STANDARD SPECIFICATION

FOR

WATER DISTRIBUTION CONSTRUCTION

FOR PROJECTS WITH THE

DARE COUNTY WATER DEPARTMENT

AUGUST 1, 1999

TABLE OF CONTENTS

I. GENERAL CONDITIONS

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1. Definitions
2. Additional Instructions and Detail Drawings
3. Schedules, Reports and Records
4. Drawings and specifications
5. Shop Drawings
6. Materials, Services and Facilities
7. Inspection and Testing
8. Substitutions
9. Patents
10. Surveys, Permits, Regulations
11. Protection of Work, Property, Persons
12. Supervision by Contractor
13. Changes in the Work
14. Changes in Contract Price
15. Time for Completion and Liquidated Damages
16. Correction of Work
17. Subsurface Conditions
18. Suspension of Work, Termination and Delay
19. Payments to Contractor
20. Acceptance of Final Payment as Release
21. Insurance

1. DEFINITIONS:

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.2 ADDENDA: Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS AND SPECIFICATIONS, by additions, deletions, clarifications or corrections.

1.3 BID: The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER: Any person, firm or corporation submitting a BID for the WORK.

1.5 BONDS: Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER: A written order executed by the Owner to the CONTRACTOR authorizing an addition, deletion, or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT ITEM.

1.7 CONTRACT DOCUMENTS: The contract, including Advertisement for Bids, Information for Bidders, Bid, Bid Bond, Agreement, Payment Bond, Performance Bond, Notice of Award, Notice to Proceed, Change Order, Drawings, Specifications, and Addenda.

1.8 CONTRACT PRICE: The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME: The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR: The person, firm or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS: The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER: The person, firm or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER: A written order affecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD: The WRITTEN NOTICE of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED: Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

1.16 OWNER: A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.17 PROJECT: The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE: The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS: ALL DRAWINGS, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, supplier, or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS: A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR: An individual, firm or corporation having a direct contact with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION: That 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 is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS: Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS.

1.24 SUPPLIERS: Any person, supplier or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.25 WORK: All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE: Any notice to any part of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS:

2.1 The CONTRACTOR may be furnished additional instructions and detail DRAWINGS, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2 The additional DRAWINGS and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail DRAWINGS and instructions.

3. SCHEDULES, REPORTS, AND RECORDS:

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the OWNER may request concerning WORK performed or to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit schedules showing the order in which he proposed to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part, and, as applicable:

3.2.1 The dates at which special detail DRAWINGS will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

4. DRAWINGS AND SPECIFICATIONS:

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental WORK necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scale dimensions, and detailed DRAWINGS shall govern over general DRAWINGS.

4.3 Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies, or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS:

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the work as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirements of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6. MATERIALS, SERVICES AND FACILITIES:

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any

nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Store materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, suppliers and equipment shall be in accordance with samples submitted by the CONTRACTOR, and approved by the ENGINEER.

6.5 Materials, supplies or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale CONTRACT or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING:

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards.

7.2 The CONTRACTOR shall provide, at his expense, the necessary testing and inspection services required by the CONTRACT DOCUMENTS, unless otherwise provided.

7.3 The OWNER shall provide all other inspection and testing services not required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction required any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing, or approval.

7.5 Neither observations by the ENGINEER nor inspections, tests or approval 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.

7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or state agency shall be permitted to inspect all WORK, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection, or testing thereof.

7.7 If any WORK is covered contrary to the written request of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8 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, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

8. SUBSTITUTIONS:

8.1 Whenever a material, article or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalogue number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approved its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

9. PATENTS:

9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, but if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

10. SURVEYS, PERMITS, REGULATIONS:

10.1 The OWNER shall furnish all land surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slop stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve benchmarks, reference points and stakes and, in case of willful or careless destruction, he shall be responsible for any mistakes that may be caused by the unnecessary loss of disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance with such permits, licenses or easements, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY AND PERSONS:

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervision 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 all employees on the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused.

11.3 In emergencies affecting the safety of person or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act 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.

12. SUPERVISION OF CONTRACTOR:

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

13. CHANGES IN THE WORK:

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER also may, at any time, by issuing a field order, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such field order entitles him to a change in CONTRACT PRICE or time, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within fifteen (15) days after the receipt of the ordered change, and the CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

14. CHANGES IN CONTRACT PRICE:

14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

(a) Unit prices previously approved.

(b) An agreed lump sum.

(c) The actual cost for labor, direct overhead, materials, supplies, equipment and other services necessary to complete the WORK. In addition, there shall be added an

amount to be agreed upon but not to exceed fifteen (15) percent of the actual cost of the WORK to cover the cost of general overhead and profit.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES:

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED. OWNER and CONTRACTOR acknowledge that the OWNER will incur damages if CONTRACTOR fails to perform all of its obligations as set forth herein within the time specified. The parties further acknowledge that the damages which might be reasonable anticipated are difficult to ascertain due to their indefiniteness and uncertainty. Consequently, the parties agree that CONTRACTOR shall pay the OWNER liquidated damages in the amount of $300.00 per day for each day it is late in completing all of its obligations as set forth in the Agreement.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER:

15.4.1 To any preference, priority or allocation order duly issued by the OWNER.

15.4.2 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 of this article.

16. CORRECTION OF WORK:

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

17. SUBSURFACE CONDITIONS:

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment hereunder shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE: provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION AND DELAY:

18.1 The OWNER may, at any time and without cause, suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK will be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged a bankrupt or insolvent, or if 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 applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules regulations, or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the

OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional service, such excess shall be paid to the CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right of remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days notice to the OWNER and the ENGINEER stop the WORK until he has been paid all amounts then due in which even and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delay attributable to the stoppage of WORK.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both,

shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. PAYMENTS TO CONTRACTOR:

19.1 At least ten days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate 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 or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within ten days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate 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 partial payment estimate. The OWNER will, within ten days of presentation to him of an approval partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain ten (10%) percent of the amount of each payment until final completion and acceptance of all WORK covered by the CONTRACT DOCUMENTS. The OWNER at any time, however, after fifty (50%) percent of the WORK has been completed, if he finds that satisfactory progress is being made, shall reduce retainage to five (5%) percent on the current and remaining estimates. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

The CONTRACTOR shall use his Standard Estimate Form for all partial payments. This form shall include a lien waiver statement including, but not limited to, all labor and materials.

19.2 Thc request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

19.3 All WORK covered by partial payment made shall thereupon become the sole property of the OWNER, but this provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK upon which payments have been made or the restoration of any damaged WORK, or as a waiver of the right of the OWNER to require the fulfillment of all terms of the CONTRACT DOCUMENTS.

19.4 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the

conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.5 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety, or any third party.

19.6 If the OWNER fails to make payment 30 days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE:

20.1 The acceptance by the CONTRACTOR as final payment shall be and shall operate as a release to the OWNER of all claims and liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of the WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance Bond and Payment Bonds.

21. INSURANCE:

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by himself or by anyone for whose acts any of them may be liable:

21.1.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts;

21.1.2 Claims for damages because of bodily injury, occupation sickness or disease, or death of his employees;

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

21.1.4 Claims for damage insured by personal injury liability coverage which are sustained (1) by any persons as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, liability insurance as hereinafter specified;

21.3.1 CONTRACTOR'S General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Insurance shall be written with a limit of liability of not less than $500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than $1,000,000 for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than $200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than $200,000 for any such damage sustained by two or more persons in any one accident.

21.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at his own expense during the CONTRACT TIME, Workers' Compensation Insurance in accordance with the provisions of the laws of the state in which the WORK is contracted. The CONTRACTOR shall

require such SUBCONTRACTOR similarly to provide Workers' Compensation Insurance. In case any class of employees engaged in hazardous WORK under this CONTRACT at the site of the PROJECT is not protected under Workers' Compensation statute, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

21.5 The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER, and the OWNER.

22. CONTRACT SECURITY:

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance Bond and a Payment Bond in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions, and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

23. ASSIGNMENTS:

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the CONTRACT or any portion thereof, or of this right, title or interest therein or his obligations thereunder, without written consent of the other party.

24. INDEMNIFICATION:

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense 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 is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR, or any SUBCONTRACTOR under workers' compensation acts, disability benefit acts or other employee benefit acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications.

25. SEPARATE CONTRACTS:

25.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. 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. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself, or he may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties to such Contracts (or the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, WRITTEN NOTICE thereof shall be given to the CONTRACTORS prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles

him to an extension of the CONTRACT TIME, he may make a claim therefore as provided in Sections 14 and 15.

26. SUBCONTRACTING:

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(S) in excess of fifty percent of the CONTRACT PRICE without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all SUBCONTRACTS relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

27. ENGINEER'S AUTHORITY:

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. LAND AND RIGHTS OF WAY:

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

29. GUARANTEE:

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of two (2) years from the date of SUBSTANTIAL COMPLETION unless otherwise noted in the specifications. The CONTRACTOR warrants and guarantees for a period of two (2) years from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

30. TAXES:

30.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed. The CONTRACTOR shall provide along with each pay request a list of all sales taxes paid, including County in which paid, for all materials incorporated into this project.

EXHIBIT GC-A

RESOLUTION TO ESTABLISH A VERIFIABLE PERCENTAGE GOAL FOR PARTICIPATION BY MINORITY BUSINESS IN THE AWARDING OF BUILDING CONSTRUCTION CONTRACTS PURSUANT TO N.C.G.S. 143-128.

RESOLUTION TO ESTABLISH A VERIFIABLE
PERCENTAGE GOAL FOR PARTICIPATION
BY MINORITY BUSINESS IN THE
AWARDING OF BUILDING CONSTRUCTION
CONTRACTS AWARDED PURSUANT TO N.C.G.S. 143-128

WHEREAS, the North Carolina General Assembly enacted Chapter 480 and Section 74.17 of Chapter 770 of the 1989 Session Laws, thereby rewriting North Carolina General Statute 143-128; and

WHEREAS, N.C.G.S. 143-128(c) requires each city, county or other public body to adopt, after notice and a public hearing, an appropriate verifiable percentage goal for participation by minority businesses (as defined in that statute) in the total value of work for building contracts the costs of which exceed one hundred thousand dollars ($100,000) and which are awarded pursuant to N.C.G.S. 143-128; and

WHEREAS, N.C.G.S. 143-128(c)(3) requires an authority awarding a building contract the cost of which exceeds one hundred thousand dollars ($100,000) under a separate prime or separate specification contract system to adopt written guidelines specifying actions that will be taken by the awarding authority to ensure a good faith effort in the recruitment and selection of minority businesses for building contracts awarded under the separate prime or separate specification contract systems; and

WHEREAS, N.C.G.S. 143-128(c)(4) requires an authority awarding a building contract the cost of which exceeds one hundred thousand dollars ($100,000) under a single-prime contract system to adopt written guidelines specifying the action that the prime contractor must take to ensure a good faith effort in the recruitment and selection of minority businesses for building contracts awarded under the single prime contract system; and requires that action take by the prime contractor must be documented in writing by the contractor to the appropriate awarding authority; and

WHEREAS, N.C.G.S. 143-128(b) requires that a public body choosing to use a single-prime contract system must also seek bids for a building contract the cost of which exceeds one hundred thousand dollars ($100,000) under a separate prime or separate specification contract system and must award such building contract to the lowest responsible bidder or bidders for the total project; and

WHEREAS, N.C.G.S. 143-128(d) requires the state and its political subdivisions to award public building contracts the costs of which exceeds one hundred thousand dollars ($100,000) without regard to race, religion, color, creed, national origin, sex, age or handicapping condition; and

WHEREAS, notice of the public hearing was duly published in The Coastland Times and the public hearing required by N.C.G.S. 143-128(c) was held February 5, 1990.

NOW THEREFORE, BE IT RESOLVED by Board of Commissioners of Dare County

1. That the County of Dare shall have a verifiable goal of seven (7%) percent for participation by minority businesses in building construction contracts awarded pursuant to N.C.G.S. 143-128.

2. That the official, employee or agent responsible for advertising such contracts shall compile a list of minority businesses within the bidding area, using information obtained from the North Carolina Department of Economic and Community Development, Minority Business Development Agency or from other institutions or agencies providing such information.

   This list shall be updated on an annual basis and shall be open for inspection and shall be available so that minority businesses will have the opportunity to add their names to the list. Copies of this resolution shall be transmitted to the businesses on the list as soon as practicable along with the name of the official, employee or agent who shall serve as the contact person for minority businesses and be responsible for answering project related questions posed by minority businesses.

3. That for each such building contract put out for bids under the separate specification or the single prime contract systems, notice of the contract shall be transmitted to minority businesses on the above list.

4. That for each such building contract put out for bids under the separate specification or single prime contract systems, documents related to the contract shall be available for inspection at a convenient and accessible location of which minority businesses shall receive notice.

5. That for each such building contract put out for bids under the separate specification or single prime contract systems, the contact person designated pursuant to paragraph 3 above shall hold a pre-bid conference to orient contractors and subcontractors to the policy expressed in this resolution as well as bid procedures and regulations. Minority businesses on the list obtained and maintained as provided herein shall be notified of and invited to these pre-bid conferences.

6. That for each such building contract put out for bids under the separate specification or single prime contract system, published notice of the contract shall include a summary of this resolution.

7. That for any such building contract put out for bids under the separate specification contract system, the contact person designated herein shall maintain records with respect to:

   (a) those contractors or subcontractors notified of the project and the number of these contractors and subcontractors that are minority businesses as defined in G.S. 143-128 appearing on the

list of minority businesses maintained pursuant to paragraph 2 herein,

(b) those contractors or subcontractors that bid or otherwise respond to notice of the project and the number of these that are on the maintained list of minority businesses,

(c) those contractors or subcontractors awarded contracts as part of the project and the number and identity of those that are on the list of minority businesses, and

(d) the percentage of work on the project that is to be performed by minority businesses appearing on the list maintained pursuant to this resolution.

8. That for any such building contract put out for bids under the single prime contract system, the single prime contractor shall:

(a) notify those minority businesses appearing on the list of minority businesses maintained pursuant to paragraph 2 of the portion of the project which will be subcontracted by the single contractor and solicit bids from those minority businesses.

(b) submit with his bids records with respect to:

1) those subcontractors notified of the project and of those elements of the project for which subcontracts will be let and the number of these subcontractors that are minority businesses as defined in G.S. 143-128 appearing on the list of minority businesses maintained pursuant to paragraph 2 herein,

2) those subcontractors that bid or otherwise respond to notice of the project and the number of these that are on the maintained list of minority businesses, and

3) those subcontractors awarded contracts as part of the project and the number and identity of those that are on the maintained list of minority businesses, and

4) the percentage of work on the project that is to be performed by minority businesses appearing on the list maintained pursuant to this resolution.

9. That these policies shall be a part of the request for proposals for any such contract, and noncompliance by any single prime bidder shall be grounds for declaring the bid non-responsive.

10. That this resolution shall become effective upon its adoption.

READ, APPROVED AND ADOPTED, this 5th day of February, 1990.

COUNTY OF DARE

BY: Michael P Daniels

Michael P. Daniels, Chairman
Dare County Board of Commissioners

ATTEST:

Sandra W. Bri

Clerk of the Board

COUNTY OF DARE SEAL NORTH CAROLINA

II. DEFINITIONS

Abbreviations: Wherever the following abbreviations are used in these specifications or on the plans, they are to be construed the same as the respective expressions represented:

A.A.S.H.O.	American Association of State Highway Officials
A.C.I.	American Concrete Institute
A.S.T.M.	American Society of Testing and Materials
N.C.D.O.T.	North Carolina Department of Transportation
A.W.W.A.	American Waterworks Association
A.N.S.I.	American National Standards Institute
N.P.T.	National Pipe Thread

Approved Drawings. Plans prepared by a registered Engineer and approved by the Dare County Water Department which show the location, character, and dimension of the prescribed work.

Approved Equal. Shall mean comparable equipment or materials to specified equipment or materials as determined by the County of its agent.

Contractor. The duly authorized representative of the developer, responsible for installation of the water system.

Defective Work. Work that does not conform to the requirements of this ordinance and the approved drawings.

Developer. The property owner, developer or subdivider of the land to which, or across which, a water main is being planned.

Drawings. Plans prepared by a registered Engineer and submitted to the Dare County Water Department for approval which show the location, character, and dimension of the prescribed work.

Engineer. A professional engineer registered in North Carolina to act as duly authorized representative of the developer or the Dare County Water Department.

Inspector. The Dare County Water Department or the Engineer's authorized representative assigned to make detailed inspections of the work.

NCDOT Standards. Policies and procedures for accommodating Utilities on Highway Rights-of-Way, State of North Carolina, Department of Transportation, July 1, 1978.

Shop Drawings. All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by contractor, subcontractor, manufacturer, supplier or distributor and which illustrate the equipment, material or some portion of the work.

Subcontractor. An individual, partnership, firm, corporation, or joint venture, to which the contractor sublets part of the work.

Work. The furnishing of all labor, materials, equipment, and incidentals necessary or convenient to the successful completion of the project and carrying out the duties and obligations imposed by the Dare County Water Department specifications.

Working Day. A calendar day during which normal construction operations could proceed for a major part of a shift, excluding Saturdays, Sundays and Dare County Water Department holidays.

III. REQUIREMENTS OF LAYOUT AND DESIGN

A. All mains shall be a minimum of 6 inches in diameter unless approved by the Dare County Water Department.

B. Dead-end lines shall exist only with approval from the Dare County Water Department.

C. Butterfly valves are not to be used in distribution system piping.

D. Butterfly valves may be used, with approval from the Dare County Water Department, in process piping at water treatment or pumping facilities.

