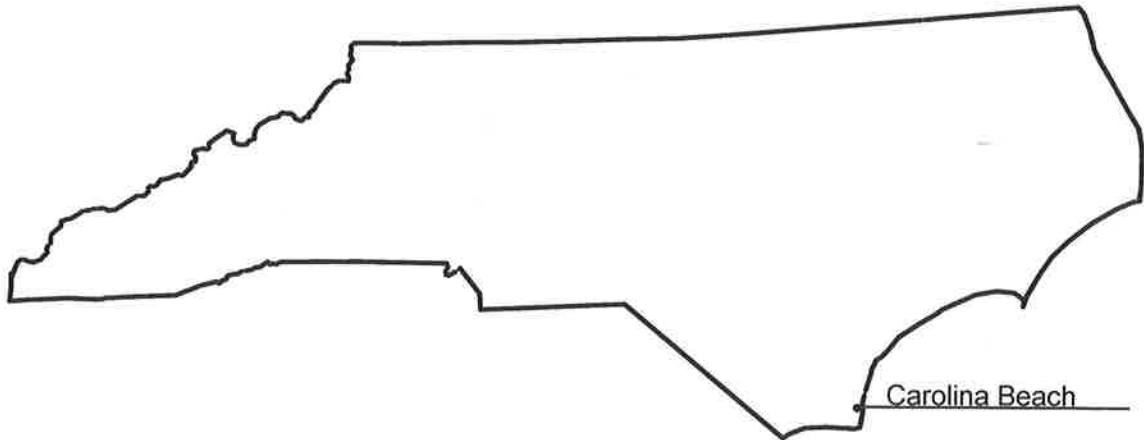


Construction Documents

Town of Carolina Beach, NC

OCEAN BOULEVARD SIDEWALK PROJECT



November 2023
Project No. 22035

PREPARED BY:

ES



ENGINEERING SERVICES, P.A.

(License #C-1342)

P.O. BOX 1849

1202 BENSON ROAD, #200

GARNER, NC 27529

TELEPHONE (919) 662-7272

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NCDOT Permit

ADVERTISEMENT FOR BIDS
OCEAN BOULEVARD SIDEWALK PROJECT
FOR THE
TOWN OF CAROLINA BEACH, NC

RECEIPT OF PROPOSALS

Sealed proposals for the furnishing of equipment and materials for a complete installation are invited, and will be received by the TOWN OF CAROLINA BEACH, North Carolina, in the Board Meeting Room of the Town Hall on or before, but no later than 11 a.m., local time, on Friday, December 8, 2023. Immediately thereafter all bids received will be publicly opened and read aloud.

Proposals must be made on the blank form provided in the Contract Documents, and must be enclosed in a sealed envelope and addressed to Brian Stanberry, TOWN OF CAROLINA BEACH, North Carolina. **The name and address and Licensing Number of the Bidder must be plainly marked on the outside of each envelope.** Pursuant to N.C. Gen. Stat. §87-15, by submitting a bid, the Bidder represents that it is appropriately licensed by all applicable Licensing boards for the scope of work presented herein.

There will be a non-mandatory pre-bid conference on November 28, 2023, at 1:00 p.m. at the Carolina Beach Town Hall Council Chambers. The bidding Contractors are encouraged to provide project related questions to Brian Stanberry, three (3) business days prior to the pre-bid conference so that responses can be provided during the meeting.

PROJECT DESCRIPTION

This project consists of the furnishing of all materials, labor and equipment to install the following:

- 2,200 LF of 5 ft. wide sidewalk
- 1,450 LF of stormwater drainage pipe varying sizes from 15" to 30" diameter
- Replacement and addition of stormwater catch basins
- Asphalt and concrete driveway pavement

CONTRACT DOCUMENT

The Contract Document for the above work is on file and available for inspection during regular business hours between 9:00 a.m. and 5:00 p.m., Monday through Friday at the following locations:

TOWN OF CAROLINA BEACH
1121 N. Lake Park Blvd.
Carolina Beach, NC 28428

Engineering Services, PA
1202 Benson Road, Suite 200
PO Box 1849, Garner, NC 27529
919.662.7272

Copies of the Contract Documents required for review or bidding purposes may be obtained by contacting Engineering Services, during regular business hours, Monday through Friday or viewed from the Town of Carolina Beach website, www.carolinabeach.org. The contractor shall acknowledge his receipt of a complete set of bid documents to Brian Stanberry, with the Town of Carolina Beach, in order to receive project addendum and updates. This correspondence shall be sent by email to brian.stanberry@carolinabeach.org.

BID SECURITY

Each Proposal must be accompanied by a certified or cashier's check payable to the order of the Owner, TOWN OF CAROLINA BEACH, North Carolina, or a satisfactory bid bond executed by the Bidder and a corporate surety licensed under the laws of the State of North Carolina to execute such bonds in an amount not less than 5% of the bid as a guarantee that the Bidder will within ten (10) days after the date of the Bidder's receipt of the NOTICE OF AWARD of a contract, execute an agreement and file same as required by the Contract Document if his Proposal is accepted.

If a Bidder fails to execute and file an agreement, the amount of his security shall be forfeited as liquidated damages.

AWARD OF CONTRACT

The Owner will award a contract to the lowest responsive Bidder for this Division of the project in accordance with the General Statutes of North Carolina, Chapter 143-128.2. The Owner reserves the right to reject all Proposals of Bidders for any Phase of the project. The Owner further reserves the right to reject the Proposal of any Bidder submitting a proposal which is not responsive to the bid document or the proposal of any Bidder which is found not responsible to carry out the scope and intent of the bid document.

The Owner reserves the right to reject any Proposal for failure to comply with all requirements of this notice or of the Contract Document; however, he may waive any minor defects or informalities at his discretion. The Owner further reserves the right to reject any and all Proposals or to award the Contract that is in his best interest.

TOWN OF CAROLINA BEACH, NC
Brian Stanberry

By:  _____

3.0 INSTRUCTIONS TO BIDDERS

3.01 DEFINITIONS:

- (a) **Bidding Documents** include the Advertisement or Invitation to Bid, Instructions to Bidders, the bid form, other sample bidding and contract forms and the proposed Contract Documents including any Addenda issued prior to receipt of bids. Additionally, pursuant to N.C. Gen. Stat. §87-15, Chapter 87 of the North Carolina General Statutes is hereby incorporated in its entirety as part of the Bidding Documents. All Contractors shall turn in their Bids on forms provided and bound within the Contract Documents.
- (b) **Contract Documents:** The "Contract Documents" consist of the Agreement or Contract, the Advertisement, the Instructions to Bidders, the General Conditions, the Special Conditions, the Technical Specifications, the Drawings (including such detail drawings as may be furnished and/or approved by the Engineer from time to time during the performance of the Work in explanation of said drawings), the accepted Proposal, and all required bonds, power-of-attorney and insurance certificates.
- (c) **Definitions** set forth in the General Conditions of the Contract for Construction or in other Contract Documents are applicable to the Bidding Documents.
- (d) **Addenda** are written or graphic instruments issued by the ENGINEER prior to the execution of the Contract which modify or interpret the bidding documents by addition, deletions, clarifications or corrections.
- (e) **Bid** is a complete and properly signed proposal to do the Work or designated portion thereof, for the sums stipulated therein, supported by data called for by the Bidding Documents.
- (f) **Base Bid** is the sum stated in the Bid for which the Bidder offers to perform the Work described as the base, to which Work may be added or deducted for sums stated in Alternate Bids.
- (g) **Alternate Bid** (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.
- (h) **Unit Price** is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Contract Documents.

