313	9 314	10 315	11 316	12
13	14 317	15 318	16 319	17 320	18 321	19
20	21 322	22 323	23 324	24 325	25 326	26
27	28 327	29 328	30 329			

October

S	M	T	W	T	F	S
				1 330	2 331	3
4	5 332	6 333	7 334	8 335	9 336	10
11	12	13 337	14 338	15 339	16 340	17
18	19 341	20 342	21 343	22 344	23 345	24
25	26 346	27 347	28 348	29 349	30 350	31

November

S	M	T	W	T	F	S
1	2 351	3 352	4 353	5 354	6 355	7
8	9 356	10 357	11	12 358	13 359	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

December

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

TOWN OF MANCHESTER ENGINEERING DIVISION
WEEKLY STATEMENT OF WORKING DAYS

CONTRACTOR:	WEEK ENDING:
ABC CONSTRUCTION Co.	5/31/2013

PROJECT:	PROJECT NO.:
RECONSTRUCTION OF ANY STREET	2013100

Date	Day	Weather, Weather Conditions or Other Conditions	Working Day	Non-Working Day	Working Day No Work Done
5/27/2013	Monday	HOLIDAY			
5/28/2013	Tuesday	Sunny	X		
5/29/2013	Wednesday	Sunny	X		
5/30/2013	Thursday	Rain		X	
5/31/2013	Friday	Sunny	X		
		Days This Week:	3	1	0
		Days Previously Reported:	26	5	8
		Total Days to Date:	29	6	8

Time Extension Days Granted This Week:	0	
Reason:		

Computation of Extended Date for Completion	Number of Days	Numbered Day	Date
1. First Working Day		10	4/1/2013
2. Working Days Specified in Contract	60		
3. Computed Date for Completion (Line 1 + Line 2)		70	6/25/2013
4. Total Time Extensions Approved to Date	4		
5. Total Non-Working Days to Date	6		
6. Subtotal (Line 4 + Line 5)	10		
7. Extended Date for Completion		80	7/10/2013
8. Revised Working Days for Contract (Line 2 + Line 6)	70		
9. Total Working Days to Date	29		
10. Working Days Remaining (Line 8 - Line 9)	41		

CONTROLLING OPERATIONS:

Installation of drainage pipe and associated structures from Sta 0+00 to 2+00.

REMARKS:

The Contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise the statement shall be deemed to have been accepted by the contractor as correct.

CONTRACTOR'S SIGNATURE:	DATE:

Sample

TOWN OF MANCHESTER ENGINEERING DIVISION
WEEKLY STATEMENT OF WORKING DAYS

CONTRACTOR:	WEEK ENDING:

PROJECT:	PROJECT NO.:

Date	Day	Weather, Weather Conditions or Other Conditions	Working Day	Non-Working Day	Working Day No Work Done
	Monday				
	Tuesday				
	Wednesday				
	Thursday				
	Friday				
		Days This Week:			
		Days Previously Reported:			
		Total Days to Date:			

Time Extension Days Granted This Week:		
Reason:		

Computation of Extended Date for Completion	Number of Days	Numbered Day	Date
1. First Working Day			
2. Working Days Specified in Contract			
3. Computed Date for Completion (Line 1 + Line 2)			
4. Total Time Extensions Approved to Date			
5. Total Non-Working Days to Date			
6. Subtotal (Line 4 + Line 5)			
7. Extended Date for Completion			
8. Revised Working Days for Contract (Line 2 + Line 6)			
9. Total Working Days to Date			
10. Working Days Remaining (Line 8 - Line 9)			

CONTROLLING OPERATIONS:

REMARKS:

The Contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise the statement shall be deemed to have been accepted by the contractor as correct.

CONTRACTOR'S SIGNATURE:	DATE:

APPENDIX "D"

STATE OF CONNECTICUT
PREVAILING WAGE RATES