E. Fire prevention sprinkler systems shall be designed to allow the entire piping system to be flushed once a year. Flushing capabilities shall be provided by means of a blow-off valve at the farthest point on the piping system. If the system is looped, isolation valves shall be installed to allow blow-off of one half of the loop at a time. All fire sprinkler service lines or other hazard lines shall be supplied with a reduced pressure principle type backflow preventer.

F. At least one sample tap and valve shall be installed to allow the Dare County Water Department to sample the water standing in the sprinkler of the system. The sample tap shall be located near the farthest point on the system, and shall be easily accessible.

G. Adjustment of fire hydrant fittings and valves shall be made by the Contractor in the field subject to the desire of the Engineer without any increase or decrease in unit price. No additional compensation will be paid for varying Rights-of-Way widths when installing fire hydrant legs. No additional compensation will be made for setting fire hydrants to grade or for fittings on the hydrant leg.

All hydrant valves shall utilize grip ring pipe restrainers as manufactured by Romoc Industries or approved equal.

All tapping sleeves shall be stainless steel, the fully gasketed, wrap around type. Mechanical joint tapping sleeves are not acceptable.

H. Contractor shall be responsible to provide all fittings or couplings necessary to connect PVC pipe to ductile iron pipe needed within this Project.

I. A detectable tape for protection of underground water lines shall be used for the water distribution main. The tape shall be an inert, bonded layer plastic with a metallized foil core and shall be highly resistant to alkalis, acid, or other destructive chemical components likely to be encountered in soil. The tape shall be brightly

colored to contrast with soil and shall bear an imprint identifying the type of line buried below. The tape shall be minimum of 2 inches wide.

The tape shall be buried a maximum of 12 inches below the ground surface directly above the water line with printed side up. The Contractor shall take necessary precaution to insure that the tape is not pulled, distorted or otherwise misplaced in completing the trench backfill. The tape shall be Terra Tape as manufactured by Griffolyn Co., Inc. or an Owner approved equal.

Compensation paid to the Contractor for detectable tape shall not be a separate pay item but shall be absorbed in the appropriate unit prices and/or lump sum prices of items in the proposal.

IV. SUBMITTALS

A. Prior to actual construction of water lines, the developer must submit the following for approval by the Dare County Water Department:

1. Certificates of Conformance for each lot of pipe supplied verifying that the pipe meets the specifications.

2. Engineering data covering all equipment and fabricated materials which will become a permanent part of the work. This data should include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; and dimensions needed for installation and correlation with other material and equipment.

3. Written approval of shop drawings by the Dare County Water Department is required prior to installation.

4. Three (3) sets of drawings and specifications which include, as a minimum:

   a. Plan view drawn to 1 inch equals 50 feet scale, submitted on 22 inch X 36 inch paper.

   b. All existing topography within rights-of-way, plus all permanent building structures outside of rights-of way, within 200 feet of centerline.

   c. All proposed work including streets and underground utilities.

      1) Water line, valves, hydrants, and miscellaneous fittings dimensioned to existing topography or centerline of rights-of-way.

      2) All water line crossings of culverts shall indicate size and invert of existing pipe line and ground elevation.

      3) Location of all proposed water services.

      4) Location and method of connection to existing water system.

5. All other information required by the specifications dealing with actual construction of water lines.

B. Thirty (30) days shall be allowed for approval by the Dare County Water Department.

C. Following approval of the drawings and specifications by the Dare County Water Department, the developer is required to submit a letter of approval for the water system from the North Carolina Department of Environment and Natural Resources, Public Water Supply Section.

D. Following actual construction of the water lines, the contractor shall furnish a copy of the bacteriological test for total coliform analysis. The test must be done by a State certified laboratory and the certification number must be on the copy of the bacteriological test.

E. Prior to commencing work, the Contractor will submit to the Engineer a schedule delineating the order in which the work will be installed and approximate beginning dates for each.

F. The Contractor will be required to supply batch tickets for concrete where the bid item is paid for on a cubic yard basis such as concrete for blocking. Concrete for storm sewer separation as detailed shall not be paid directly but will be considered under the bid item for concrete blocking.

G. The Contractor is required to videotape all areas to be disturbed prior to construction and after construction is complete. This will be coordinated with the Engineer. Special attention shall be given to items such as driveways and landscaping. A copy of the videos shall be supplied to the Owner.

H. The Contractor shall maintain, in readable condition at the job site, one complete set of working drawings and specifications for his work, including all shop drawings. Such drawings and specifications shall be available for use by the Dare County Water Department or his representative at all times. This set shall be marked, or notes acceptable to the Engineer provided, in order to reflect as-built conditions, changes indicating such conditions shall be kept current at all times. Upon completion of the project, this complete set of drawings and specifications or notes, showing as-built conditions, shall be returned to the Dare County Water Department or his representative. In addition, the Engineer shall supply to the Dare County Water Department three completed sets of as-built drawings, one set of mylars, and a copy of the drawings on computer disk in AutoCad.

V. JOB CONDITIONS

A. Laws to be Observed: The developer and/or contractor must keep fully informed of all Federal and State laws, all local laws, ordinances, and regulations and all orders and decrees of bodies having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect conduct of the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders and decrees; and shall protect and indemnify the County and its representatives against any claim or liability arising from or based on the violation of any such law, ordinances, order, or decree whether by himself or his employees.

B. Permits, Licenses and Taxes: The developer and/or contractor must procure all permits and licenses, pay all charges, fees, and taxes, and give notices necessary and incidental to the due and lawful prosecution of the work.

C. Protection and Restoration of Property and Landscape: The developer shall be responsible for the preservation of all public and private property and shall protect carefully from disturbance or damage all property markers.

D. Developer's Responsibility for Damage: The developer shall be responsible for all damage or injury to property of any character, during the prosecution of the work, resulting from any act, omission, neglect, or misconduct in this manner or method of executing the responsibility.

E. Developer's Responsibility for Work: Until final written acceptance of the project by the Dare County Water Department, the developer shall have the responsibility to protect against injury or damage to any part thereof arising directly or indirectly from any cause, whether from the execution or from the non-execution of the work. The developer shall, at his expense, rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any above causes before final acceptance.

F. Developer's Responsibility During Suspension of Work: In case of suspension of work for any cause, the developer shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project. The developer shall provide for normal drainage and shall erect any necessary temporary structures, signs or other facilities at his expense.

G. Shutting off for Connections: The existing water supply and fire protection systems shall not be disturbed, except as absolutely necessary, by the developer's operations. Special care shall be exercised where pipes are being removed and replaced with new lines. The developer shall carefully plan his work in order to avoid contamination and lengthy shutdowns of existing water lines.

H. Notification of Affected Parties: The contractor shall notify the affected property owners and the Fire Department at least 24 hours prior to shutting off water.

I. Contractor's Responsibility Prior to Work: Prior to commencing work on any existing water line, the contractor shall assist the County with workers and tools to enable the Dare County Water Department to shut off the water for making connections. Existing valves shall be operated by the County's employees only.

J. Review of Procedures Prior to Work: A preconstruction meeting will be held to review the progress schedules, to establish procedures for handling shop drawings and other submissions and to establish a working understanding between the parties as to the project. Attendance will include the Dare County Water Department, Developer, Contractor, utility companies and other interested parties.

K. Access to the Work: The Dare County Water Department and its representatives shall at all times have access to the work. The contractor shall provide facilities for such access and observation of the work and also for any inspection, or testing thereof by others.

L. Contractor's Responsibility During Work: The contractor shall furnish all labor, materials, and equipment required to construct the water line, appurtenances and other miscellaneous items. The contractor shall excavate the trench, maintain the backfilled trench until final acceptance, replace pavement, sidewalks, curb and gutter and any permanent structures where required.

M. County May Stop the Work: If the work is defective, or the developer fails to supply sufficient skilled workers or suitable materials or equipment, the Dare County Water Department may order developer to stop the work, or any portion thereof, until the cause for such order has been eliminated, however, this right of the Dare County Water Department to stop the work shall not give rise to any duty on the part of the County to exercise the right for the benefit of the developer or any other party.

N. Correction or Removal of Defective Work: If the work has been rejected by the Dare County Water Department, the developer must remove it from the site and replace it with non-defective work. If the developer does not correct such defective work or remove and replace such rejected work, all as specified in a written notice from the Dare County Water Department, the County 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 developer. Developer shall also bear the expenses of making good all work of others destroyed or damaged by his defective work.

O. Clean-up: Following construction of water lines. all surplus material shall be removed from the site by the contractor. Clean-up work, including complete trench backfill, may be delayed for testing purposes, but shall be limited to single sections of pipe that can be valved off. Clean-up must be done prior to or concurrent with pipe laying operations for the next valved section.

P. Two-Year Warranty Period: If construction meets the requirements of the specifications, final approval will be granted to the developer by the Dare County Water Department. If, after the final approval and prior to the expiration of 2 years after the date of final approval, any work is found to be defective, the developer will correct such defective work, without cost to the Dare County Water Department, or, if it has been rejected by the County, remove it from the site and replace it with non-defective work. If developer does not promptly comply with the terms of such instructions, the County 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, shall be paid by the developer. Repair or replacements made under the guarantee shall bear an additional 12 months guarantee dated from the acceptance of repair or replacement.

Q. Work shall be commenced with adequate forces on the date stipulated in the Notice to Proceed and the Project shall be fully completed within the following times:

Completion Time = Per Job Basis

A two-year warranty period shall begin on the date of acceptance by Dare County as defined by the General Conditions.

If it becomes apparent that work is not proceeding to meet the project schedule, at the Owner's request, the Contractor shall provide additional crews and/or crew members to assure completion with the allocated time.

R. If the project remains incomplete after the established time of completion, the liquidated damages sustained by the Owner shall be _____ per day. The Contractor will be liable for additional inspection costs incurred by the Owner for the time by which contract time is exceeded.

S. Areas of existing manicured lawns (turf or sod) shall be protected or repaired to the original condition. See Section - Seeding and Turfing.

T. All work performed within North Carolina Department of Transportation rights-of-way shall be performed in strict accordance with the NCDOT Construction and Maintenance Operations Supplement to the Manual on Uniform Traffic Control Devices. The Contractor shall be responsible for performing the work and adhering

to the Right-of-Way Encroachment Contract Special Provisions. The Contractor shall be required to obtain written close-out from NCDOT.

In addition to the 100% Performance and Payment Bonds required by the Owner, the North Carolina Department of Transportation requires an additional Performance Bond for the project. The successful low bidder shall coordinate with the District Engineer's office to furnish the bond and assure the bond is executed in the proper manner.

U. The Contractor will be required to coordinate all tie-ins with the Owner. No water mains will be cut off without consent of the Owner.

VI. MATERIALS

A. General: All water line materials furnished shall conform in all respects to the Dare County Water Department Water Line Specification Standards. The standards are prepared by and are located at the Dare County Water Department for viewing by affected parties.

B. All pipe shall be PVC C-900 – DR18 (pressure rating 150 psi), PVC SDR 21 or ductile iron pressure class 350 as listed in the Water Main Construction Specifications and the plans.

C. All pipe joints shall be slip joint gasket types. No solvent weld will be permitted on any size pipe.

D. Fittings and specials for this project shall be mechanical joint conforming to ANSI A21.10 (AWWA C110) and ANSI A21.11 (AWWA C-111), latest revision. No push-on fitting will be allowed. The use of compact fittings 3" - 16" conforming to ANSI 21.153 (AWWA C153) will be accepted. In addition to concrete thrust blocks, all fittings shall utilize grip ring pipe restrainers as manufactured by Romoc Industries or approved equal.

VII. EXECUTION - PREPARATION

A. Alignment and Grade

1. Deviations: Wherever obstructions, not shown on the plans, are encountered during the progress of the work and interfere to such an extent that an alteration in the plan is required, the Dare County Water Department shall be notified at once for approval of any changes.

2. Depth of Pipe: The pipe shall be buried to provide 36 inches of cover over the top of the pipe, unless specified by the Dare County Water Department. High points in the line shall be avoided in intersections and when crossing streets. Required cover shall be provided at the lowest grade in the street. High points shall be located at house services or air vents. Ditch crossings shall have a minimum 24 inch cover.

3. Lateral Separation of Sewers and Water Mains: Water mains shall be laid at least 10 feet laterally from existing or proposed sewers, unless local conditions or barriers prevent a 10-foot lateral separation, in which case:

   a. The water main is laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or

   b. The water main is laid in the same trench as the sewer with the water main located at one side on a bench of undisturbed earth, and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.

4. Crossing a Water Main Over a Sewer: Whenever it is necessary for a water main to cross over a sewer, the water main shall be laid at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer, unless local conditions or barriers prevent an 18 inch vertical separation, in which case both the water main and sewer shall be constructed of ferrous materials and with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing.

5. Crossing a Water Main Under a sewer: Whenever it is necessary for a water main to cross under a sewer, both the water main and the sewer shall be constructed of ferrous materials and with joints equivalent to water main standards for a distance of 10 feet on each side of the point or crossing.

   A section of water main pipe shall be centered at the point of crossing.

6. Where utility work crosses storm sewers concrete shall be utilized as per details as directed by the Engineer.

B. Trench Width and Dewatering.

1. Trench Width

a. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing, and embedment. However, the limiting trench width from the bottom of the trench to an elevation 1 foot above the top of the installed pipe, and the minimum permissible sidewall clearances between the installed pipe and each trench wall shall be as follows:

NOMINAL PIPE SIZE (inches)	MINIMUM SIDEWALL CLEARANCES (inches)	MAXIMUM TRENCH WIDTH (inches)
6	5	27
8	5	30
10	6	33
12	6	37
15	7	42
18	8	47

b. Stipulated minimum sidewall clearances are not minimum average clearances but are minimum clear distances which will be required.

c. Cutting trench banks on slopes to reduce earth load to prevent sliding and caving shall be used only in areas where the increased trench width will not interfere with surface features or encroach on right-of-way limits. Slopes shall not extend lower than 1 foot above the top of the pipe.

2. Dewatering

a. The contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all water entering excavations, trenched, or other parts of the work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the pipe to be installed is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

b. Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property.

C. Cleaning Pipe and Fittings. General. The contractor shall maintain the interior of pipe and fittings free of foreign material and joint surfaces free of lumps and blisters.

D. The Contractor shall remove and replace existing culverts and drainage structures as necessary during the construction of the water lines. The Contractor at no additional cost to the Owner shall replace any damage to the culverts.

E. All trenches shall be compacted to 95% density as required by NCDOT. Any density test requested by the Engineer or NCDOT shall be paid for by the Contractor. All trenches for road cuts will be compacted by mechanical means.

F. The Contractor will be required to wrap and seal plastic bags around each new fire hydrant set on the project. It will be removed when the hydrants are placed in service.

G. All fittings and valves shall be wrapped in plastic prior to pouring concrete for thrust blocks.

VIII. EXECUTION – FIELD QUALITY CONTROL

A. Testing and Inspection

1. General: The Dare County Water Department will be observing the testing and inspecting the lines as construction progresses.

   a. All testing shall be completed before connecting to existing water lines.

   b. The Contractor must notify the Dare County Water Department 24 hours in advance when he will be ready for inspection and testing. All appropriate tests should be completed before notifying the County.

   c. The Contractor shall provide all equipment and assistance for performing the test.

2. Electrical Continuity Test: Cast iron pipe shall be tested for continuity and any breaks shall be repaired.

B. Pressure testing shall begin after main water lines are installed. Sections to be tested shall be between valves not to exceed 5,000 feet per test. Pressure test will be for two hours. All lines shall be tested at 1.25 time working pressure of 150 p.s.i. whichever is higher. Water for testing and blow-off may be obtained from existing water mains. The Contractor is responsible for any cost of water used during testing. The cost of water for testing and sterilization will average approximately $8.68 per 100 feet of pipe installed.

Pressure testing requirements for this project shall be as outlined in Section 6 – Construction Methods of the specifications with the exception of allowable leakage. Allowable leakage shall be half of the volume allowed by AWWA C-600, latest revision.

Sterilization shall be accomplished by filling the pipe with chlorine solution of sufficient strength such that after 24 hours contact time, there will be 50-mg/l residual chlorine. Sections to be sterilized shall not exceed 5,000 feet under any circumstances. The pipe shall be flushed and refilled and a bacteriological sample will be taken by the Contractor 72 hours after the pipe is flushed and refilled unless otherwise directed by the Dare County Water Department.

C. The Contractor is instructed to control erosion and sedimentation run-off with methods approved by the Engineer during the course of construction of this project. The Contractor shall implement approved erosion and sedimentation control measures whenever necessary. Cost for erosion and sedimentation control shall not

be paid directly but shall be included in the line item for pipe installation in the Schedule of Bid Items. The Contractor is reminded that all work shall meet all applicable requirements of the rules and regulations of Erosion and Sedimentation Control as published by the Department of Natural Resources and Community Development, North Carolina Sedimentation Control Commission. The Contractor shall be required to obtain written close-out from the Land Quality Section - DENR.

IX. EXECUTION – ADJUST AND CLEAN

A. Flushing. The water shall be flushed by providing taps in sufficient size or number to provide a velocity of 2.5 feet per second in the line being flushed. Hydrants may be used providing the requirements listed below are met.

1. Procedure: Submit to the Dare County Water Department a written procedure outlining the method proposed to be used for flushing water lines.

2. Time for Flushing: Flushing may be done prior to pressure testing or following pressure testing, but in any case, prior to chlorination of the water line.

B. Chlorination: All newly laid lines shall be chlorinated. The contractor shall furnish all necessary equipment and materials and shall furnish all necessary assistance for effective disinfection of the water lines.

C. Pressure Tests and Chlorinating Reports: All information relative to pressure tests and chlorinating procedures and the results shall be reported to the Dare County Water Department. These reports shall be submitted immediately upon the completion of said tests and disinfecting.