- (i) **Bidder** is one who submits a Bid for a prime contract with the Owner for the Work described in the proposed Contract Documents.
- (j) **Owner** is the party entering into this Contract with the successful Bidder.
- (k) **Sub-contractor** is one who submits a bid to a Bidder for materials or labor for a portion of the Work.

3.02 BIDDER'S REPRESENTATION:

Each Bidder by making his bid represents that:

- (1) He has read and understands the Bidding Documents and his bid is made in accordance therewith.
- (2) He has visited the site and has familiarized himself with the local conditions under which the Work is to be performed.
- (3) His Bid is based upon the materials, systems and equipment described in the Bidding Documents without exceptions.
- (4) He is a qualified license holder in good standing with the appropriate Licensing Board(s) to perform the scope of Work.

3.03 BIDDING DOCUMENTS:

3.03.1 COPIES

- (a) Bidders may obtain from the ENGINEER (unless another issuing office is designated in the Advertisement of Invitation to Bid) complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Invitation. The deposit will be refunded to Bidders who submit a bonafide Bid and return the Bidding Documents in good condition within ten (10) days after receipt of Bids. The cost of replacement of any missing or damaged documents will be deducted from the deposit. A Bidder receiving a contract award may retain the Bidding Documents and his deposit will be refunded.
- (b) Bidding Documents will not be issued to Sub-contractors or others unless specifically offered in the Advertisement or Invitation to Bids.
- (c) Complete sets of Bidding Documents shall be used in preparing bids; neither the Owner nor the ENGINEER assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

- (d) The Owner or ENGINEER in making copies of the Bidding Documents available on the above terms, does so only for the purpose of obtaining bids on the Work and does not confer a license or grant for any other use.

3.03.2 MAKE-UP OF CONTRACT DOCUMENTS

- (a) The attention of prospective Bidders is directed to the makeup of the Contract Documents on this Project. It should be noted that:
 - (1) Special Instructions to Bidders, if required, includes paragraphs which amplify the General Instructions to Bidders which it follows.
 - (2) Special Conditions of Contract, if required, includes paragraphs which amplify the General Conditions of Contract which it follows.
 - (3) The Contract Specifications included in this document are divided into the major types of construction operations included under this Contract. The first Section of Specifications is designated as General Specifications which is followed by one or more Sections designated as Project Specifications.
 - (4) In resolving conflicts, the Contract documents shall be given precedence in the following order: Agreement, Specifications, Drawings. Within the Specifications the order of precedence shall be as follows: Addenda, Technical Specifications, Major Equipment Specifications, Project Specifications, General Specifications, Special Conditions, Instructions to Bidder, General Conditions.
- (b) Each General Specification covers the description of materials generally encountered in the construction carried out under the designated Title of this specification and the installation of such materials. The Project Specifications and the Contract Drawings define the locations and details of the work required under this Contract. The first sections of the Project Specifications contain the same section numbers and titles as the corresponding General Specification. These sections amplify the materials and construction methods for items in the General Specifications. The last sections of the Project Specifications are identified as Major Equipment Items and will provide detailed specifications of the primary items of interest and the division or phase of the work to which this equipment applies. Unless specifically noted

otherwise, the General Specifications and Project Specifications used within this document are applicable to all enclosed Divisions and Phases of Work.

- (1) The Contract Specifications included in this document may be required to vary from the above format due to project scope. In these cases the Project and General Specifications shall be combined under the heading Technical Specifications.

3.03.3 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

- (a) Bidders shall promptly notify the ENGINEER of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.
- (b) Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the ENGINEER, to reach him at least ten (10) days prior to the date for receipt of bids.
- (c) Any interpretation, correction or change of the Bidding Documents will be made by Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and bidders shall not rely upon such interpretations, corrections and changes.

3.03.4 SUBSTITUTIONS

- (a) The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.
- (b) No substitution will be considered unless written request for approval has been received by the ENGINEER at least fourteen (14) days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The ENGINEER'S decision of approval or disapproval of a proposed substitution shall be final.

- (c) If the ENGINEER approves any proposed substitution, such approval will be set forth in and addendum. Bidders shall not rely upon approvals made in any other manner.
- (d) The Bidder shall bear the cost of any additional engineering caused by an approved substitution. The ENGINEER will be compensated at a rate equal to 2.0 times the direct labor cost of doing the additional engineering. This cost of engineering is to include, but not limited to, salaries, travel, supplies, materials, telephone and additional inspection.
- (e) Unless approved in writing by the ENGINEER, an approved substitution will not entitle the bidder to an extension of the contract time.

3.03.5 ADDENDA

- (a) Addenda will be mailed or delivered to all who are known by the ENGINEER to have received a complete set of Bidding Documents.
- (b) Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
- (c) An Addenda will be issued not later than two (2) days prior to the date for receipt of bids except an Addendum, if necessary, postponing the date for receipt of bids or withdrawing the request for bids.
- (d) Each Bidder shall ascertain prior to submitting his bid that he has received all Addenda issued, and he shall acknowledge their receipt in his bid at the bottom of the Proposal.

3.04 BIDDING PROCEDURE:

3.04.1 FORM AND STYLE OF BIDS

- (a) Bids shall be submitted on the forms provided by the ENGINEER.
- (b) All blanks on the bid form shall be filled in by typewriter or manually **in black ink**.
- (c) Where so indicated by the makeup of the bid form, sums shall be expressed in both words and figures, and in case of discrepancy between the two (2), the written amount shall govern.

- (d) Any interlineation, alteration or erasure must be initialed by the signer of the Bid.
- (e) All requested alternates shall be bid.
- (f) Bidder shall make no additional stipulations on the bid form or qualify his bid.
- (g) Each copy of Bid shall include the legal name of Bidder and a letter addressed to the Owner stating whether Bidder is a sole proprietor, a partnership, a corporation, or any other legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the State of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current Power of Attorney attached certifying agent's authority to bind bidder. A Bid not properly signed shall become invalid.

3.04.2 BID SECURITY

- (a) Each Bid shall be accompanied by a certified check or bid bond in the amount of 5% of the Contract amount, pledging that the Bidder will enter into a contract with the Owner on the terms stated in his Bid and will furnish bonds as described hereunder in Section 3.08 covering the faithful performance of the Contract and the payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as penalty.
- (b) A surety bond shall be written on the form Bid Bond or on the Bonding Company's standard form attached, executed by the Attorney-In-Fact until either (a), the Contract has been executed and bonds, if required, have been furnished or (b), the specified time has elapsed so that Bids may be withdrawn, or (c), all Bids have been rejected.