X. WATER MAIN SPECIFICATION STANDARDS

PIPE FOR WATER MAINS

01. SCOPE: This section shall include the furnishing of all types of pipe and other incidentals required for the construction of a complete water system as shown on the drawings and as specified herein.

Unless otherwise noted, the materials listed below are acceptable to the Owner for use in water distribution systems. Should the Contractor desire to use other materials not listed in these specifications, written permission must be obtained from the Owner's Engineer.

All material shall be free from defects impairing strength and durability and be of the best commercial quality for the purposes specified. It shall have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

02. SUBMITTALS: The Contractor shall submit to the Engineer six (6) copies of all submittal data for review and/or approval. Submittals shall include at a minimum: (1) the manufacturer's name, (2) type of material, (3) ASTM, ANSI, AWWA or other quality standard and (4) pressure class. If the materials do not meet the quality standards specified, the submittals will be rejected and other materials submitted as specified. The Contractor must obtain approval of all pipe materials prior to commencing construction.

The Contractors shall submit to the Engineer two (2) copies of a certificate of inspection from the pipe manufacturer that the pipe supplied has been inspected at the plant and meets the requirements of these specifications.

03. PIPE DELIVERY, STORAGE AND HANDLING: Units shall be delivered, handled, and maintained in a manner to avoid damage to the pipe. The pipe shall be stored in an open area on high, well-drained land not subject to flooding, mud or other means of contamination.

04. DUCTILE IRON PIPE:

A. General: Ductile iron pipe shall be centrifugally cast in accordance with ANSI A21.51 (AWWA C151), latest revision. Ductile iron shall meet the following minimum physical grade requirements:

Ultimate Strength	=	60000 psi
Yield Strength	=	42000 psi
Minimum Elongation	=	10%

B. Pipe Thickness: Pipe design conditions shall be as follows:

1. Working pressure of 180 psi plus 100-psi water hammer allowance.

2. External load of earth load of at least 3' cover plus a live truck superload (ASHTO H-20).

Pipe shall be installed in a Type 2 trench. Pressure class thickness shall be calculated in accordance with ANSI A21.50 (AWWA C150), latest revision, considering the above conditions and a safety factor of two. The standard service allowance and casting tolerance shall be added to the net thickness. Pipe up to and including 12" diameter shall be a pressure class 350. All larger pipe shall be a pressure class 300.

C. Joints:

1. Slip-Type: Pipe joints are to be slip-type single gasket bell and plain end or, where noted on the drawings, restrained joints in accordance with ANSI A21.11, AWWA C111, latest revision.

2. Flange Pipe: All flange pipe shall be of ductile iron pipe and ductile iron flanges manufactured per ANSI A21.15, AWWA C115, latest revision, and shall be minimum Class 53. Flanges shall be cast or screwed on by the pipe manufacturer only. Welding of flanges to the body of the pipe in lieu of methods outlined in ANSI A21.15 will not be acceptable. Flanges shall be standard Class 125 unless they are noted on plans as "F&D 250". F&D 25" flanges shall have a raised face and be faced and drilled to match Class 250 flanges shown in ANSI B16.1, latest revision.

3. Mechanical Joints: ANSI Specification A21.11 (AWWA C-111), latest revision, for three inch pipe and larger, and CIPRA Specification 3-54 and 4-54 for two inch pipe. Bolted mechanical joints shall be used where specifically called for on the plans or in the Schedule of Bid Items.

D. Pipe Lining: Cement mortar lining shall conform to ANSI A21.5, AWWA C104, latest revision, and shall be sealed with a bituminous coating.

E. Exterior Coating: The pipe shall have an outside pipe coating of bituminous material in accordance with AWWA C151, latest revision. The final coat shall be continuous and smooth being neither brittle when subjected to low temperatures nor sticky when exposed to hot sun. The coating shall be strongly adherent to the pipe at all temperatures.

F. Length and Weight: Pipe shall be furnished in 20' or 18' nominal lengths. Weights and length tolerances shall be within those specified by ANSI A21.51, AWWA C151, latest revision.

G. Marking: The net weight, pressure class or nominal thickness, sampling period and manufacturer shall be marked on each pipe. Pipe shall also be marked "D.I." or "Ductile."

05. THICKWALL PVC PIPE: Thickwall PVC pipe shall conform with AWWA C-900, latest revision for polyvinyl chloride pressure pipe sizes 4 inch through 12 inch or AWWA C-905 for larger than 12-inch. Class 150, DR 18 pipe as called for on the plans or scheduled bid items shall be furnished. Pipe shall be furnished in cast iron pipe equivalent outside diameters with rubber-gasketed separate couplings or push-on joints. Pipe and couplings shall not fail when subjected to the following tests: (1) sustained pressure (2) burst pressure (3) flattening and extrusion quality. Tests shall be conducted as outlined in AWWA C-900 or AWWA C-905. Each length of PVC pipe shall pass a hydrostatic integrity test at the factory 4 times the pressure class of the pipe for 5 seconds.

Pipe shall be furnished in 20 ft. laying lengths. Random lengths shall be a minimum of 10 feet long and shall comprise no more than 15 percent of the length of the piping system. Pipe shall be furnished in factory packaged units, with each joint plainly marked with the manufacturer's name, pressure class, size, etc.

06. THINWALL PVC PIPE: PVC pipe shall be SDR 21, pressure rating 200 psi, as called for on the plans or scheduled in the bid items. The pipe shall be plainly marked with the following information: manufacturer's name, size, material (PVC) type and grade or compound, NSF Seal, pressure rating and reference to appropriate product standards.

PVC Pipe used for construction shall comply with the following standards:

A. Standard dimension ratio: -ASTM D-2241

200 PSI PIPE SDR 21

B. Material:

Grade 1 PVC Compound Material -ASTM D-1784

C. Rubber Coupling Rings: -ASTM D-1869

D. Burst Pressure Test:

200 psi, SDR-21 minimum quick burst pressure 800 psi

E. Impact Strength: -ASTM D-2444

VALVES AND FIRE HYDRANTS FOR WATER DISTRIBUTION

01. SCOPE: This section shall include the furnishing of all types of valves and fire hydrants and all other incidentals required for the construction of a complete water system as shown on the drawings and as specified herein. Unless otherwise noted, the materials listed below are acceptable to the Owner for use in water distribution systems. Should the Contractor desire to use other materials not listed in these specifications, written permission must be obtained from the Owner's Engineer.

All material shall be free from defects impairing strength and durability and be of the best commercial quality for the purposes specified. It shall have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

Valves supplied shall be of the designations and description indicated on the plans or described herein.

02. SUBMITTALS: The Contractor shall submit to the Engineer six (6) copies of all submittal data for review and/or approval. Submittals shall include at a minimum: (1) The manufacturer's name, (2) type of material, (3) ASTM, ANSI, AWWA or other quality standard, and (4) pressure class. If the materials do not meet the quality standards specified, the submittals will be rejected and other materials submitted as specified. The Contractor must obtain approval of all valves and fire hydrants prior to commencing construction.

03. DELIVERY, STORAGE AND HANDLING OF VALVES AND HYDRANTS: Units shall be delivered, handled and maintained in a manner to avoid damage to the valves. The materials shall be stored in an open area on high, well-drained land not subject to flooding, mud or other means of contamination.

04. GATE VALVES: Gate valves shall conform to AWWA C-509, latest revision. All valves shall be of iron body, bronze mounted, resilient seat type. Gate valves shall be Waterous or Clow or other approved by the Dare County Water Department.

Valves for buried use shall be NRS with 2-inch square operating nut. Valves for above ground use shall be OS&Y design with handwheel. Valves shall be manufactured with "O" Ring stem seals.

Valves 16" and larger shall have a by-pass to equalize pressure on both sides of the valve to facilitate opening. All valves 24" and larger shall be equipped with gearing and asbestos packing.

Valve ends shall be of the size and type required for connections to the type service line used, i.e. valves with AC pipe bells shall not be adapted to PVC pipe. Standard connections shall be as follows:

Ductile Iron Pipe - Bolted Mechanical Joint

PVC Pipe - Bolted Mechanical Joint

D.I. Hydrant Leg - Bolted Mechanical Joint

Pressure ratings for the valves shall be as follows:

SIZE	WORKING PRESSURE	HYDROSTATIC TEST PRESSURE (SHELL)
2"-12"	200 psi	400 psi
14"-24"	150 psi	300 psi

05. BUTTERFLY VALVES: Butterfly valves shall conform to AWWA C-504, latest revision. All valves for buried service shall have cast iron bodies with integrally cast mechanical joint ends conforming to AWWA C-111, latest revision. Valves for above ground use shall be short-bodied with flanges conforming to ANSI B16.1, latest revision.

The valve discs shall be designed to rotate 90 degrees from full open to tight shut position and shall have adjustable mechanical stops to govern the rotation of the disc. The valve shall have Buna-N or Buna-S valve seats with bronze or stainless steel seating rings. The stuffing boxes shall be integrally cast with the valve body. The shaft bearings shall be of the self-lubricating sleeve type with thrust bearings to keep the valve disc centered.

Butterfly valves shall be pressure class 200 unless otherwise noted on the plan or scheduled in the bid items.

06. SWING CHECK VALVES:

A. Valves Size 2 Inch to 12 Inch: Swing check valves shall conform to AWWA C-508 latest revisions. Small swing check valves shall have iron bodies with NPT ends. The swing disc shall be internally weighted or spring loaded and constructed of composition or bronze with rubber seats. Valves shall be rated at 175 Lb. service water pressure or 200 lb. WOG.

Valves for use in aboveground installations shall be flanged without side spring and lever or when positioned horizontally weight and lever may be used. Valves for underground service shall have mechanical joint ends with an internally weighted swing disc.

07. VALVE BOXES: Valve boxes shall be of close-grained gray cast iron. The valve boxes shall be the two piece screw type and the cover or cap shall have cast on the upper surface in raised letter the word "Water." Valve boxes shall be painted with a coat of protective bituminous paint before being shipped from the factory.

08. FIRE HYDRANTS: Fire hydrants shall conform to AWWA C-502, latest revision and the following design standards.

A. Fire hydrants shall be of the compression type, with a 4-1/2" valve opening designed to close against line pressure.

B. Hydrants shall have a minimum of 36" bury and shall stand approximately 30" above surface elevation.

C. Hydrants shall be furnished with a sealed oil or grease reservoir located in the bonnet, so that all threaded and bearing surfaces are automatically lubricated. Teflon washers shall be used for ease of operation.

D. Hydrants shall be furnished with a breakaway feature that will break cleanly upon impact. This shall consist of a two-part breakable safety flange.

E. The seat ring shall be bronze and be threaded into a bronze drain ring located between the lower barrel and shoe.

F. All hydrants will be cast marked on the outside such that visible identification can be made as to type and design.

G. Hose and pumper nozzles shall be threaded or leaded-in nozzles with caps and chains supplied.

H. Operating nut shall be 1 ½" pent. and shall open counterclockwise. Fire hydrants shall be American Flow Control "Waterous Trend WB77" with stainless steel bolts or other approved by the Dare County Water Department.

I. The Contractor shall be required to wrap and seal plastic bags around each new fire hydrant set on the project. It will be removed when the hydrants are placed in service.

All hydrants shall receive two (2) exterior shop coats of fire hydrant red paint as specified by AWWA C-502. In addition, one finish exterior coat of fire engine red paint shall be applied after construction operations are complete.

The paint used shall comply with the following schedule:

MANUFACTURER	SHOP PRIMER	FINISH COAT
Tnemec	37-77	Tneme-Coat
Koppers	622	Glamortex
Pratt and Lambert	40.90	Vitralite Gloss

Steel and iron surfaces shall be prepared in conformance with SSPC requirements SP1-63 and SP2-63. The surface shall be tool cleaned, lightly sanded and spot primed before application of final field coat.

09. TAPPING SLEEVES:

Fully Gasketed Wrap Around Tapping Sleeve: These sleeves must consist of the following:

1. Body: 18-8 stainless steel for total corrosion control.
2. Bolts and Nuts: 18-8 stainless steel NC threads.
3. Gasket: Gridded virgin GPR compounded for water service. ASTM D2000-80M 4AA607. Full gasket gives 360° pipe coverage. The outlet gasket is Buna-N.
4. Flange: 18-8 stainless steel flange with recess to accept standard tapping sleeves.
5. Testing Plug: Water Works Brass 3/4" with standard square head.

FITTINGS AND COUPLINGS FOR WATER DISTRIBUTION

01. SCOPE: This section shall include the furnishing of all types of fittings and couplings and all other incidentals required for the construction of a complete water system as shown on the drawings and as specified herein. Unless otherwise noted, the materials listed below are acceptable to the Owner for use in water distribution systems. Should the Contractor desire to use other materials not listed in these specifications, written permission must be obtained from the Owner's Engineer.

All material shall be free from defects impairing strength and durability and be of the best commercial quality for the purposes specified. It shall have structural properties

sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

Valves supplied shall be of the designation and description indicated on the plans or described herein.

02. SUBMITTALS: The Contractor shall submit to the Engineer six (6) copies of all submittal data for review and/or approval. Submittals shall include at a minimum: (1) The manufacturer's name, (2) type of material, (3) ASTM, ANSI, AWWA or other quality standard, and (4) pressure class. If the materials do not meet the quality standards specified, the submittals will be rejected and other materials submitted as specified. The Contractor must obtain approval of all fittings and couplings prior to commencing construction.

03. DELIVERY, STORAGE AND HANDLING OF FITTINGS AND COUPLINGS: Units shall be delivered, handled and maintained in a manner to avoid damage to the fittings. The material shall be stored in an open area on high, well-drained land not subject to flooding, mud or other means of contamination.

04. DUCTILE IRON FITTINGS: Ductile iron fittings shall conform with ANSI A 21.10 (AWWA C-110 or C-153), latest revision with the exception of the manufacturer's design dimensions and thickness. Fittings shall have a working pressure rating of 350 psi for fittings, 12 inch and under and 250 psi for fittings over 12 inch.

Ductile iron shall conform to ASTM A-536, latest revision, Grade 70- 50-05.

A. Thickness Design: Nominal thickness of the fittings shall be equal to Class 54 ductile iron pipe as specified in ANSI A 21.51 (AWWA C-151).

B. Lining: Fittings shall have a cement mortar lining and seal coating conforming with ANSI A 21.4 (AWWA C-104), latest revision.

C. Exterior Coating: Fittings shall have an outside coating of bituminous material in accordance with the manufacturer's specifications. The final coat shall be continuous and smooth being neither brittle when subjected to low temperatures nor sticky when exposed to hot sun. The coating shall be strongly adherent to the pipe at all temperatures.

D. Joints: Fittings shall have mechanical or flanged joints as specified herein.

1. Mechanical Joint: ANSI Specification A 21.11 (AWWA C-111), latest revision, for three inch pipe and larger. Bolted mechanical joint fittings shall be used with ductile iron pipe, PVC pipe, for all hydrant tees, and where specifically called for on the plans or in the Schedule of Bid Items.

2. Push-on Joints: Single gasket push-on type joints shall conform with ANSI A 21.11 (AWWA C-111), latest revision. Push-on joint fittings may be used on PVC pipe or where mechanical joints are not specifically called for on the plans or specified above.

3. Flanged Joint: Flanged fittings shall be constructed of ductile iron with flanges drilled and faced per ANSI B 16.1 for both 125 Lb. or 250 Lb. working pressure.

05. WROUGHT IRON OR STEEL FITTINGS: Wrought fittings shall conform with Federal Specification WW-P-521 d, Type 11, latest revision, and be hot dipped galvanized inside and out.

06. PVC FITTINGS: PVC fittings are not acceptable for water mains three (3) inches or greater. Fittings for PVC pipe less than three (3) inches shall be solvent weld schedule 80 PVC.

07. COUPLINGS: Couplings may be used where applicable for completion of the work. Couplings supplied shall conform to the following:

A. Compression Sleeve Coupling: Units shall be Dresser style 38, Smith-Blair No. 431 or equal.

B. Victaulic Couplings: Units shall be Victaulic Co., style 31, 41, or 44 or equal.

C. Gruvagrip Couplings: Units shall be Gustin-Bacon Division of Certainteed, Series 100 or equal.

D. Flanged Adapters: Units shall be Dresser style 128, Smith-Blair No. 913 or equal.

3/4 INCH TO 2 INCH SERVICES FOR WATER DISTRIBUTION

01. SCOPE: This section shall include the furnishing of all materials and all other incidentals required for the installation of a complete water service connection as shown on the detail drawings and as specified herein. Unless otherwise noted, the materials listed below are acceptable to the Owner for use in water services. Should the Contractor desire to use other materials not listed in these specifications, written permission must be obtained from the Owner's Engineer.

All material shall be free from defects impairing strength and durability and be of the best commercial quality for the purposes specified. It shall have structural properties sufficient to safely sustain or withstand strains or stresses to which it is normally subjected and be true to detail.

Materials supplied shall be of the designations and description indicated on the plans or described herein.

02. SUBMITTALS: The Contractor shall submit to the Engineer six (6) copies of all submittal data for review and/or approval. Submittals shall include at a minimum: (1) The manufacturer's name, (2) type of material, (3) ASTM, ANSI, AWWA or other quality standard, and (4) pressure class. If the materials do not meet the quality standards specified, the submittals will be rejected and other materials submitted as specified. The Contractor must obtain approval of all materials prior to commencing construction.

03. DELIVERY, STORAGE AND HANDLING OF MATERIALS: Materials shall be delivered, handled and maintained in a manner to avoid damage due to breakage or contamination.

04. TAPPING SADDLES: Tapping saddles shall provide full support around the circumference of the pipe with a designed in safeguard against over-tightening to prevent deforming the pipe. All parts of the saddle shall be constructed of corrosive resistant bronze including bolts and nuts required to assemble. Only saddles designed specifically for the type water main pipe used shall be allowed. Threads shall be AWWA standard cc tapered. Tapping saddles shall be Ford only in the Rodanthe-Waves-Salvo System. Ford and A.Y. McDonald will be accepted in all other areas within the Dare County Water System upon approval.

05. CORPORATION STOPS: Corporation stops shall be of bronze construction and a minimum size of 1" (inlet and outlet). Inlet threads shall be AWWA Standard Taper cc. A brass compression fitting adapter for the appropriate water service pipe size is required. Corporation stops shall be Ford in the Rodanthe-Waves-Salvo System. Ford and A.Y. McDonald will be accepted in all other areas within the Dare County Water System upon approval.

06. PIPE FOR SERVICE LINES: Pipe for service lines shall be polyethylene conforming with all applicable requirements in the latest revisions of the following standards and shall be blue in color:

A. AWWA C-901: Standard for polyethylene (PE) pressure pipes 1" through 2" for water.

B. ASTM D-1248: Standard for polyethylene molding and extrusion materials.

C. ASTM D-2239: Standard for polyethylene (PE) Plastic pipe 200 psi rating.

Polyethylene extrusion compound from which the polyethylene pipe is extruded shall comply with the applicable requirements for PE-3406 or PE-3408 high density; ultra high molecular weight polyethylene material as described in ASTM D-1248, latest revision.

The PE pipe shall be rated for use with water at 73.5 degrees F. at a hydrostatic design stress of 630 psi and a maximum working pressure of 200 psi.

Dimensions and tolerances shall comply with ASTM D-2239.

D. Marking: The following data shall be clearly marked on all service pipes installed:

1. Nominal size
2. Operating pressure @ 73.4 degrees F
3. Type of pipe, i.e. "water service pipe"
4. Material designation code, "PE-3406" or "PE-3408"
5. Date code: Month, year and day
6. Manufacturer's brand name
7. National sanitation foundation logo (indicating approval for potable water and compliance with ASTM Specifications)
8. ASTM Specification – "ASTM D-2239"
9. Plant location code

NOTE: Typical house service shall be 1" "CTS" as shown on plans.

07. METER STOPS/CURB STOPS: Curb stops shall be 1" min. (inlet and outlet) of bronze construction and with lock wings. Inlets shall have a brass adapter as required for compression fitting to "CTS" for 1-inch service pipe. Outlets shall be male threads with a brass swivel meter nut. Curb stops shall be Ford in the Rodanthe-Waves-Salvo System. Ford and A.Y. McDonald will be accepted in all other areas within the Dare County Water System upon approval.

08. COMPRESSION FITTINGS: Compression fittings shall be Ford, "Pack-Joint" or an approved equal. A plastic insert will be required with any fitting that compresses the outside of the pipe to hold the pipe in place.

09. METER BOXES: Meter boxes shall be supplied with each service connection. Boxes may be constructed of high-density polyethylene.

A. Plastic Boxes: High-density polyethylene material used in the boxes shall meet or exceed the following physical properties:

1. Flexural modulus, psi - 90,000

2. Compression strength 10% deflection, psi - 1,100

3. Heat distortion, 66 psi - 170 degrees

4. Specific gravity - .6

5. Hardness, Shore D - 58

6. Impact strength, 1016., falling dirt - 160 in-lb.

7. Total load at center of top - 2,800 + lbs.

Boxes shall not be less than 12" deep, by 17" long by 10" wide. The box cover may be either plastic with a cast iron reader lid or of all cast iron construction with a cast iron reader lid upon approval of the Dare County Water Department.

10. TEFLON TAPE: Teflon tape shall be used on all threaded connections to reduce the possibility of leaking joints.

11. CHECK VALVES: The Dare County Water Department shall supply with each service a check valve as described herein:

12. COLD WATER METERS: Meters shall be of the displacement or multi-jet types and shall conform to AWWA C-700 or C-708, latest revision and the following standards:

A. Meter Case: The main case shall be of bronze or copper alloy construction with a frost protection feature. The measuring chamber shall be of bronze, copper alloy or synthetic polymer construction.

B. Register: Registers shall be straight reading in U.S. gallons and hermetically sealed.

C. Disc: 1" through 2" meters shall be of the nutating disc or oscillating disc type with magnetically coupled drive. Larger meters shall be turbine, compound or combo based on requirements of the Dare County Water Department.

D. Operating Range: Meters shall have normal operating range as follows: 5/8" X 3/4": 1-20 gpm; 3/4": 2-30 gpm; 1": 3-50 gpm; 1 1/2": 5-100 gpm; 2": 9-160 gpm; 4": 15-1000 gpm; 6": 30-2000 gpm; 8": 35-3500 gpm.

E. Working Pressure: Meters shall operate without damage or leakage at a working pressure of 150 psi.

F. Repair and Replacement: Supplier shall repair and/or replace without charge to the Owner any parts that become defective under normal wear conditions within one year of the date of installation of the meter.

G. Accuracy: Meter accuracy shall not be less than 98.5 percent or more than 101.5 percent of actual water passed through the meter.

H. Approved Meters: Water meters shall be Kent, Sensus or approved equal.

13. TURBINE TYPE METERS: Turbine type meters shall conform to AWWA C701. Turbine type main-line meters require a strainer. The main casing shall be bronze with stainless steel external fasteners. Registers shall be straight-reading type, shall be permanently sealed, and shall read in U.S. gallons. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading register. Meters shall comply with the accuracy and capacity requirements of AWWA C701.

14. COMPOUND TYPE METERS: Compound type meters shall conform to AWWA C702 and shall be furnished with strainers. The main casing shall be bronze with stainless steel external fasteners. The main casing shall be tapped for field testing purposes. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. The meter shall be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading register. Meters shall comply with the accuracy and capacity requirements of AWWA C702.

15. FIRE SERVICE TYPE METERS: Fire service type meters shall be turbine type conforming to AWWA C703 and shall be furnished with strainers. The main casing shall be bronze with stainless steel external fasteners. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. The meter shall be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading register. Meters shall comply with the accuracy and capacity requirements of AWWA C703. When turbine type main line meters are used, the meter shall be supplied with a separate check valve, as a unit.

16. METER VAULTS: Large meters shall be installed in reinforced concrete vaults in accordance with the details shown on the drawings. The designer shall provide construction details of meter vaults on the drawings. All meter vault designs shall be approved by the Dare County Water Department.

Concrete will have a minimum compressive strength of 4,000 psi @ 28 days.

The contractor shall provide and install sump pump in the vault. One-inch sch. 40 PVC discharge pipe shall exist to an approved discharge point.

The access door shall be a single or double leaf aluminum door with a 1/4" aluminum diamond plate cover. An extruded aluminum frame, and a removable key wrench. Access door shall be of the watertight type construction with a 1 ½" drainage coupling located in the channel frame. The drainage coupling shall be piped to the sump. The access door shall be Bilco type, JD or approved equal.

All piping shall be ductile iron pipe. Mechanical joint fittings shall be used outside of the vault with approved restraint mechanisms and flanged fittings shall be used inside the vault. All meter vaults shall have external bypass with shutoff gate valve. Dual check valves shall be supplied in line with the meter assembly.

The contractor shall guarantee a watertight vault for the period of the protected warranty.

All components of the meter vault assembly shall be provided and installed by the contractor.

17. METHOD OF MEASUREMENT: Services shall be measured as a unit and shall include labor, materials, equipment and all incidentals required to install the following:

    A. Tapping saddle.

    B. Corporation stop.

    C. Service pipe and casing pipe if installed under roadway.

    D. Curb stop.

    E. Meter box.

    F. Meter: 3/4" through 2" meters will be supplied and installed by the Dare County Water Department.

    G. Spring assisted check valve: 3/4" through 2" check valves will be supplied and installed by the Dare County Water Department.

BORING UNDER HIGHWAYS AND RAILROADS

01. SCOPE: This section shall include furnishing all labor, tools, equipment and other incidentals required to bore casing pipe under highways or railroads.

02. BORINGS: Procedures for boring shall be in accordance with the best accepted methods of the construction and as shown on the plans and specified and detailed in these specifications.

A. Boring Under Highways: Lines installed under highways shall be bored as shown on the detail drawings contained in these specifications. Casings will be installed of the type, size, and thickness as specified herein or on the detail drawings. The Contractor shall be responsible for notifying the Department of Transportation at least five days prior to any contemplated work and for securing any required permits for performing the work. All work shall be accomplished under the supervision of the Engineer and the District Engineer of the Department of Transportation or his authorized representative.

1. Carrier Pipe: Carrier pipe used under highways shall be of an approved material and installed to the satisfaction of the District Engineer of the Department of Transportation. Carrier pipe shall be of the same material specified for water main construction unless otherwise noted.

2. Casing Pipe: The inside diameter of the casing pipe shall not be less than 2 inches greater than the largest outside diameter of the joints and couplings for carrier pipe less than 6" O.D., and 4" greater for carrier pipe 6" and larger. It shall, in all cases, be great enough to easily remove carrier pipe without disturbing the casing pipe.

   a. Steel pipe manufactured from steel having a minimum yield strength of 35,000 psi and having a minimum permissible wall thickness as listed below shall be used as casing pipe.

SCHEDULE 40

DIAMETER OF PIPE INCHES	WROUGHT STEEL WALL THICKNESS INCHES	WROUGHT IRON WALL THICKNESS INCHES
2-1/2	.203	.208
3	.216	.221
3-1/2	.226	.231
4	.237	.242
5	.258	.263
6	.280	.286
8	.322	.329

b. Pipe Sizes 8" and Larger: Steel pipe for casing 8" and larger shall be manufactured from steel having a minimum yield strength of 35,000 psi with the minimum wall thickness as shown below:

DIAMETER INCHES	MINIMUM WALL THICKNESS INCHES
10	.188
12	.188
16	.250
18	.250
20	.250
24	.250
30	.312
36	.375

c. Installation: The minimum depth from the roadway surface to the top of the casing pipe at its closest point shall be three feet. The casing pipe ends shall be sealed utilizing grant seal or other method approved by the Engineer. The casing pipe shall extend from ditch line to ditch line or toe to toe of fill unless otherwise noted on the plans or specified herein.

Contractors shall be required to provide shoring of boring pits and trenches more than 6 feet deep in accordance with the North Carolina Department of Transportation and Federal Occupational Health and Safety Act.

B. Borings Under Railroads: All work on railroad rights of way shall be done under the supervision of the Chief Engineer of the railroad, or his authorized representative, who shall be notified at least 15 days before construction is begun. In addition, this work shall only be done in the presence of the authorized representative of the Chief Engineer, and no methods shall be used that, in the opinion of the representative, could be hazardous to the railway.

1. Carrier Pipe: Carrier line pipe and joints shall be of the material shown on the details of the railroad encroachment agreements or as approved by the Chief Engineer or his authorized representative.

2. Casing Pipe: The inside diameter of the casing pipe shall not be less than 2 inches greater than the largest outside diameter of the joints and couplings for the carrier pipe less than 6" o.d. and 4" greater for carrier pipe 6" and larger. It shall, in all cases, be great enough to easily remove carrier pipe without disturbing the casing pipe.

Steel pipe manufactured from steel having a minimum yield strength of 35,000 psi and having a minimum permissible wall thickness as listed below shall be used as casing pipe.

DIAMETER INCHES	MINIMUM WALL THICKNESS INCHES
10	.188
12	.251
16	.312
18	.313
20	.375
24	.407
30	.469

3. Installation: The depth from the base of the railway rail to the top of the casing at the closest point shall not be less than 5-1/2 feet. Also, there should not be less than 3 feet from the bottom of the side ditches to the top of the casing pipe. The casing pipe ends shall be protected from the entrance of foreign materials. The casing shall extend 25 feet either side of the centerline of the railroad track unless otherwise noted on the plans or specified herein.

Contractors shall be required to shore all pits used for boring if it is over 6 feet deep.

CONSTRUCTION METHODS

01. SCOPE: This section shall include furnishing all labor, tools, equipment and other incidentals required for the construction of the water distribution system as shown on the drawings and as specified herein.

The work shall include laying pipe and setting fittings, valves, hydrants, and services, pressure testing and sterilization of the water distribution system.

Materials shall be as specified in previous sections of these specifications.

02. PIPE AND FITTINGS: Pipe and fittings shall be laid as directed by the Engineer, and located as shown on the drawings. No additional payment will be made due to location changes directed in the field by the Engineer.

A. Trenching: The trench shall be dug to the required alignment and depth as shown on the plans or directed by the Engineer, and only so far in advance of the pipe laying as the Engineer shall permit. The width of the trench shall be kept at a minimum. The depth of the trench shall generally be sufficient to allow a minimum of three feet of cover over the top of the pipe. The bottom of the trench shall be shaped by hand and shall support the pipe for the entire length. It shall be the responsibility of the Contractor to provide adequate bearing for all pipe lines laid in uncertain soil conditions. If the trench bottom should be softened by flooding, rain or other causes, the unsuitable material shall be removed and replaced with suitable material properly shaped and tamped to grade. The use of timber or other material to support the pipe shall not be used.

B. Pipe Laying: Water pipe shall be laid in conformance with the standards set forth by AWWA C-600, latest revision. All water pipe shall be laid by experienced workers with straight lines, even grades, and all joints shall be perfectly fitted. All pipe fittings, valves, hydrants, and accessories shall be carefully lowered into the trench with suitable equipment in a manner that will prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Pipe and accessories shall be inspected for defects prior to their being lowered into the trench. Any defective, damaged or unsound material shall be repaired or replaced as directed by the Engineer. All foreign matter or dirt shall be removed from the interior and machined ends of pipe and accessories before it is lowered into position in the trench. Pipe shall be kept clean by means approved by the Engineer, during and after laying.

1. Jointing Mechanical Joint Pipe:

a. Joining Existing Bell and Spigot to New Mechanical Joint: Due to the difficulty that may be encountered in attempts to make such a connection of this type, an adapter having a fitting bell and a M.J. socket may be used by the Contractor.

b. Cleaning and Assembling Joints: Clean last 8" outside the spigot, and the inside of the bell of mechanical joint pipe to remove oil, grit, tar (other than standard coating) and other foreign matter from the joint and then paint area clean with an approved soap solution.

The ductile iron gland shall then be slipped on the spigot end of the pipe with the extension of the gland toward the socket or bell end. The rubber gasket shall be painted with the soap solution and placed on the spigot end with thick edge toward the gland.

c. Bolting of Joints: Push entire section of pipe forward to seat spigot end in the bell. Press gasket into place within the bell, being careful to have the gasket evenly located around the entire joint. Move ductile iron gland along the pipe into position for bolting, insert all bolts, and screw nuts up tightly with fingers. Tighten all nuts with a suitable (preferably torque-limiting) wrench. Tighten nuts that are spaced 180 degrees apart alternately in order to produce equal pressure on all parts of the gland.

2. Jointing Rubber Gasket Pipe (Bell Tite, Tyton, or Equivalent):

a. Cleaning Joint and Gasket: Clean gasket and spigot and inside of bell thoroughly to remove all dirt and other foreign matter.

b. Inserting Gasket: Insert gasket furnished by the pipe manufacturer into the gasket seat in the bell. Gasket shall be properly seated in the grooves provided in the pipe bell.

c. Lubricating Gasket and Pipe Spigot: Using a non-toxic vegetable soap, apply a film by hand to the inside surface of the gasket that comes into contact with the entering pipe and to the first 1" of the spigot end of the entering pipe. Use only lubricant specified by the pipe manufacturer.

d. Final Assembling of Joint: Align entering pipe with the bell to which it is to be joined. Enter the spigot end into the bell until it just makes contact with the gasket. Apply sufficient pressure to force the spigot end past the gasket up to solid contact with the bell.

e. Field Cutting Pipe: When it is necessary to field cut pipe with rubber gaskets, chamfer the cut end 1/8 inch x 30 degrees before inserting into a rubber gasket bell.

f. Fittings: Fittings shall be installed where and as shown on the plans or as directed by the Engineer. All bends (1/16 to 1/4), y-branches, plugs and all other fittings requiring such shall be sufficiently backed, blocked, or braced to preclude the possibility of their blowing off the main.

03. FIRE HYDRANTS AND VALVES: Fire hydrants and valves shall be set as directed by the Engineer and located as shown on the drawings. No additional payment will be made due to location changes directed in the field by the Engineer.

A. Fire Hydrants: Fire hydrants shall be set where shown on the plans or as directed by the Engineer. The hydrants shall be set upon a bed of compacted crushed stone at least thirty (30) inches square by ten (10) inches in depth. When the hydrant is backfilled, crushed stone or gravel shall be placed around the hydrant to a point just above the drain holes of the hydrant.

B. Valves: All valves set by the Contractor shall include a cast iron or ductile iron valve box set to grade or as directed by the Engineer.

04. CONNECTIONS TO EXISTING MAINS: The Contractor shall make connection to the old mains when and as directed by the Engineer. In no case shall the Contractor shut off the water or operate the fire hydrants or gate valves of the old distribution system without the expressed permission of the Engineer. In case it becomes necessary to delay the cut off, such instructions shall be given and obeyed without recourse.

In making connections to the old distribution system, valves shall be set as shown on the plan, or at such designated place as the Engineer may direct. If due to unforeseen conditions, these locations have to be changed or additional valves or fittings added, the Contractor shall install the valves or fittings at the new locations at the unit price scheduled in the bid items. Payment for special fittings or couplings will not be made unless approved by the Engineer prior to installation.