3.04.3 SUBMISSION OF BIDS

- (a) All copies of the Bid, the bid security and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and the portion of the project or category of work for which the Bid is submitted. If the Bid is sent by mail the

sealed envelope shall be enclosed in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof.

- (b) Bids shall be deposited at the designated locations prior to the time and date for receipt of bids indicated in the Advertisement or Invitation to Bid, or any extension thereof made by Addendum. Bids received after the time and date for receipt of bids will be returned unopened.
- (c) Bidder shall assume full responsibility for timely delivery at location designated for receipt of Bids.
- (d) Oral, telephonic, telegraphic or facsimile Bids are invalid and will not receive consideration.

3.04.4 MODIFICATION OR WITHDRAWAL OF BID

- (a) In submitting his Bid, the Bidder agrees that a Bid may not be modified, withdrawn or cancelled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids.
- (b) Prior to the time and date designated for receipt of Bids, Bids submitted early may be modified or withdrawn only by notice to the party receiving Bids at the place and prior to the time designated for receipt of Bids.

Such notice shall be in writing over the signature of the Bidder or be by telegram; if by telegram, written confirmation over the signature of Bidder must have been mailed and postmarked on or before the date and time set for receipt of Bids; it shall be so worded as not to reveal the amount of the Original Bid.

- (c) Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.
- (d) Bid security shall be in an amount sufficient for the Bid as modified or resubmitted.

3.05 CONSIDERATION OF BIDS:

3.05.1 OPENING OF BIDS

Unless stated otherwise in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be opened publicly and

will be read aloud, and an abstract of the amounts of the Base Bids and major Alternates, if any, will be made available to Bidders. When it has been stated that Bids will be opened privately, an abstract of the same information may be made available to the Bidders within a reasonable time.

3.05.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids and in particular to reject any Bid not accompanied by bid security or data required by the Bidding Documents or any Bid in any way incomplete or irregular.

3.05.3 ACCEPTANCE OF BID (AWARD)

- (a) The Owner shall have the right to waive any informality or irregularity in any Bid received.
- (b) It is the intent of the Owner, if he accepts any Alternates, to accept them in the order in which they are listed in the bid form but the Owner shall have the right to accept alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and the Alternates accepted.
- (c) It is the intent of the Owner to award a contract to the lowest responsive, responsible Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents, is judged to be reasonable, and does not exceed the funds available.
- (d) Unless noted otherwise in the Proposal section, if the contract is awarded, the Owner will issue the successful bidder a Notice of Award within thirty (30) days after the opening of the Bids.
- (e) Unless noted otherwise in the Proposal section, by the submission of a Bid, the Bidder guarantees to hold all pricing to the Owner for a period not to exceed thirty (30) calendar days from the date of the Bid.

3.06 QUALIFICATION OF CONTRACTORS:

3.06.1 SUBMISSION OF QUALIFICATION STATEMENT

Bidders to whom Award of a contract is under consideration shall submit to the ENGINEER upon his request a properly executed Contractor's Qualification Statement unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

3.07 POST-BID INFORMATION

3.07.1 SUBMISSIONS

- (a) Unless waived by the ENGINEER, in writing, the Bidder shall, within fifteen (15) days of the date of the Notice of Award, submit the following information to the ENGINEER:
 - (1) A designation of the work to be performed by the Bidder with his own forces.
 - (2) A list of names of the Subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.
- (b) The Bidder will be required to establish to the satisfaction of the Engineer and the Owner the reliability and responsibility of the proposed Subcontractors who will furnish and perform the Work described in the Sections of the Specifications pertaining to such proposed Subcontractors' respective trades.
- (c) Prior to the award for the contract, the ENGINEER will notify the Bidder in writing if either the Owner or the ENGINEER, after due investigation, has reasonable and substantial objection to any person or organization, the Bidder may, at his option, (1) withdraw his bid, or (2) submit an acceptable substitute Subcontractor. The ENGINEER and Owner may, at their discretion, accept the substitute subcontractor or they may disqualify the Bidder. In the event of either withdrawal or disqualification under this Subparagraph, bid security will be forfeited, notwithstanding anything in Paragraph 3.04.4.
- (d) Subcontractors and other persons and organizations proposed by the Bidder and accepted by the Owner and the ENGINEER

must be used on the Work for which they were proposed and accepted and shall not be changed except with the written approval of the Owner and the ENGINEER.

- (e) A minimum of 50% of the work must be performed by the Bidder's own work force to whom the Contract is awarded.

3.08 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND:

3.08.1 OWNER'S RIGHT TO REQUIRE BONDS

The Owner shall require the Bidder to furnish bonds, covering the faithful performance of the Contract and the payment of all obligations arising thereunder, in such form and amount as provided by the Contract Documents and with such sureties secured through the Bidder's usual sources as may be agreeable to the parties. If the furnishing of such bonds are not stipulated in the Bidding Documents, the premiums shall be paid by the Owner subsequent to the submission of bids.

3.08.2 TIME OF DELIVERY AND FORM OF BONDS

- (a) The Bidder shall deliver the required bonds to the Owner not later than the date of execution of the Contract.
- (b) The bonds may be written in the form of Performance Bond and Labor and Material Payment Bonds, as included in the Contract Document. Bonding company forms are acceptable if properly worded and executed.
- (c) The Bidder shall require the Attorney-In-Fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his Power of Attorney.

3.09 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

3.09.1 FORM TO BE USED

Unless otherwise provided in the Bidding Documents, the Agreement for the Work will be written on the Standard form of Agreement between Owner and Contractor, included in the Contract Document.

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4.0 GENERAL CONDITIONS

4.01 DEFINITIONS:

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

- (a) **AGREEMENT:** The written agreement between the OWNER and the CONTRACTOR covering the Work to be performed; the Contract Documents will be attached to and made a part of the Agreement.
- (b) **APPLICATION FOR PAYMENT:** The form furnished by the ENGINEER which is to be used by the CONTRACTOR in requesting progress payments and which is to include the schedule of values required by paragraph 4.14.1 and an affidavit of the CONTRACTOR that progress payments theretofore received from the OWNER on account of the Work have been applied by the CONTRACTOR to discharge in full all of the CONTRACTOR'S obligations incurred in connection with the Work covered by all prior Applications for payment.
- (c) **BID:** The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
- (d) **BIDDER:** Any person, firm or corporation submitting a Bid for the Work.
- (e) **BONDS:** Bid, Performance and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the Contract Documents.
- (f) **CHANGE ORDER:** A written order to the CONTRACTOR signed by the OWNER authorizing an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time issued after execution of the Agreement.
- (g) **CONFLICT:** An item and/or condition defined in both written specifications and drawings, but identified differently in each place.
- (h) **CONTRACT DOCUMENTS:** The "Contract Documents" consist of the Agreement or Contract, the Advertisement, the Instructions to Bidders, the General Conditions, the Special Conditions, the General Specifications, the Project Specifications, the Technical Specifications, the Drawings (including such detail drawings as may be furnished and/or approved by the ENGINEER from time to time during the performance of the Work in explanation of said drawings), the accepted Proposal, all required bonds, powers-of-attorney, insurance certificates, and all addenda.