05. CONCRETE BLOCKING: All turns, fittings, etc., that induce pressure which would cause separation of pipe, breakage, etc., shall be blocked with 3,000 lb. concrete. Blocking shall be formed and placed in such a manner that the pressure to be exerted at the point of blocking shall be transferred to firm, undisturbed earth at a maximum load of 2,000 lbs., per square foot. The Contractor shall insure that blocking at all tees, bends, plugs, etc., shall be sufficient to contain all pressure exerted by the pipe up to a pressure of 200 lbs. per square inch hydraulic pressure within the pipe, i.e. pressure at plug = 200 x (area of pipe in inches). Blocking shall be constructed as shown on the detail sheet contained in these specifications. The Contractor shall also be responsible for any damage or repairs caused by blowouts of any insufficiently blocked pipe.

06. PRESSURE TESTING: Hydrostatic pressure testing shall conform to AWWA C-600, latest revision. Pressure testing shall be performed on all pipe, valves, hydrants, and fittings. The test shall be conducted on line segments from shut valve to shut valve in segments not exceeding 5,000 linear feet. The Contractor shall provide a suitable pump for applying pressure and an accurate gauge for measuring the pressure and an Engineer approved method of determining volume of water used.

All newly laid pipe and any valved sections thereof shall be subject to a hydrostatic pressure of 1.25 times the working pressure or 150 P.S.I. (whichever is greater) at the testing point. The hydrostatic test shall be of at least two hour duration. Removal of air shall be performed to the satisfaction of the Engineer through use of the air release valve assemblies (automatic and manual) and the fire hydrants. If determined necessary by the Engineer, the Contractor shall install additional air taps to be abandoned after all air removal at no additional cost to the Owner.

Leakage shall 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 (35 MPa or 0.35 bar) of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133{,}200} \div 2$$

Where:

L	=	allowable leakage, in gallons per hour
S	=	length of pipe tested, in feet
D	=	nominal diameter of the pipe, in inches
P	=	average test pressure during the leakage test, in pounds per square inch (gauge)

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in. (0.0012 L/h/m) of nominal valve size shall be allowed.

The allowable leakage methods outlined above are as specified by AWWA C-600. **All water mains installed in the Dare County Water System shall have an allowable leakage volume of 1/2 the amount specified by AWWA C-600.**

Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified above, the Contractor shall, at his own expense, locate and make approved repairs as necessary until the leakage is within the specified allowance.

All visible leaks are to be repaired, regardless of the amount of leakage.

07. STERILIZATION: Sterilization shall be performed in accordance with the requirements of the North Carolina Department of Environment and Natural Resources and the

requirements of AWWA C-651, latest revision. The pipe shall be sterilized and sampled in segments not exceeding 5,000 linear feet.

The "continuous-feed method" or the "slug method" as discussed in AWWA C-651 shall be used to chlorinate the water mains.

After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

The environment to which the chlorinated water is to be discharged shall be inspected. If there is any question that the chlorinated discharge will cause damage to the environment, then a reducing agent shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. (See AWWA C-651 Appendix B for neutralizing chemicals). Where necessary, Federal, State and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water. This effort shall be coordinated fully by the Contractor.

Seventy-two hours after final flushing to remove excess chlorine, representative water samples shall be taken from each water line segment for bacteriological quality tests in accordance with "Standard Methods for the Examination of Water and Wastewater". No portion of the system shall be placed in operation until the tests are approved. If the presence of coliform bacteria is detected in the water samples, the section of pipe shall be resterilized and additional samples shall be taken.

If, during construction, trench water has entered the main, or if in the opinion of the Engineer or job superintendent, excessive quantities of dirt or debris have entered the main, bacteriological samples may be required at intervals of approximately 200 feet shall be identified by location. Samples shall be taken of water that has stood in the main for at least 72 hours after final flushing has been completed.

If the initial disinfection fails to produce satisfactory bacteriological samples, the main may be reflushed and shall be resampled. If check samples show the presence of coliform organisms, then the main shall be rechlorinated by the continuous-feed or slug method of chlorination until satisfactory results are obtained.

SITEWORK ON WATER MAINS

01. SCOPE: This section shall include the clearing and grubbing of all required construction areas together with disposal of materials, site preparation, and clean up as specified herein.

02. SITE PREPARATION:

A. Existing Facilities: The Contractor shall provide protection for all existing structures, buildings, and utilities against all construction activity. The Contractor shall protect and preserve the Owner harmless against damage and claims resulting from these activities.

B. Streets and Highways: Effective barricades, danger signals and signs on all streets and in other locations where required for the protection of the work and the safety of the public, shall be provided, erected and maintained by the Contractor. Barricades and obstructions that encroach on, or are adjacent to, public rights of way shall be properly lighted between the hours of sunset and sunrise. The Contractor shall conform to all city, state and local laws and regulations in the use of streets and highways. The Contractor shall be responsible for all damages occurring due to neglect or failure to meet these requirements. When dictated by conditions that might endanger the public, a watchman shall be provided to fulfill the requirements stated herein.

C. Traffic Flow and Continuance of Services: The work shall be arranged in a manner that will cause a minimum of disturbance to vehicular and pedestrian traffic. Adequate ingress and egress to both private and public property shall be provided by the Contractor during all stages of construction. Without written approval from Dare County, existing services shall not be interrupted by the construction work.

03. PRELIMINARY WORK:

A. Rights of Way: Adequate working space shall be cleared along the pipe lines and space shall be provided for control stakes and hubs. Trees and permanent structures not located within the right-of-way of new streets shall be removed only as directed.

B. Valuable Trees and Shrubs: When the construction work involves the removal of valuable trees and shrubs on existing public rights of way, the work shall be done in cooperation with the city, county, or state.

C. Protection of Private Property: The Contractor shall provide protection for privately owned trees and shrubs bordering the right-of-way and shall take full responsibility for any damage that does occur.

D. Existing roads, subject to interference by the Contractor's work, shall be kept open in all cases. The Contractor shall provide, erect and maintain, at his own expense, effective barricades on which shall be placed acceptable warning and/or detour signs at each side of any road obstruction caused by the operations of the Contractor. All barricades shall comply with OSHA requirements and State or local laws, whichever are most strenuous.

E. The Contractor shall protect all public roads and bridges which may be damaged by, interfered with, or given undue wear by reason of the work, and shall repair or replace them if damaged, at his own expense, to the satisfaction of governmental authorities and the Owner.

F. When questions arise as to safe methods or suitable protection, the Contractor shall confer with the Owner but full responsibility for results shall rest with the Contractor.

04. FENCES AND GATES:

A. The Contractor shall not cut temporary openings or take down fences until he has contacted the property owner, tenant or occupant and arranged the ingress and egress to the right-of-way. All fences and gates removed for construction shall be replaced in like kind by the Contractor. Payment for fence and gate removal and replacement shall be by the Contractor.

B. In each case where the fence is opened, braced posts shall be installed capable of holding the tension in the fence wires so that the adjacent fence spans will not become slack. Where temporary openings are immediately adjacent to the corner post, the fence shall be firmly attached to the brace post, and the fence wire shall be removed or cut at the corner post. At other locations the fence openings shall be made by cutting the wires near one of the braced fence posts. In both the above cases, a gate shall be installed by the Contractor.

C. The Contractor shall be held responsible for damage to crops, livestock, or other property caused by his failure to keep fences, gates, and gaps in proper condition. Damage claims resulting from the Contractor's negligence with respect to construction and maintenance and use of these gates, fences and gaps shall be the Contractor's full responsibility.

D. The continuity of electric fences shall be maintained at all times.

05. DAMAGES AND COMPLAINTS

A. The Contractor shall provide protection which, in the opinion of the Owner, will prevent damage to the property, such as lawns, roads, fences, buildings, drains, bridges and pipelines by passage of his equipment, and shall assume sole responsibility for damages thereby incurred and shall notify the Owner immediately if and when damage occurs. The Owner shall be promptly notified of all pipelines that are broken by the Contractor's operations and immediate arrangements made for repairs. Damage to property shall be repaired to a condition that is as good or better than original.

B. The Contractor shall promptly comply with all reasonable requests of the landowners and tenants relative to access to right-of-way and to general conduct of his work; however, he shall not enter into any agreements with property owners or tenants on other matters such as the saving of logs or firewood or the disposal of brush without prior approval of the Owner and Engineer. In cases of disagreement between any landowner or tenant and the Contractor, the Contractor shall notify the Owner and Engineer immediately and shall not perform any further operations against the objections of the property owner or tenant without prior approval of the Owner and Engineer.

06. CLEARING AND GRUBBING: Clearing and grubbing shall be performed in areas indicated and where required for construction. It shall include the complete removal and disposal of all brush, weeds, timber, stumps, rubbish and all other obstructions. All such material shall be removed to a depth of at least one foot below finished grade. In clearing and grubbing areas where excavation is done, all timber, roots, or stumps removed that are exposed by said excavation shall be removed to a depth of one foot below the excavated surface.

07. DISPOSAL OF CLEARED AND GRUBBED MATERIAL: All refuse from the clearing and grubbing operation shall be disposed of either by burning or removal to a dump area that is approved by the Owner. The Contractor shall obtain a burning permit from the city fire chief before any burning is started. Burning, if approved, shall be done in such a manner that does not create hazards such as damage to existing structures, trees and vegetation, interference with traffic and construction in progress. When the construction site is outside the city limits and burning is required, proper permits shall be obtained from the city, county or state officials. All disposal by burning shall be kept under constant supervision until all fires have been extinguished. All burning shall comply with all state and local laws relative to the building of fires.

08. PAVEMENT REMOVAL AND REPLACEMENT

A. Removal: When pipe is to be laid in or across existing paved streets, driveways, sidewalks and swales, the pavement shall be cut to true and neat lines as directed by the Engineer. All cuts shall form a straight line. Any broken off sections or corners shall require the entire length to be recut in a new straight line. All broken pavement shall be removed before trenching is started.

B. Replacement: The pipe trench shall be backfilled with granular select material to within 10 inches of the pavement surface. The trench shall then be filled with ABC stone to the surface and sufficiently compacted. The stone fill shall be maintained in a workmanlike manner until the surface has been replaced in a manner consistent with the original paving material.

1. Asphalt Replacement: The edges of the asphalt shall be neatly trimmed to a new face and mopped with asphalt cement. The asphalt surface shall be

placed and thoroughly rolled to a smooth, dense surface true to adjacent areas of the street. The asphalt surface course shall consist of Type I-2 bituminous concrete surface course in accordance with North Carolina Department of Transportation Specifications.

2. Concrete Replacement: Concrete replacement shall be performed in accordance with North Carolina Department of Transportation Standard Specifications for Roads and Structures, 1991, Sections 848-1 through 848-3 and 850-1 through 850-3. Existing concrete shall be saw cut to true and neat lines. Any broken off sections or corners shall require the entire length to be recut in a new straight line.

   Cut areas shall be maintained by the Contractor in a safe, passable condition until paved. Should the area create a dusty condition, the Contractor shall remedy this condition by the use of water or calcium chloride. Special care shall be given to the areas cut in traffic lanes and intersections by placing crushed stone and maintaining in a smooth condition at the Contractor's expense.

C. Curb and Gutter Replacement: Existing curb and gutter removed, disturbed or destroyed by construction, shall be replaced or repaired in a manner consistent with North Carolina Department of Transportation Standard Specifications for Roads and Structures, 1991, Sections 846-1 through 846-3.

E. State Highway Crossings: All construction related to state highway crossings shall be in full compliance with all requirements of the permit and to the satisfaction of the Department of Transportation.

F. State Highway Crossings: All construction related to state highway crossings shall be in full compliance with all requirements of the permit and to the satisfaction of the Department of Transportation.

G. Warranty Period: All pavement, concrete or gravel open cut and patches shall be covered for the full warranty period of the project.

09. RELATION OF WATER MAINS TO SEWERS:

A. Lateral Separation of Sewers and Water Mains: Water mains shall be laid at least 10 feet laterally, from existing or proposed sewers, unless local conditions or barriers prevent a 10-foot lateral separation in which case:

   1. The water main is laid in a separate trench with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or

2. The water main is laid in the same trench as the sewer with the water main located at one side on a bench of undisturbed earth, and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.

B. Crossing a Water Main Over a Sewer: Whenever it is necessary for a water main to cross over a sewer, the water main shall be laid at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer, unless local conditions or barriers prevent an 18 inch vertical separation in which case both the water main and sewer shall be constructed of ferrous materials and with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing. The Contractor shall receive approval in the field from the Engineer before payment will be made at ductile iron prices.

C. Crossing a Water Main Under a Sewer: Whenever it is necessary for a water main to cross under a sewer, both the water main and the sewer shall be constructed of ferrous materials and with joints equivalent to water main standards for a distance of 10 feet on each side of the point of crossing. A section of water main pipe shall be centered at the point of crossing.

10. WETLANDS: In wetland areas where a compaction of the backfill cannot be obtained the Contractor shall install compacted gravel 6" below the pipe and up to the centerline of the pipe. Crushed stone or crushed gravel used for pipe bedding shall meet ASTM C33 gradation 57.

11. ARCHAEOLOGICAL: If the Contractor, during the prosecution of work, encounters an unidentified archaeological or other cultural resource within the work area, the Contractor shall immediately stop work and notify the Engineer.

SEEDING/TURFING

01. SCOPE: This section shall include the furnishing of all labor, materials, equipment and incidental items to seed and establish a turf on all areas disturbed by the pipe laying operation.

All materials shall be of the best commercial quality available for the purposes specified.

02. SEEDING: Seed shall be furnished and sowed at the rates per acre and during the times of year as follows:

August 1 - April 30
75 lbs. Kentucky 31 Tall Fescue
50 lbs. Pensacola Bahiagrass

May 1 - September 30
50 lbs. Kentucky 31 Tall Fescue
75 lbs. Pensacola Bahiagrass
5 lbs. Centipede

* On cut/fill slopes 2:1 or steeper add 25 lbs. Sericea Lespedeza

Quantities stated are in terms of total seed of the specified quantity. The three types of seed shall be mixed thoroughly prior to sowing.

All sowing of seed shall be completed within the time limit of the contract, or unless otherwise authorized by the Engineers. All seed shall be covered to an average depth of one-fourth (1/4) inch.

03. LIME: The quality of lime and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Lime Law and regulations adopted by the North Carolina Board of Agriculture.

During the handling and storing, the lime shall be cared for in such a manner that it will be protected against hardening and caking. Any hardened or caked lime shall be pulverized to its original condition before being used.

Lime shall be applied at the rate of 2000 lbs. per acre and mixed thoroughly with the topsoil as the seedbed is prepared.

04. FERTILIZER: Applying Fertilizer - Fertilizer shall be distributed at the rate to provide 500 pounds per acre (Complete mix fertilizer - 10 parts nitrogen, 20 parts phosphoric acid and 20 parts potash), after topsoil is returned to the area and thoroughly mixed with the topsoil immediately before planting.

05. ESTABLISHING TURF: The establishment period shall continue for six (6) months from the date of seeding. The Contractor shall be responsible for maintenance, protection, repairing and resulting re-seeding and re-fertilization for six (6) months after initial seeding. No direct payment will be made for this work.

06. MULCHING: Where indicated on the plans or as described in encroachment agreements, mulch shall be applied as described herein.

A. Materials:

1. Mulch Material: Acceptable mulch shall be the materials listed below or locally available material that is similar to those specified. Low grade, musty, spoiled, partially rotted hay, straw, or other materials unfit for animal consumption will be acceptable. Mulch materials, which contain matured seed of species which would volunteer and be detrimental to the proposed overseeding or to surrounding farmland, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advance stage of decomposition as to smother or retard the planted grass, will not be acceptable.

2. Straw: Straw shall be the threshed plant residue of oats, wheat, barley, rye or rice from which grain has been removed as approved by the Engineer.

3. Asphalt Binder: Asphalt binder material shall conform to the requirements of AASHTO M140, Type SS-1, or RS-1 as appropriate.

B. Mulching: Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding. The spreading of the mulch shall be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

Mulch material shall be furnished, hauled and evenly applied on the area shown on the plans or designated by the Engineer. Straw shall be spread over the surface to a uniform thickness at the rate of three (3) tons per acre to provide a loose depth of not less than 1-1/2 inches nor more than three (3) inches. Mulch may be blown on the slopes and the use of cutters in the equipment for this purpose will be permitted to the extent that at least 95% of the mulch in place on the slope shall be 6 inches or more in length. When mulches applied by the blowing method are cut, the loose depth in place shall be not less than one (1) inch nor more than two (2) inches.

C. Securing Mulch: The mulch shall be held in place by asphalt binder on all slopes greater than 3 to 1, i.e. side slopes of roadside ditches or swales, or as directed by the Engineer. Where mulches have been secured by either of the asphalt binder methods, it will not be permissible to walk on the slopes after the binder has been applied. Level areas such as the road shoulder may utilize crimping methods to secure mulch if pre-approved by DOT. However, asphalt binders shall be utilized if traffic and wind blows away the mulch.

D. Care and Repair:

1. The Contractor shall care for the mulched area until final acceptance of the project.

2. The Contractor shall be required to, at his expense, repair or replace any mulching that is defective or becomes damaged until the project is finally accepted.

3. If the "Asphalt Spray" method is used, all mulched surfaces shall be sprayed with asphalt binder material so that the surface has a uniform appearance. The binder shall be uniformly applied to the mulch at the rate of approximately 8.0 gallons per 1,000 square feet, or as directed by the Engineer, with a minimum of 6.0 gallons and a maximum of 10 gallons

per 1,000 square feet, depending on the type of mulch and the effectiveness of the binder securing it. Bituminous binder material may be sprayed on the mulched slope areas from either the top or the bottom of the slope. An approved spray nozzle shall be used. The nozzle shall be operated at a distance of not less than four (4) feet from the surface of the mulch and uniform distribution of the bituminous material shall be required. A pump or an air compressor of adequate capacity shall be used to ensure uniform distribution of the bituminous material.