- (i) **CONTRACT PRICE:** The total monies payable to the CONTRACTOR under the Contract Documents.
- (j) **CONTRACT TIME:** The number of calendar days stated in the Agreement for the completion of the Work.
- (k) **CONTRACTOR:** The person, firm or corporation with whom the OWNER has executed the Agreement.
- (l) **DRAWINGS:** The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by the ENGINEER and are referred to in the Contract Documents.
- (m) **ENGINEER:** The person, firm, or corporation named as such in the Contract Documents and acting as an appointed representative for the Owner.
- (n) **FIELD ORDER:** A written order issued by the ENGINEER which clarifies or interprets the Contract Documents in accordance with paragraph 4.09.3 or orders minor changes in the Work in accordance with paragraph 4.10.2.
- (o) **MODIFICATION:** (a) A written amendment of the Contract Documents signed by both parties, (b) a Change Order, (c) a written clarification or interpretation issued by the ENGINEER in accordance with paragraph 4.09.3 or (d) a written order for a minor change or alteration in the Work issued by the ENGINEER pursuant to paragraph 4.10.2. A Modification may only be issued after execution of the Agreement.
- (p) **NOTICE OF AWARD:** The written notice by the OWNER to the CONTRACTOR that the CONTRACTOR is the successful Bidder and that upon compliance with the conditions herein to be fulfilled by the CONTRACTOR within the time specified, the OWNER will execute and deliver the Agreement to him.
- (q) **NOTICE TO PROCEED:** Written communication issued by the OWNER/ENGINEER to the CONTRACTOR authorizing him to proceed with the Work and establishing the date for commencement of the Work.
- (r) **OWNER:** A public body or authority, corporation, association, partnership, individual or appointed representative for whom the Work is to be performed.
- (s) **PROJECT:** The entire construction to be performed as provided in the Contract Documents.

- (t) **INSPECTOR:**
CONSTRUCTION INSPECTOR:
PROJECT REPRESENTATIVE:
CONSTRUCTION OBSERVER: An authorized representative of the ENGINEER and/or OWNER assigned to observe the Work performed and materials furnished by the CONTRACTOR or such other person as may be appointed by the OWNER as his representative. The CONTRACTOR shall be notified of the identity of this representative at the Pre-Construction Conference with the OWNER.
- (u) **SHOP DRAWINGS:** All illustrations, brochures, drawings, diagrams, schedules, and other data which are prepared by the CONTRACTOR, a Subcontractor, manufacturer, supplier or distributor and which illustrate the equipment, material, or some portion of the Work and as required by the Contract Documents.
- (v) **SPECIFICATIONS:** The Instructions to Bidders, addenda (whether issued prior to opening of bids or the execution of the Agreement) these General Conditions, the Special Conditions, the General Specifications, the Project Specifications and the Technical Specifications. The "North Carolina Department of Transportation Standard Specifications for Roads and Structures", latest revision, shall be considered a part of these specifications. However, reference made to Department of Transportation in the above mentioned specifications shall be interpreted for the purpose of this contract to mean the Owner.
- (w) **SUBCONTRACTORS:** The term Subcontractor, as employed herein, includes only those having a direct contract with CONTRACTOR: and it includes one who furnished material worked to a special design according to the plans or specifications for this Work, but does not include one who merely furnished material not so worked.
- (x) **SUBSTANTIAL COMPLETION:** The date as certified by the ENGINEER when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purpose for which it was intended; or if there be no such certification, the date when final payment is due in accordance with paragraph 4.14.14.
- (y) **SURETY:** The corporate body, which is bound with and for the CONTRACTOR and which engages to be responsible for the CONTRACTOR and his acceptable performance of the Work.
- (z) **WORK:** Any and all obligations, duties and responsibilities necessary to the successful completion of the Project assigned to or undertaken by the CONTRACTOR under the Contract Documents, including the furnishing of all labor, materials, equipment and other incidentals.

- (aa) **WRITTEN NOTICE:** The term "Notice" as used herein shall mean and include all written notices, demands, instructions, claims, approvals, and disapprovals required to obtain compliance with contract requirements. Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or to an authorized representative of such individual, firm or corporation, or if delivered at or sent by registered mail to the last business address known to him who gives the notice. Unless otherwise stated in writing, any notice to or demand upon the OWNER under this contract shall be delivered to the OWNER through the ENGINEER.

4.02 PRELIMINARY MATTERS:

AWARD:

4.02.1 The Award of the Contract, if it is awarded, will be to the lowest responsive, responsible Bidder whose qualifications indicate the award will be in the best interest of the OWNER and whose proposal complies with all the prescribed requirements. No Notice of Award will be given until the OWNER has concluded such investigations as he deems necessary to establish the responsibility, license, qualifications and financial ability of the Bidders to do the Work in accordance with the Contract Documents to the satisfaction of the OWNER WITHIN THE TIME PRESCRIBED. The OWNER reserves the right to reject the Bid of any Bidder who does not pass such investigation to the OWNER'S satisfaction. In analyzing Bids, the OWNER may take into consideration alternates and unit prices, if requested by the Bid forms. If the contract is awarded, the OWNER will issue the successful Bidder a Notice of Award within thirty (30) days after the opening of the Bids.

EXECUTION OF AGREEMENT:

4.02.2 Unless noted otherwise in the Special Conditions and/or Contract, at least three (3) counterparts of the Agreement and such other Contract Documents as practicable will be signed by the OWNER and the CONTRACTOR within fifteen (15) days of the Notice of Award. The ENGINEER will identify those portions of the Contract Documents to be signed and such identification will be binding on all parties. The OWNER, the CONTRACTOR, and the ENGINEER will receive an executed counterpart of the Contract Documents. The Contractor's attention is directed to Article 4.02.15 of these General Conditions.

DELIVERY OF BONDS:

4.02.3 Simultaneously with the execution and delivery of the Agreement, the CONTRACTOR will deliver to the OWNER the required Bonds.

FORFEITURE OF BID SECURITY:

4.02.4 Failure of the Successful Bidder to execute and deliver the Agreement and the required Bonds within fifteen (15) days of the Notice of Award shall be just cause for the OWNER to annul the Notice of Award and declare the Bid and security therefore forfeited.

COPIES OF DOCUMENTS:

4.02.5 The OWNER will furnish to the CONTRACTOR copies of the Specifications and drawings as stated in the SPECIAL CONDITIONS. Additional copies will be furnished upon request, at the cost of reproduction.

BEFORE STARTING WORK (PRECONSTRUCTION CONFERENCE):

4.02.6 The Contractor shall not work prior to the execution of this Agreement, executing the required Bonds and Insurance and the issuance of a Notice to Proceed from the Owner. The Notice to Proceed will be issued within sixty (60) calendar days from the date of the Award of Contract.

4.02.6.1 The recommendation of award by the Owner represents a preliminary determination and no legally binding acceptance of the bid or offer occurs until the Owner has executed a written agreement. The contract award is subject to the Contractor providing all bonds, insurance and other required documents and executing a contract in a form agreeable to the Owner.