07. MANICURED AREAS (SOD):

A. The goal of sodding, where specified, is to return disturbed manicured lawns to their original vegetative condition, and to return the area to an aesthetically pleasing environment.

Vegetative restoration (sodding or seeding) shall be done as the work progresses.

All existing ornamental grass stands (commercial or private lawns) may be carefully taken up, protected and replaced to their original condition or the Contractor may elect to install new sod of the same type. In most instances the areas requiring sod restoration should be readily determinable by the Contractor based on preconstruction conditions. Questionable areas shall be restored in the manner (sodded or seeded) determined by the Engineer to be appropriate.

Any area disturbed without Owner's authorization will be restored by the Contractor at his own expense. In all cases the Contractor will guarantee a stand of grass over the entire area.

The work to be done to acquire the necessary vegetative cover shall include but is not specifically restricted to appropriate tilling of the area, the application of fertilizer and lime for areas to be seeded, placement of sod, or sowing of seed and placing of a straw mulch to hold the seed and soil in place until germination and growth occur.

After bringing the area to be sodded or seeded to proper grade, the entire area shall be tilled to a minimum depth of four (4") inches by disking, harrowing or other approved means. Following tilling, all large debris and stones shall be removed to the satisfaction of the Engineer and the surface leveled.

The Contractor shall provide general care for the restored areas as soon as the sod has been laid (or seeded and mulched), and such care shall continue until final inspection and acceptance of the work. All restored areas shall be protected against traffic or other use by warning signs or barricades approved by the Engineer.

B. Sodding: Sod furnished by the Contractor shall have good cover of living or growing grass. This shall be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas where the soil is reasonably fertile and contains a turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials which might be detrimental to the development of the sod or to future maintenance. At least 70 percent of the plants in the cut sod shall be composed of the existing lawn species, and any vegetation more than six (6) inches in height shall be mowed to a height of three (3) inches or less before sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, shall be cut uniformly to a thickness not more than two (2) inches.

The sod shall be cut with approved sod cutters to such a thickness that after it has been transported and placed on the prepared bed, but before it has been compacted, it shall have a uniform thickness of not less than two (2) inches. Sod sections or strips shall be cut in uniform widths, not less than ten (10) inches, and in lengths of not less than eighteen (18) inches, but of such length as may be readily lifted without breaking, tearing, or loss of soil. Where strips are required, the sod must be rolled without damage with the grass folded inside. The Contractor may be required to mow high grass before cutting sod.

The sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storing necessary. In such cases, sod shall be stored in an unrolled condition, irrigated, and protected from exposure to air drafts and sun and shall be kept from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, permission to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the depth the sod is to be cut.

Sodding shall be performed only during the seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the Engineer, provided the sod bed is watered to moisten the soil to a depth of at least four (4) inches immediately prior to laying the sod.

The sod shall be moist and shall be placed on a moist earth bed. Pitchforks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and insure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod may be displaced

during sodding operations, the workmen when replacing it shall work from ladders or treated planks to prevent further displacement. Screened soil of good quality shall be used to fill all cracks between sod sections. The quantity of the fill soil shall not cause smothering of the grass. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately one (1) inch below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaces around the manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

On slopes steeper than 1 vertical to 2 1/2 horizontal and in v-shaped or flat-bottom ditches or gutters, the sod shall be pegged with wooden pegs not less than twelve (12) inches in length and have a cross-sectional area of not less than 3/4 square inch. The pegs shall be driven flush with the surface of the sod.

Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner which will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface.

08. INSTALLATION: Permanent erosion control shall be performed as follows:

A. All disturbed areas shall be dressed to typical sections and plowed to a depth of 5 inches. The top 2 inches shall be pulverized to provide a uniform seedbed. NOTE: Lime should be applied before plowing operation.

B. Lime, seed, and fertilizer shall be applied with necessary equipment to give uniform distribution of these materials. The hand/bucket method is not acceptable. Following are rates and kinds of these materials to be applied per acre.

C. Seeded area shall be cultipacked to firm seedbed and cover seed.

D. Grain straw shall be applied over seeded areas as a mulch base. Ground shall not be visible when riding by a mulched area if proper application is achieved. Thick clumps of straw are not permissible as a uniform coverage is expected.

E. Mulched area shall be tacked with asphalt where required to hold straw in place.

F. Ditch treatment shall be used in areas where steep grades could cause ditch erosion. Use of jute mash, excelsior matting, or fiberglass roving is acceptable. Ditch treatment should be installed before mulching operation.

G. The use of temporary erosion control measures shall be included to prevent siltation of waterways and adjacent property. The use of silt basins, brush barriers, and temporary seeding, and mulching, as needed is recommended.

09. SEDIMENTATION AND EROSION CONTROL: The Contractor is instructed to control sedimentation runoff by methods approved by the Engineers during the course of construction of this project. The Contractor is reminded that all work shall meet all applicable requirements of the rules and regulations of erosion and sediment control as published by the Department of Natural Resources and Community Development, North Carolina Sedimentation Control Commission. The pavement for construction of silt fence and sediment basins as shown on the plans shall not be paid directly but shall be included in the cost per acre for seeding and mulching as noted in the Schedule of Bid Items. The construction sequence for sedimentation and erosion control is as follows:

A. Begin pipe laying activity.

B. Road shoulders shall be seeded and mulched as per the specifications within 30 working days of pipe installation on all portions of the project. approval of final grade for disturbed road shoulders must be received from North Carolina DOT District Engineer prior to seeding and mulching.

C. Install erosion control device as detailed in project plans as directed by the Engineer.

D. Call for on-site inspection by the sedimentation and erosion control inspector.

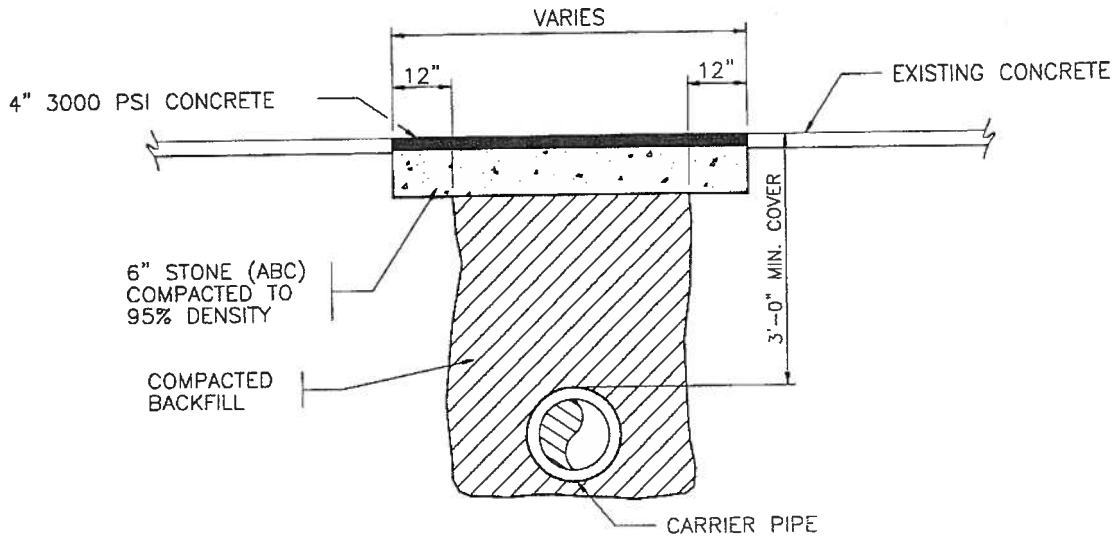
E. When construction is complete and all road shoulders are stabilized, call for inspection by the sedimentation and erosion control office.

F. When the site is approved, remove temporary silt fence and sediment basins and seed and mulch resulting disturbed areas.

G. When vegetation is established call for final site inspection.

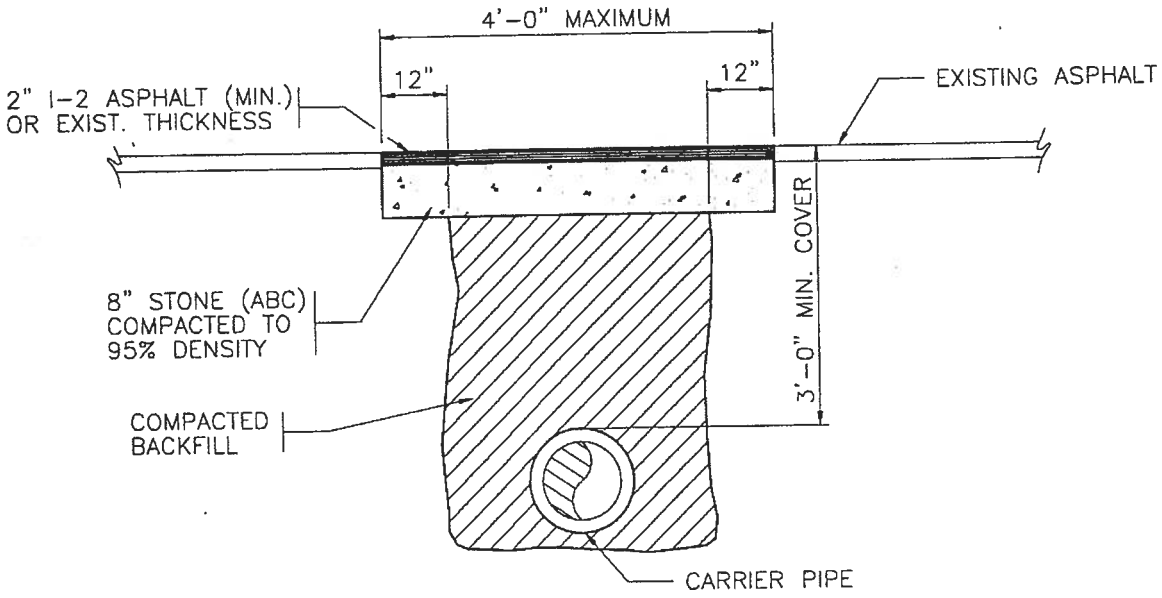
10. MOWING: No mowing will be required.

XI. STANDARD DETAILS



CONCRETE DRIVEWAY
OPEN, CUT AND PATCH

N.T.S.



ASPHALT DRIVEWAY
OPEN, CUT AND PATCH

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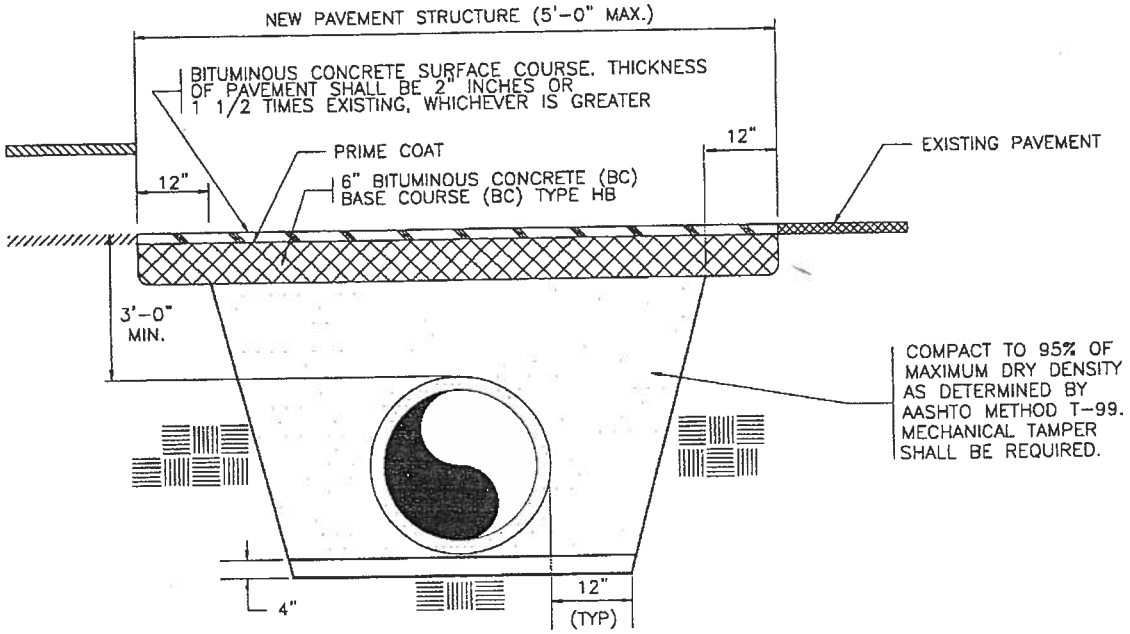

OPEN CUT ROADWAY CROSSING

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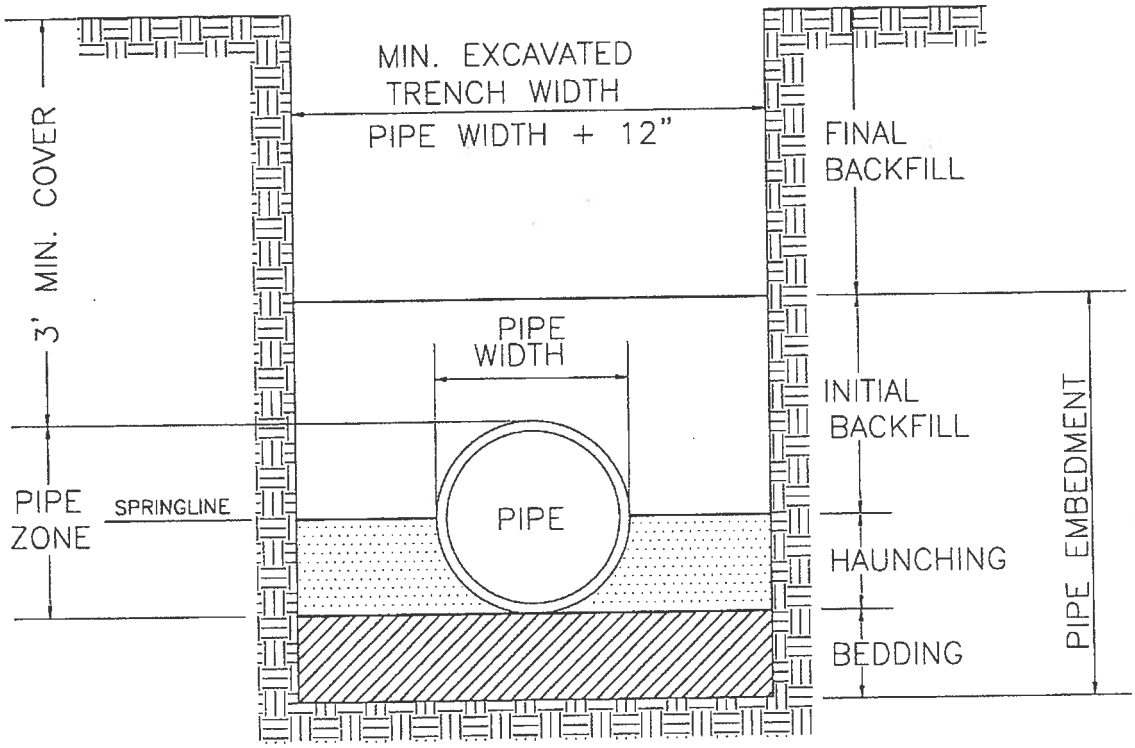

TRENCH DETAIL

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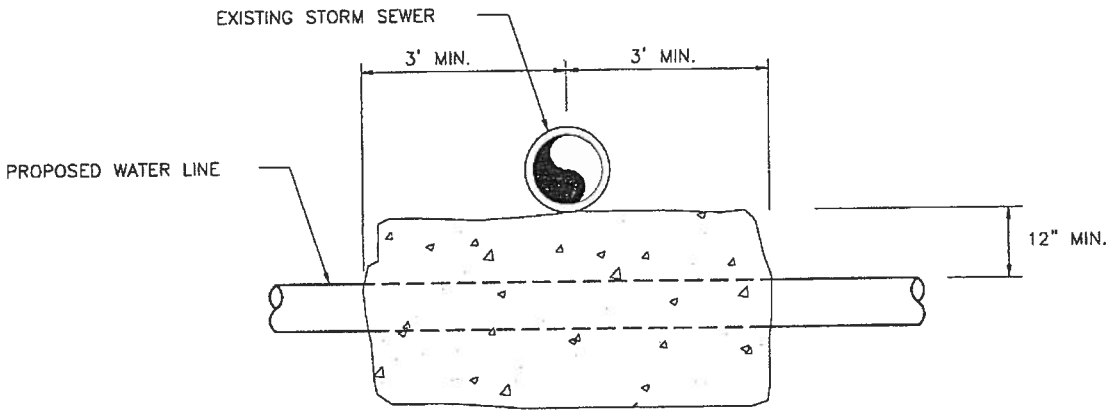

STORM SEWER CROSSING

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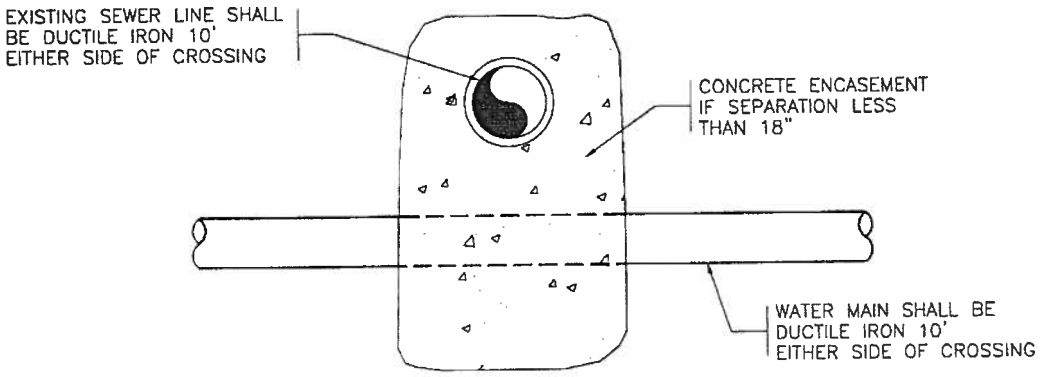