4.02.6.2 The Owner may rescind the award of the Contract at any time prior to the issuance of the Notice to Proceed.

4.02.7 Within fifteen (15) days after execution of the Agreement, the Contractor will submit to the OWNER and ENGINEER for approval an estimated progress schedule indicating the starting and completion dates of the various stages of the Work and a schedule of values representing a cost breakdown of all Lump Sum Items within the Contract. The schedule of values will subdivide work within the Agreement as required by 4.14.1.1. The progress schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit either schedule within the time prescribed, the Owner and Engineer may, but are not required to, withhold approval of progress payments until the Contractor submits the required schedule.

The Contractor shall enter the actual progress on the chart as directed by the Owner and/or Engineer, and upon doing so shall immediately deliver three (3) copies of the annotated schedule to the Engineer. If, in the opinion of either the Owner or Engineer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Owner or Engineer, without additional cost to the Owner. In this circumstance, the Owner and/or

Engineer may, but are not required to, require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction equipment, and to submit for approval any supplementary schedule or schedules in chart form as the Owner and/or Engineer deem necessary to demonstrate how the approved rate of progress will be regained.

Failure of the Contractor to comply with the requirements of the Owner and Engineer under this clause shall be grounds for a determination by the Engineer and Owner, or either of them, that the Contractor is not prosecuting the work with sufficient diligence to ensure completion with the time specified in the contract. Upon making this determination, the Owner may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

4.02.8 Before starting the Work the CONTRACTOR will furnish the OWNER and ENGINEER certificates of insurance as required by 4.05; and a conference will be held to review the above schedules, to establish procedures for handling Shop Drawings and other submissions, and for processing Applications for Payments, and to establish a working understanding between the parties as to the project. The parties at the Preconstruction Conference may establish by mutual agreement a definite payment process and time schedule so long as it does not exceed the provisions of paragraph 4.14.2. Present at the conference will be the OWNER, or his representative, the ENGINEER or his representative, the CONTRACTOR and his superintendent and the principal Subcontractors.

4.02.9 Before undertaking the Work, the CONTRACTOR will carefully study and compare the Contract Documents and check and verify all figures shown thereon and all field measurements. He will at once report in writing to the ENGINEER any conflict, error or discrepancy, which he may discover. The CONTRACTOR assumes responsibility for having familiarized himself with the nature and extent of the Contract Documents, Work, locality, and local conditions that may in any manner affect the Work to be done.

QUALIFICATION OF SUBCONTRACTORS, MATERIALMEN, and SUPPLIERS:

4.02.10 Within fifteen (15) days of the date of the Notice of Award, the apparent low Bidder will submit to the OWNER and the ENGINEER for acceptance a list of the names of Subcontractors and such other persons and organizations (including those who are to furnish principal items of materials or equipment) proposed for those portions of the Work as to which the identity of the Subcontractors and other persons and organizations must be submitted as specified in the Contract Documents. Prior to the Notice of Award, the ENGINEER will notify the apparent low Bidder in writing if either the OWNER or the ENGINEER, after due investigation, has reasonable objection to any Subcontractor, person or organization on such list. The failure of the OWNER or the ENGINEER to make objection to any Subcontractor, person or organization on the list prior to the Notice of Award shall constitute an acceptance of such Subcontractor, person, or organization. Acceptance of any such Subcontractor, person or organization shall not

constitute a Waiver of any right of the OWNER or the ENGINEER to reject defective Work, material or equipment not in conformance with the requirements of the Contract Documents.

4.02.11 If, Prior to the Notice of Award, the OWNER or the ENGINEER has reasonable objection to and refuses to accept any Subcontractor, person or organization on such list, the apparent low Bidder may, prior to Notice of Award either (1) submit an acceptable substitute without an increase in his Bid price or (2) withdraw his Bid and forfeit his Bid security.

STARTING THE WORK:

4.02.12 The CONTRACTOR will start the Work on the date on which the Agreement is executed and delivered, or on such other date, if any, as may be specified in the Agreement. However, at the time of the execution and delivery of the Agreement the OWNER may give the CONTRACTOR a written notice to proceed, stating a different date on which it is expected that the CONTRACTOR will start Work, but such date shall not be more than thirty (30) days after the date of execution and delivery of the Agreement. If for any reason, other than mutual agreement, the notice to proceed is delayed beyond this time, the CONTRACTOR may be entitled to an extension of time if such claim is made by the CONTRACTOR prior to the notice to proceed or before start of the Work. A copy of the notice to proceed shall be sent to the ENGINEER. No Work shall be done prior to the date on which the Work is to start.

4.02.13 The Contract Time shall commence to run on the date when the Work is to start as provided in paragraph 4.02.12.

4.02.14 At least ten (10) days prior to submitting the first Application for Payment, the CONTRACTOR shall submit a schedule of values as required by paragraph 4.14.1.

4.02.15 If for any reason the Contractor does not intend on beginning Work on this Project within thirty (30) calendar days from the receipt of his Notice to Proceed, he shall inform the Owner in writing prior to Award of this Contract.

4.02.16 EMPLOYMENT OF ILLEGAL ALIENS

During the performance of this Contract, the Contractor agrees not to employ on such project any alien in the United States in violation of the Immigration and Nationality Act or any other law, convention, or treaty of the United States relating to the immigration, exclusion, deportation, or expulsion of aliens.

The Contractor will include the provisions of the preceding paragraph in every subcontract so that such provisions will be binding upon each subcontractor.

4.03 CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS:

4.03.1 It is the intent of the Specifications and Drawings to describe a complete Project to be constructed in accordance with the Contract Documents. The Contract Documents comprise the entire Agreement between the OWNER and the CONTRACTOR. They may be altered only by a Change Order.

4.03.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If the CONTRACTOR finds a conflict in the Contract Documents, he will call it to the ENGINEER'S attention in writing before proceeding with the Work affected thereby. Any work done after such a discovery, until authorized, will be done at the CONTRACTOR'S risk. In resolving such conflicts, the documents shall be given precedence in the following order: Agreement, Specifications, and Drawings. Within the Specifications the order of precedence shall be as follows: Addenda, Technical Specifications, Major Equipment Specifications, Project Specifications, General Specifications, Special Conditions, Instructions to Bidder, General Conditions. Any Work that may reasonably be inferred from the Specifications or Drawings as being required to produce the intended result shall be supplied whether or not it is specifically called for. All items may or may not be shown on both Drawings and Specifications but shall be supplied if shown in either. Work, materials, or equipment described in words, which so applied, have a well-known technical or trade meaning shall be deemed to refer to such recognized standards.

4.03.3 The words "furnish", "furnish and install", "install" and "provide" or words with similar meanings shall be interpreted, unless otherwise specifically stated, to mean "furnish and install complete in place and ready for service".

4.03.4 Miscellaneous items and accessories which are not specifically mentioned, but which are essential to produce a complete and properly operating installation, or usable structure, or plant, providing the indicated function, shall be furnished and installed without change in the contract price. Such miscellaneous items and accessories shall be of the same quality standards, including material, style, finish, strength, class, weight and other applicable characteristics, as specified for the major component of which the miscellaneous item or accessory is an essential part, and shall be approved by the ENGINEER before installation. The above requirement is not intended to include major components not covered by or inferable from the Drawings and Specifications.