SEWER AND WATER CROSSING

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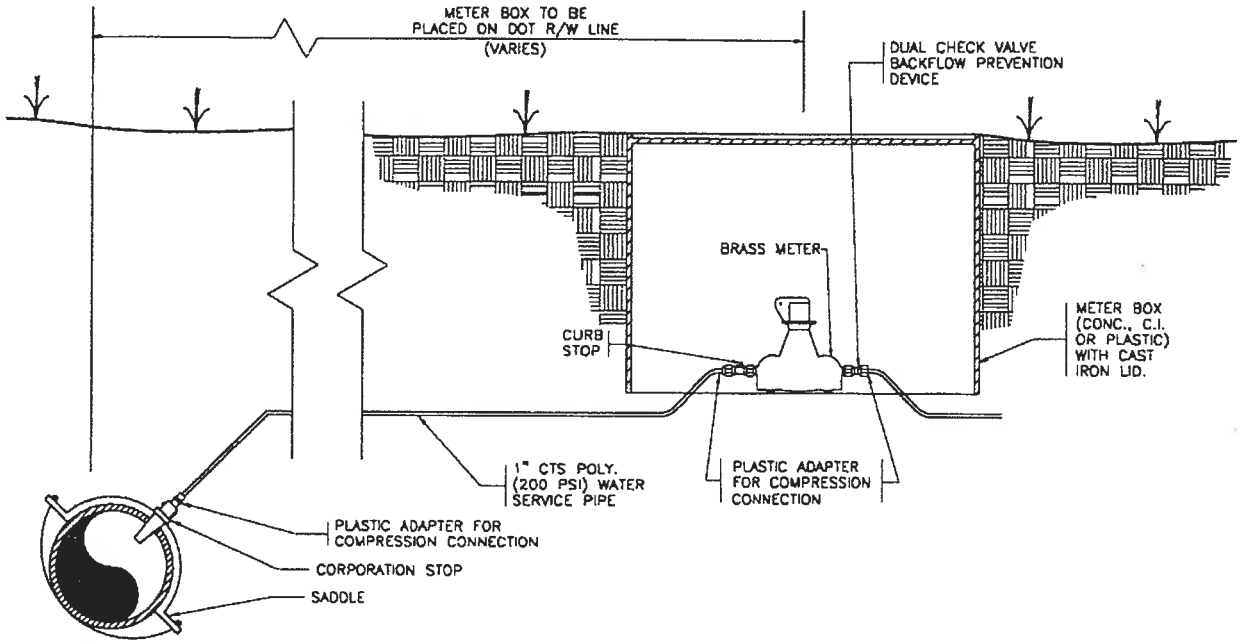

TYPICAL SERVICE CONNECTION

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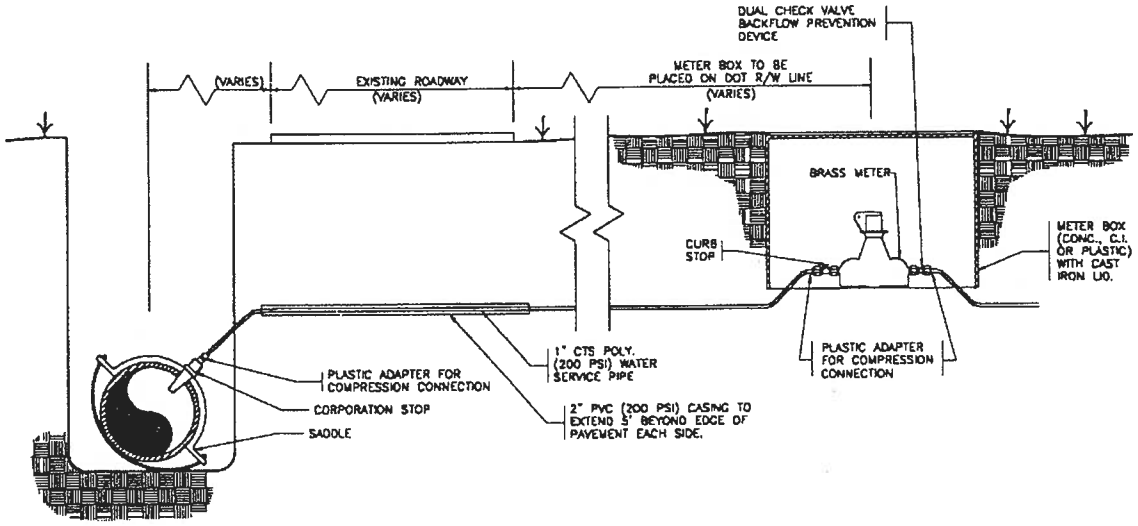

TYPICAL SERVICE CONNECTION

CROSSING ROAD

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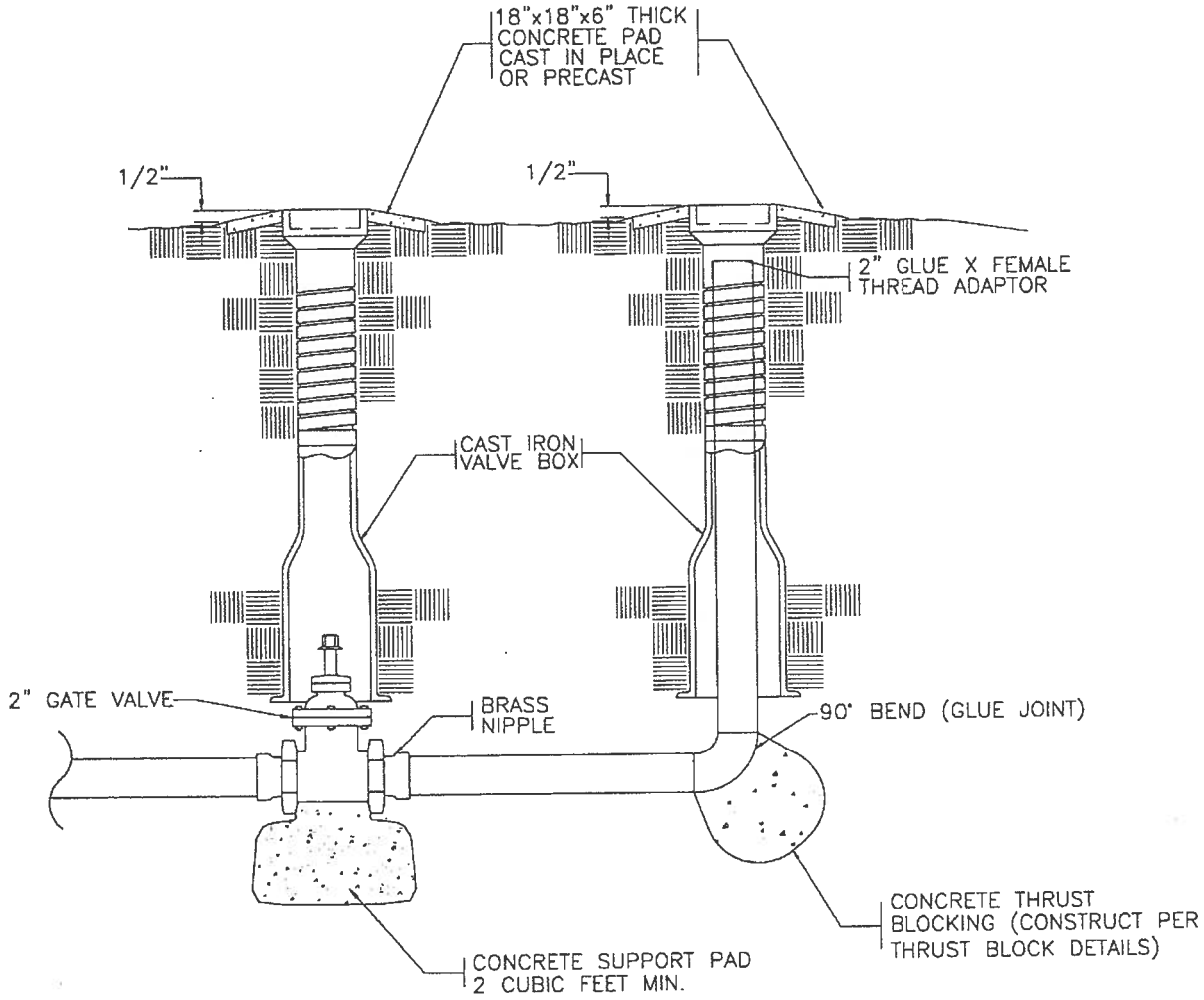
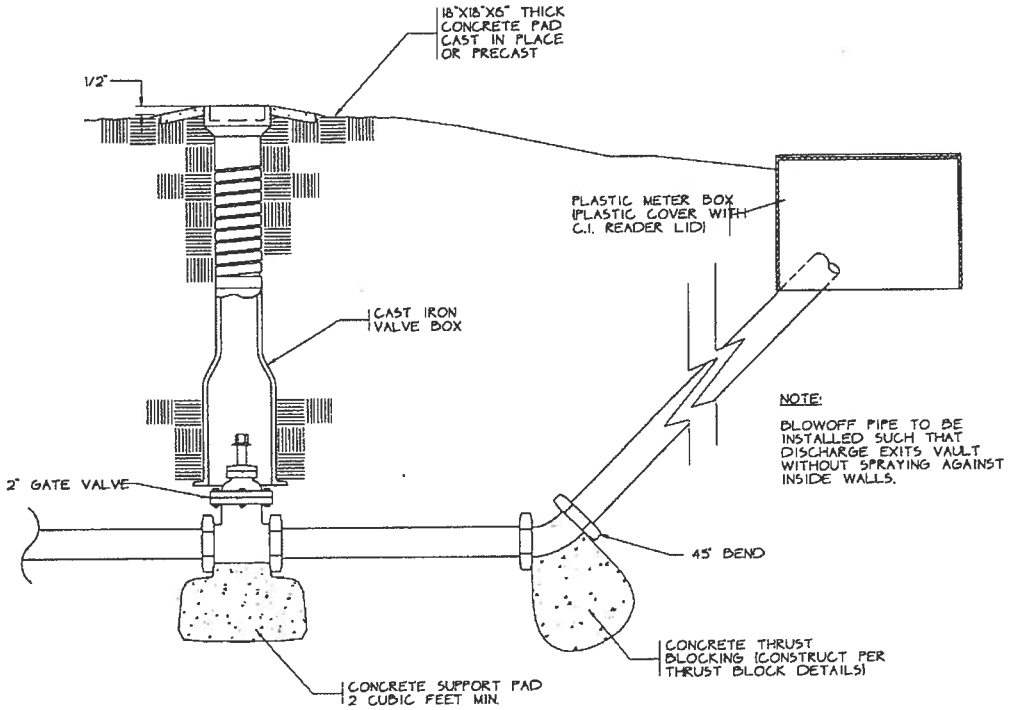


TYPICAL 2" BLOWOFF ASSEMBLY
AT END OF WATER MAIN
N.T.S.



TYPICAL 2" BLOWOFF ASSEMBLY AT END OF WATER MAIN

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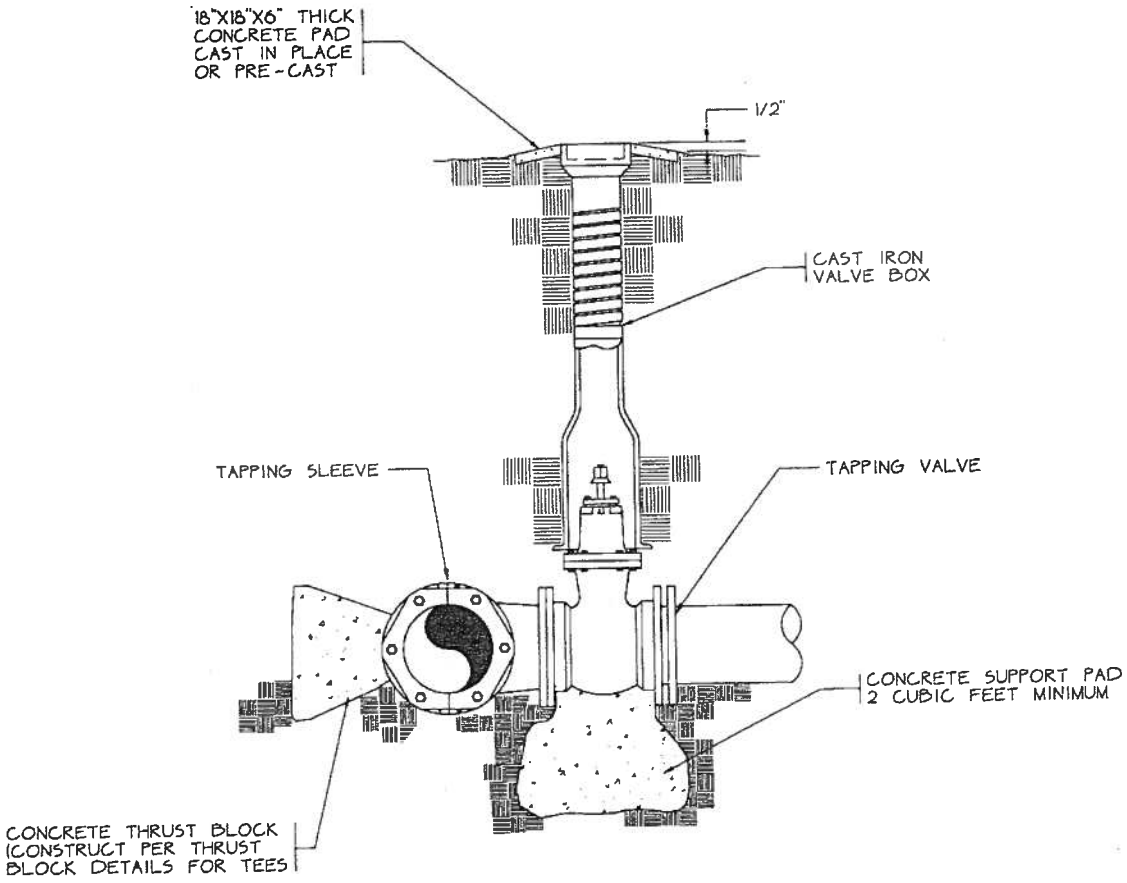

TAPPING SLEEVE AND VALVE ASSEMBLY

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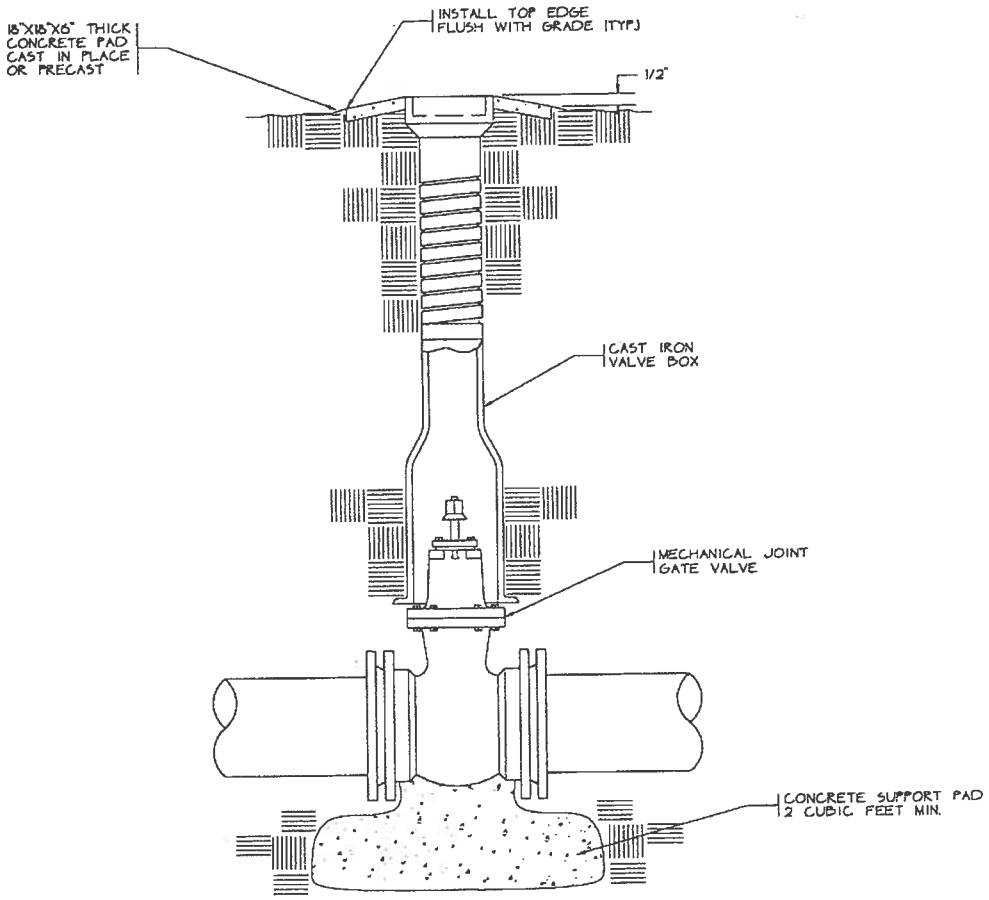