4.03.5 The Work of all trades under this contract shall be coordinated by the CONTRACTOR in such a manner as to obtain good workmanship possible for the entire project, and all components of the Work shall be installed or erected in accordance with the good workmanship practices of the particular trade.

4.03.6 The CONTRACTOR shall be responsible for making the construction of habitable structures, under this contract, rainproof, and for making equipment and utility installations properly perform the specified function. If he is prevented from doing so by any limitations of the Drawings or Specifications, the CONTRACTOR shall immediately

notify the ENGINEER in writing of such limitations before proceeding with construction in the area where the problem or limitation exists.

4.03.7 Standard Specifications or manufacturer's literature, when referenced, shall be of the latest revision or printing unless otherwise stated, and are intended to establish the minimum requirements acceptable. Unless specifically noted otherwise by any Addenda, the Project Specifications, the Contract Drawings, all materials noted herein and all standard methods of construction shall conform to the latest North Carolina Department of Transportation Specifications and Details.

4.03.8 Manufacturer's literature, when referenced, shall be dated and numbered and is intended to establish the minimum requirements acceptable. Whenever reference is given to codes, or standard specifications or other data published by regulating agencies or accepted organizations, including but not limited to National Electrical Code, applicable State Building Code, Federal Specifications, ASTM Specifications, various Institute specifications, and the like, it shall be understood that such reference is to the latest edition including addenda in effect on the date of Bid.

4.03.9 Brand names where used in the technical specifications are intended to denote the standard of quality required for the particular material or product. The term equal or equivalent, when used in connection with brand names, shall be interpreted to mean a material or product that is similar and equal in type, quality, size, capacity, composition, finish, color, and other applicable characteristics to the material or product specified by trade name, and that is suitable for the same use and capable of performing the same function, in the opinion of the ENGINEER, as the material or product so specified. Proposed equivalent items must be approved by the ENGINEER before they are purchased or incorporated in the Work. (When a brand name, catalog number, model number or other identification, is used without the phrase "or equal" or its equivalent, the CONTRACTOR shall use the brand specified.)

4.04 AVAILABILITY OF LANDS; SURFACE CONDITIONS; REFERENCE POINTS:

AVAILABILITY OF LANDS:

4.04.1 The OWNER will furnish, as indicated on the Contract Documents and not later than the date of the Notice to Proceed, the lands upon which the Work is to be done, rights-of-way for access thereto, and such other lands, which are designated, for the use of the CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the OWNER, unless otherwise specified in the Contract Documents. Other access to such lands or rights-of-way for the CONTRACTOR'S convenience shall be the responsibility of the CONTRACTOR. If the CONTRACTOR believes that any delay in the OWNER'S furnishing these lands or easements entitles him to an extension of the Contract Time and change in contract amount, he may make a claim therefore as provided in 4.12. The CONTRACTOR will provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.04.2 The OWNER will, upon request, furnish to the CONTRACTOR copies of all available boundary surveys and subsurface tests.

SUBSURFACE CONDITIONS:

4.04.3 The CONTRACTOR acknowledges that he has investigated prior to bidding and satisfied himself as to the conditions affecting the Work, including but not restricted to those bearing upon transportation, disposal, handling, and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, river stages, tides, water table or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the Work. The CONTRACTOR further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the OWNER/ENGINEER, as well as from information presented by the Drawings and Specifications made a part of this Contract, or any other information made available to him prior to receipt of bids. Any failure by the CONTRACTOR to acquaint himself with the available information will not relieve him from responsibility for estimating properly the difficulty or cost for successfully performing the Work. The OWNER/ENGINEER assumes no responsibility for any conclusions or interpretations made by the CONTRACTOR on the basis of the information made available by the OWNER/ENGINEER.

DIFFERING SITE CONDITIONS:

4.04.4 The CONTRACTOR will promptly notify the OWNER and ENGINEER *in writing* of any subsurface or latent physical conditions, unknown physical conditions at the site or differing materials from those normally encountered in this type of work, or any conditions at the site differing materially from those either indicated in the Contract Documents or customarily expected in this type of work. The ENGINEER will promptly investigate those conditions and advise the OWNER *in writing* if further investigations, surveys, subsurface tests or changes from the work contracted are necessary. If so advised, the OWNER will promptly obtain the necessary additional investigations, surveys, tests or modifications to procedures, furnishing copies to the ENGINEER. Investigations, surveys or tests indicating subsurface or latent physical conditions differing significantly from those indicated in the Contract Documents, or resulting in a change in design or construction techniques, will be negotiated with the CONTRACTOR. Subsurface conditions, which are changes as a result of the CONTRACTOR'S operations, are his responsibility and no change in Contract Amount will be made. No claim of the CONTRACTOR for additional time or money nor liability claims from the CONTRACTOR'S work under this clause shall be allowed, unless the CONTRACTOR has given proper notice as required by this Section.

REFERENCE POINTS AND PROPERTY CORNERS:

4.04.5 The OWNER/ENGINEER will establish such general reference points as in their judgments will enable the CONTRACTOR to proceed with the Work. The CONTRACTOR will be responsible for the layout of the Work and will protect and preserve the established reference points and property corners. The CONTRACTOR will make no change or relocations without prior written approval of the OWNER/ENGINEER. He will report to the ENGINEER whenever any reference point or property corner is lost or destroyed or requires relocation because of necessary changes in grades or locations. The CONTRACTOR will replace and accurately relocate all reference points and property corners so lost, destroyed or moved.

4.05 BONDS AND INSURANCE:

PERFORMANCE AND PAYMENT BONDS:

4.05.1 A Performance Bond, in the full amount of the Contract price, will be required of the successful Bidder to guarantee the faithful performance of the Work in compliance with the Contract Documents. Unless otherwise required by SPECIAL CONDITIONS, the Performance Bond shall be written on the enclosed forms. The Bond shall be dated the same as the Contract and must be accompanied by a current copy of the Power of Attorney for the Attorney-in-Fact representing a Surety Company licensed to do business in the state in which the Work is to be performed. This bond must be executed with the Contract and delivered to the OWNER within ten (10) days after the date of the official Notice of Award and transmittal of Contracts for execution.

4.05.2 Payment Bond in the full amount of the contract price will be required of the successful Bidder to guarantee the payment of all labor and material bills in connections with compliance of the Contract. Unless otherwise required by SPECIAL CONDITIONS, the Payment Bond shall be written on the enclosed forms. This bond shall be dated executed, and delivered in the same manner as the Performance Bond.

4.05.3 Cash or a certified check made payable to the OWNER in the full amount of the contract price will be acceptable in lieu of a Performance Bond of a Surety Company. This cash or check will serve as a Performance Bond to guarantee that the provisions of the Contract Documents are complied with and the CONTRACTOR hereby agrees that in default of such performance the cash or certified check or such portion thereof, as is required to satisfactorily complete the Work accompanying this proposal and Contract, shall be forfeited and become the property of the OWNER.