GATE VALVE ASSEMBLY

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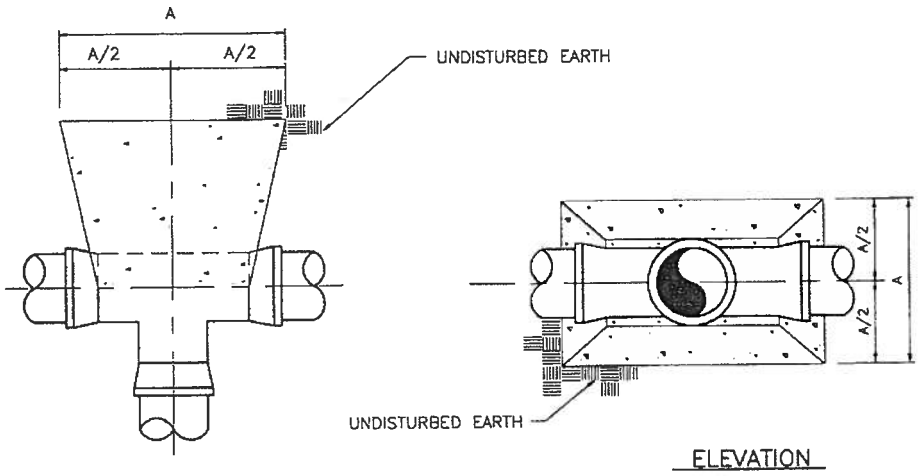


PLAN

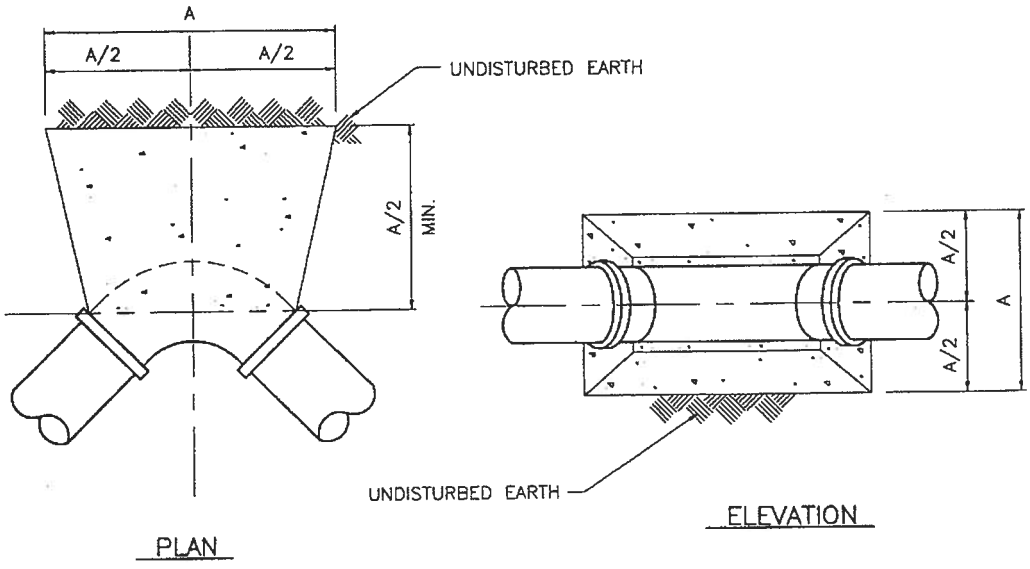
ELEVATION

NOTE: THRUST BLOCK SIZE DETERMINED BY SMALLEST DIA. OF TEE

DIM. (IN INCHES)	PIPE SIZE (INCHES)										
	2	4	6	8	10	12	14	16	18	20	24
A	1.6	1.9	2.8	3.8	4.7	5.9	6.6	7.5	8.5	9.4	11.2

THRUST BLOCK DETAIL FOR TEES

N.T.S.



NOTE: THRUST BLOCKS SHALL BE CONSTRUCTED OF 2000 P.S.I. CONCRETE

TABLE "A" DIMENSIONS (IN FEET)

BEND	PIPE SIZE (NOM. DIA. IN INCHES)									
	2	4	6	8	10	12	16	18	20	24
90°	1.5	1.9	2.8	3.8	4.7	5.9	7.5	8.5	9.4	11.2
45°	1.0	1.4	2.1	2.8	3.5	4.3	5.5	6.2	6.9	8.3
22 1/2°	0.8	1.0	1.5	2.0	2.5	3.1	4.0	4.5	4.9	5.7
11 1/4°	0.8	1.0	1.1	1.5	1.8	2.2	2.2	3.2	3.6	4.4

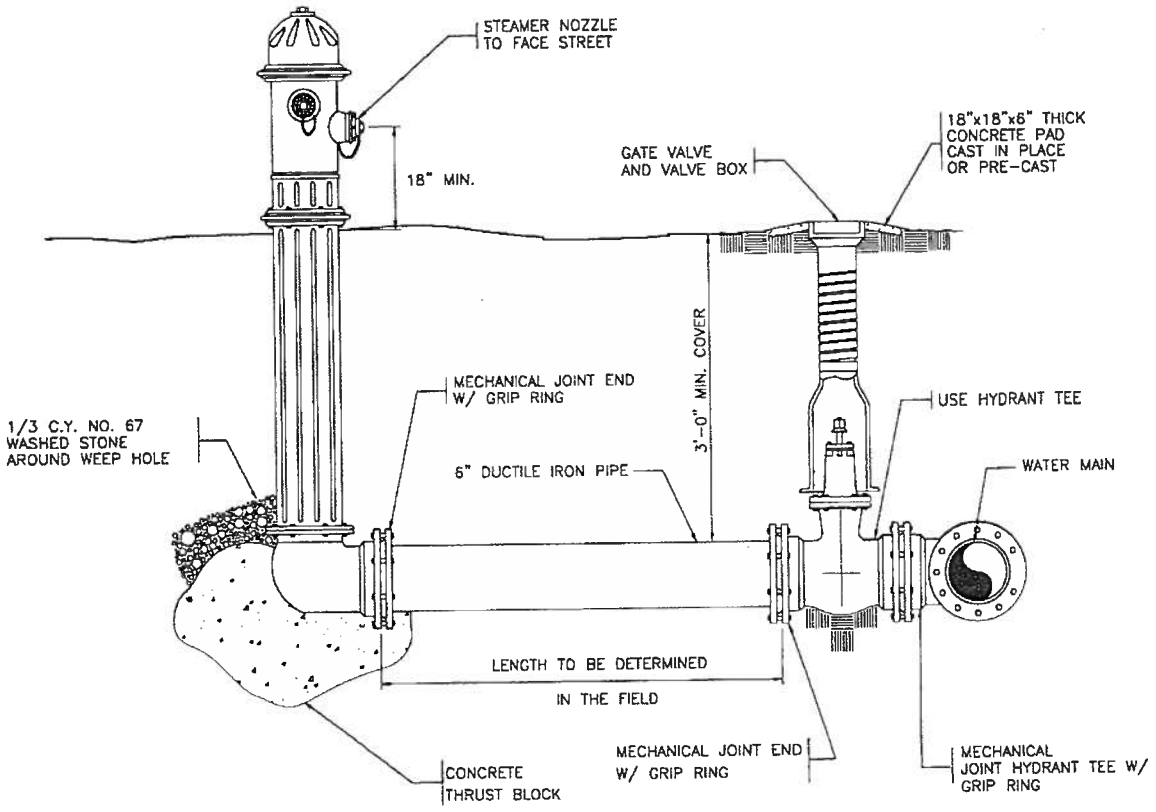
THRUST BLOCK DETAIL FOR WATER MAIN BENDS

N.T.S.

FIRE HYDRANT NOTES :

1) FIRE HYDRANTS SHALL BE INSTALLED AT THE EDGE OF THE N.C. D.O.T. RIGHT-OF-WAY. THE DISTANCE FROM THE WATER MAIN TO THE FIRE HYDRANT VARIES. THE CONTRACTORS BID PRICE FOR FIRE HYDRANT ASSEMBLES SHALL INCLUDE THE COST FOR THE VARYING FIRE HYDRANT LEG LENGTH

2.) COST TO INSTALL THE FIRE HYDRANT TO GRADE SHALL BE PAID BY THE CONTRACTOR.



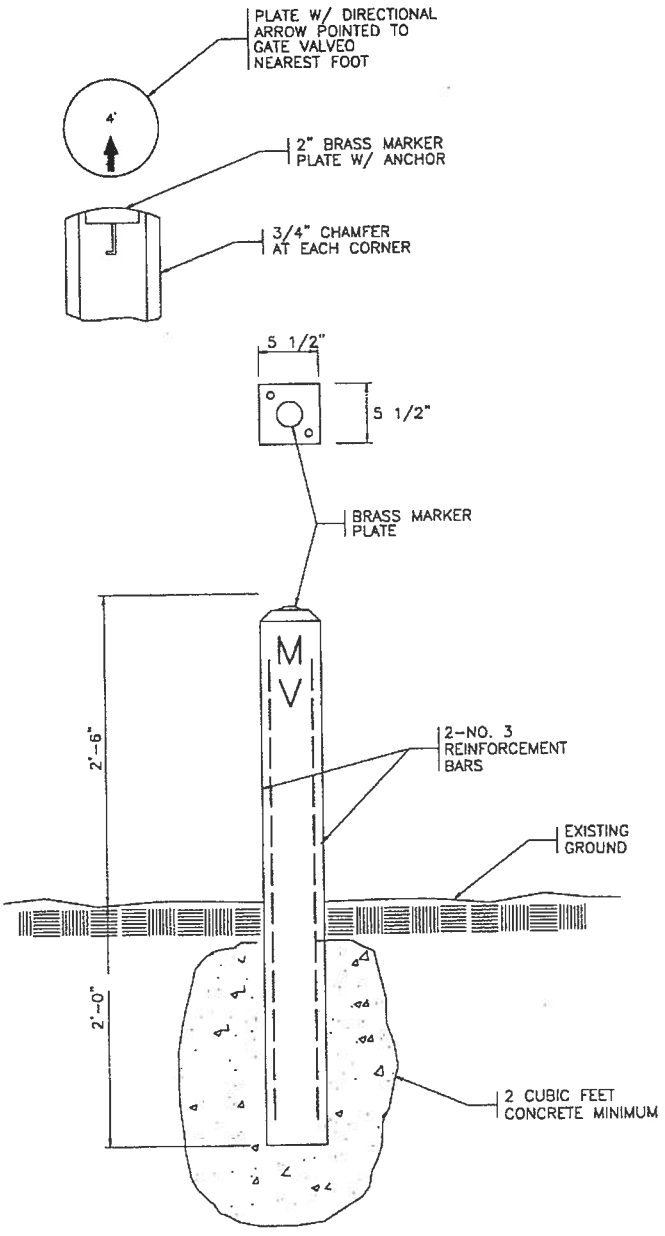
FIRE HYDRANT AND VALVE DETAIL

N.T.S.

NOTES:
1) INSTALL MARKER POST ON EDGE OF THE HIGHWAY RIGHT-OF-WAY

2) PROVIDE MARKER POSTS AT ALL VALVES, EXCEPT FIRE HYDRANT VALVES

3) ABBREVIATIONS STAMPED ON POST AS FOLLOWS
VALVES AND BLOW-OFF ASSEMBLIES
MV – MAIN VALVE



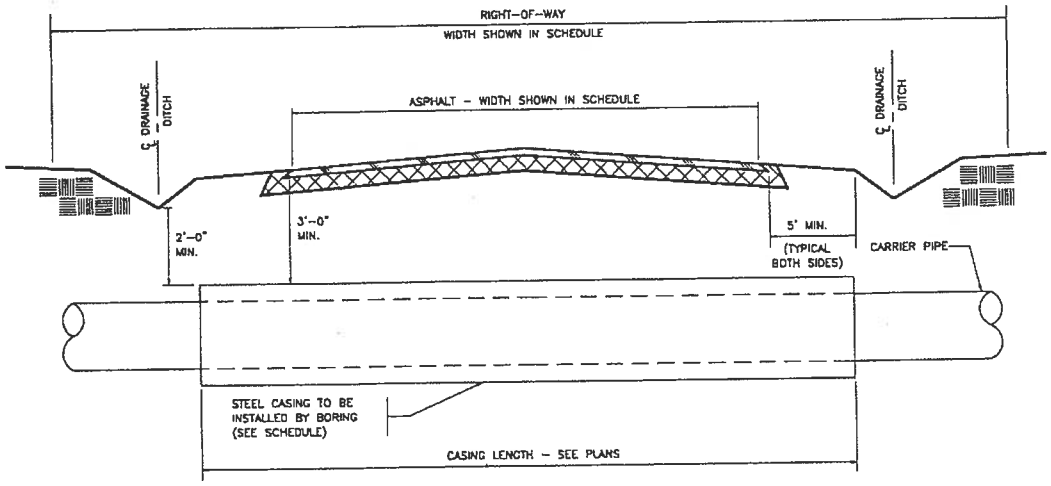
VALVE MARKER POST DETAIL

N.T.S.

NOTE:

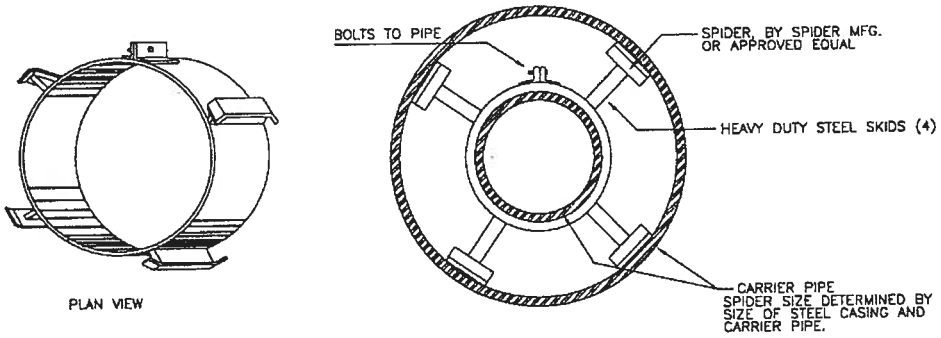
1) CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE "POLICIES AND PROCEDURES FOR ACCOMMODATING UTILITIES ON HIGHWAY RIGHTS-OF-WAY" AS PREPARED BY D.O.T.

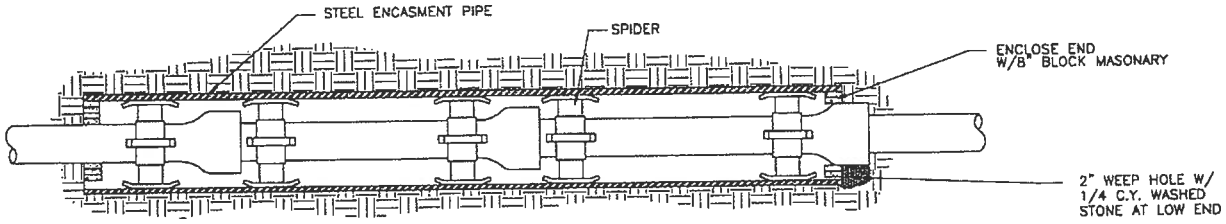
2) ALL ASPHALT AND CONCRETE OPEN CUTS SHALL BE SAW CUT, WITH SMOOTH, STRAIGHT EDGES.



TYPICAL BORING DETAIL

N.T.S.





SPIDER DETAIL

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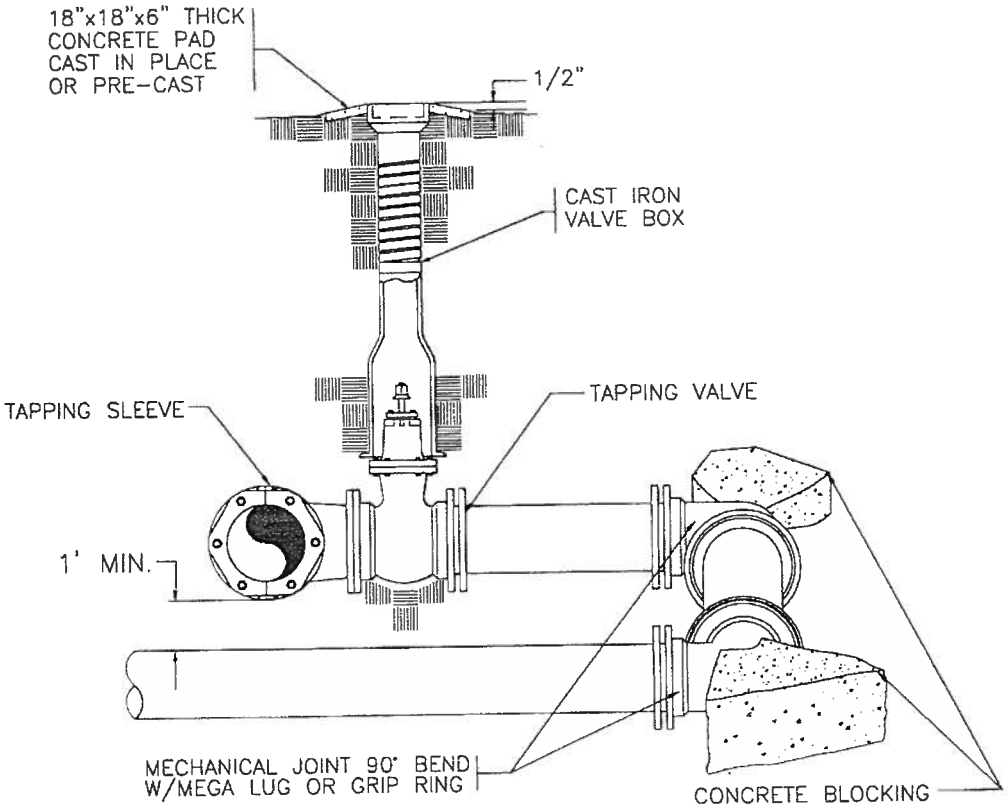

WRAP AROUND TIE-IN ASSEMBLY

SCALE: N.T.S.