4.05.4 Cash or certified check made payable to the OWNER in the full amount of the contract price will be acceptable in lieu of a Payment Bond of a Surety Company. This cash or check shall serve as a Labor and Material Payment Bond to guarantee that all legal claims for labor and material in connection with the performance of the Contract will be satisfactorily settled, and the CONTRACTOR hereby agrees that in case of default of the payment of any legal claims for labor and material, the cash or certified

check, or such portion thereof is required to satisfy all legal claims for labor and material in connection with this proposal, shall be forfeited and become the property of the OWNER.

CONTRACTOR'S LIABILITY INSURANCE:

4.05.5 The CONTRACTOR shall purchase and maintain, in a company acceptable to the OWNER, such insurance as will protect him from claims under Workmen's Compensation laws, disability benefit laws or other similar employee benefit laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees, and claims insured by usual personal injury liability coverage; from claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees including claims insured by usual personal injury liability coverage; and from claims for injury to or destruction of tangible property, including loss of use resulting therefrom any or all of which may arise out of or result from the CONTRACTOR'S operations under the Contract Documents, whether such operations be by himself or by a Subcontractor or anyone directly or indirectly employed by any of them or for who acts any of them may be legally liable. This insurance shall be written for not less than limits of liability specified below or required by law, whichever is greater. **A statement is to be included on the Certificate of Insurance verifying that the OWNER will be notified by Certified Mail 15 days prior to termination of CONTRACTOR'S insurance.**

4.05.5.1 Workmen's Compensation - Statutory (for the State in which the work is to be performed and the State of domicile of the CONTRACTOR).

4.05.5.2 Manufacturers' and CONTRACTOR'S Liability, covering operations performed by or for the CONTRACTOR, with limits of not less than:

Bodily Injury - \$500,000/\$1,000,000.

Property Damage - \$500,000.

4.05.5.3 Automobile Liability, covering owned, non-owned and hired automobiles, with limits as required in 4.05.5.2 above.

4.05.5.4 Contractor Liability, covering liability of others assumed by the CONTRACTOR elsewhere in this contract under "hold Harmless" Agreements or similar assumptions of liability with limits as required in 4.05.5.2 above.

4.05.5.5 Property Damage Insurance shall include Explosion, Collapse and damage to Underground Utilities (X, C and U) coverage with limits not less than those stated above.

4.05.6 The Contractor shall provide the OWNER with Insurance certificates certifying that the foregoing insurance is in force; **and such insurance certificates shall include provisions that the insurance shall not be cancelled, allowed to expire or be**

materially changed without giving the OWNER fifteen (15) days' advance notice by registered mail.

4.05.7 The CONTRACTOR agrees that if any part of the Work under the contract is sublet, he will require the Subcontractor(s) to furnish to him insurance certificates similar to those required by the OWNER in 4.05.6 above.

OWNER'S LIABILITY INSURANCE:

4.05.8 The OWNER will be responsible for purchasing and maintaining his own liability insurance and, at his option, may purchase and maintain such insurance as will protect him against claims, which may arise from operations under the Contract Documents.

STEAM BOILER AND MACHINERY INSURANCE:

4.05.9 The OWNER will purchase and maintain such steam boiler and machinery insurance as may be required by the Contract Documents or by law. This insurance shall include the interests of the OWNER, the CONTRACTOR, Subcontractors and Sub-subcontractors in the work.

FIRE AND EXTENDED COVERAGE INSURANCE (BUILDER'S RISK):

4.05.10 The CONTRACTOR shall maintain, in an Insurance Company or Insurance Companies acceptable to the OWNER, fire, Extended Coverage and Vandalism and Malicious Mischief Insurance on buildings and structures, while in the course of Construction, including foundations, additions, attachments and all permanent fixtures belonging to and constituting a part of said buildings or structures. The policy or policies shall also cover machinery, if the cost of machinery is included in the contract. The amount of insurance must at all times be at least equal to the actual cash value of the insured property. The policy shall be in the name of the OWNER and the CONTRACTOR as their interests may appear, and shall also cover the interests of all Subcontractors performing work.

4.05.11 The CONTRACTOR shall provide the OWNER with satisfactory evidence certifying that the foregoing insurance is in force; **and such evidence shall include provisions that the insurance shall not be cancelled, allowed to expire or be, materially changed without giving the OWNER fifteen (15) days advance notice by registered mail.**

CANCELLATION AND RE-INSURANCE:

4.05.12 If any insurance should be cancelled or changed by the insurance company, or should any insurance expire during the period of this contract, the CONTRACTOR shall be responsible for securing other acceptable insurance to provide the coverage specified

in this contract without lapse of coverage. **The Owner and Engineer shall be notified by Registered mail of all changes in insurance.**

4.06 CONTRACTOR'S RESPONSIBILITIES:

SUPERVISION AND SUPERINTENDENCE:

4.06.1 The CONTRACTOR will supervise and direct the Work efficiently and with his best skill and attention. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Superintendent shall be approved by the OWNER. The CONTRACTOR will be responsible to see that the finished Work complies accurately with the Contract Documents.

4.06.2 The Superintendent shall be approved in writing by the OWNER and approval must be obtained before beginning Work.

4.06.3 The CONTRACTOR will keep on the Work at all times during its progress a competent resident Superintendent, who shall not be replaced without written notice to the OWNER and ENGINEER. Any change in Superintendents must have prior, written approval of the OWNER. The Superintendent will be the CONTRACTOR'S representative at the site and shall have authority to act on behalf of the CONTRACTOR. (Copies or written communications given to the Superintendent shall be mailed to the CONTRACTOR's home office.)

4.06.4 The CONTRACTOR shall provide competent, suitably qualified personnel to survey, layout, and construct the Work as required by the Contract Documents. The CONTRACTOR shall at all times maintain good discipline and order on the Site.

4.06.5 Except as otherwise required for the safety or protection of persons or the Work or property at the Site or property adjacent thereto, and except as otherwise stated in these Contract Documents, all Work at the Site shall be performed during regular working hours, and the CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without the Owner's written consent (which will not be unreasonably withheld) given after prior written notice to the OWNER.

LABOR, MATERIALS AND EQUIPMENT:

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

4.06.7 All materials and equipment will be new, except as otherwise provided in the Contract Documents. When special makes or grades of material which are normally packaged by the supplier or manufacturer are specified or approved, such materials shall

be delivered to the site in their original packages or containers with seals unbroken and labels intact. Equipment and materials shall be stored in a manner and place so they will be protected from damage and maintained in a new condition.

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

MATERIALS, EQUIPMENT, PRODUCTS AND SUBSTITUTIONS:

4.06.9 Materials, equipment and products incorporated in the Work must be approved for use before being purchased by the CONTRACTOR. The CONTRACTOR shall submit to the ENGINEER a list of proposed materials, equipment or products, together with such samples as may be necessary for him to determine their acceptability and obtain his approval, within ninety (90) calendar days after Award of Contract unless otherwise stipulated in the SPECIAL CONDITIONS. No request for payment after this date will be approved until this list has been received and approved by the ENGINEER.

4.06.9.1 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 approve its substitution and use by the CONTRACTOR. 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.

4.06.9.2 If it is indicated in the Specifications that the CONTRACTOR may furnish or use a substitute that is equal to any material, equipment or product specified, and if the CONTRACTOR wishes to furnish or use a proposed substitute, he will, promptly after the award of the contract, *make written application to the ENGINEER for approval of such a substitute certifying in writing that the proposed substitute will perform the duties imposed by the general design, be similar and of equal substance to that specified, and be suited to the same use and capable of performing the same function as that specified.*

4.06.9.3 No substitute shall be ordered or installed without the written approval of the ENGINEER who shall be the judge of equality.

4.06.9.4 Delays caused by obtaining approvals for substitute materials will not be considered justifiable grounds for an extension of construction time.

4.06.9.5 Should any work or materials, equipment or products not conform to requirements of the drawings and specifications or become damaged during the progress of the work, such work or materials shall be removed and replaced, together with any work disarranged by such alterations, at any time before completion and acceptance of the project. All such work shall be done at the expense of the CONTRACTOR. See paragraphs 4.07.10, 4.13.9 and 4.13.10.

4.06.9.6 No materials or supplies for the work shall be purchased by the CONTRACTOR or by any Subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the Seller. The CONTRACTOR warrants that he has good title to all materials and supplies used by him in the Work.

4.06.9.7 Failure of the CONTRACTOR to furnish materials, equipment, or products as specified by the Contract Documents and approved by the Shop Drawings shall result in this material, equipment or product being classified as "defective". See Section 4.09.5.

4.06.9.8 Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transpiration, construction equipment and machinery, tools, appliances, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

CONCERNING SUBCONTRACTORS:

4.06.10 The CONTRACTOR will not employ any Subcontractor, other person or organization of the types referred to in paragraph 4.02.10 (whether initially or as a substitute) against whom the OWNER or the ENGINEER may have a reasonable objection, nor will the CONTRACTOR be required to employ any Subcontractor against whom he has a reasonable objection. The CONTRACTOR will not make any substitution for any Subcontractor who has been accepted by the OWNER and the ENGINEER, unless the ENGINEER determines that there is good cause for doing so.

4.06.11 The CONTRACTOR will be fully responsible for all acts and omissions of his Subcontractors and of persons for whose acts, any of them, may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Nothing in the Contract Documents shall create any contractual relationship between any Subcontractor and the OWNER or the Engineer to pay or to see to the payment of any monies due any Subcontractor, except as may otherwise be required by law. The OWNER or the ENGINEER may furnish to any Subcontractor, to the extent practicable, evidence of amounts paid to the CONTRACTOR on account of specific work done in accordance with the schedules of values.

4.06.12 The divisions and sections of the Specifications and the identifications of any drawings shall not control the CONTRACTOR in dividing the Work among Subcontractors.

4.06.13 The CONTRACTOR agrees to bind specifically every Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the OWNER.

4.06.14 All Work performed for the CONTRACTOR by a Subcontractor shall be pursuant to an appropriate agreement between the CONTRACTOR and the Subcontractor which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by insurance provided in accordance with paragraph 4.05.10. The CONTRACTOR will pay each Subcontractor a just share of any insurance monies received by the CONTRACTOR under paragraph 4.05.10.

4.06.15 The CONTRACTOR shall be responsible for the coordination of the trades, Subcontractors and material men engaged upon his Work.

4.06.15.1 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontractors relative to the Work to bind Subcontractors to the CONTRACTOR by the terms of these General Conditions and other 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 provisions of the Contract Documents.

4.06.15.2 The OWNER or ENGINEER will not undertake to settle any differences between the CONTRACTOR and his Subcontractors or between Subcontractors.

4.06.15.3 If in the opinion of the OWNER or ENGINEER, any Subcontractor on the project proves to be incompetent or otherwise unsatisfactory, he shall be replaced if and when directed in writing.

PATENT FEES AND ROYALTIES:

4.06.16 The CONTRACTOR will pay all license fees and royalties and assume all costs incidental to the use of any invention, design, process or device, which is the subject of patent rights or copyrights, held by others. He will indemnify and hold harmless the OWNER and the ENGINEER and anyone directly or indirectly employed by either one of them from and against all claims, damages, losses and expenses (including attorney's fees) arising out of any infringement of such rights during or after completion of the Work, and shall defend all such claims in connection with any alleged infringement of such rights.

4.06.17 The CONTRACTOR shall be responsible for determining the applications of patent rights and royalties on materials, appliances, articles or systems prior to bidding. However, he shall not be responsible for such determination on systems, which do not involve purchase by him of materials, appliances and articles.

PERMITS:

4.06.18 The CONTRACTOR will secure and pay for all construction permits and licenses and will pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of his Bid. He will also pay all public utility charges.

ELECTRICAL POWER AND LIGHTING:

4.06.19 Electrical Power required during construction shall be provided by each PRIME CONTRACTOR as required by him. This service shall be installed by a qualified ELECTRICAL CONTRACTOR approved by the ENGINEER. Lighting shall be provided by the GENERAL CONTRACTOR in all spaces at all times where necessary for good and proper workmanship, for inspection or for safety. No temporary power shall be used off temporary lighting lines without specific approval of the GENERAL CONTRACTOR.

LAWS AND REGULATIONS:

4.06.20 The CONTRACTOR will give all notices and comply with all laws, ordinances, rules and regulations applicable to the Work. If the CONTRACTOR observes that the Specifications or Drawings are at variance therewith, he will give the ENGINEER prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate Modification. If the CONTRACTOR performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations and without such notice to the ENGINEER, he will bear all costs arising therefrom; however, it shall not be his primary responsibility to make certain that the Drawings and Specifications are in accordance with such laws, ordinances, rules and regulations.

AUDIT, ACCESS TO RECORDS:

4.06.21 (a) The CONTRACTOR shall maintain books, records, documents, and other evidence directly pertinent to performance on work under this agreement in accordance with generally accepted accounting principles and practices consistently applied. The CONTRACTOR shall also maintain the financial information and data used by him in the preparation or support of the cost submission on job and sales tax information. The Owner or any of their duly authorized representatives shall have access to such books, records, documents, and other evidence for inspection, audit, and copying. The CONTRACTOR will provide proper facilities for such access and inspection.

(b) Audits conducted under this provision shall be in accordance with generally accepted auditing standards and established procedures and guidelines of the reviewing or audit agency(ies).

(c) The CONTRACTOR agrees to the disclosure of all information and reports resulting from access to records under paragraphs (a) and (b) of this clause, to any of the agencies referred to in paragraph (a), provided that the CONTRACTOR is afforded the opportunity for an audit exit conference and an opportunity to comment and submit any supporting documentation on the pertinent portions of the draft audit report and that the final audit report will include written comments of reasonable length, if any, of the CONTRACTOR.

(d) The CONTRACTOR shall maintain and make available records under paragraphs (a) and (b) of this clause during performance on this work under this agreement and until 1 year from the date of final payment for the project. In addition, those records which relate to any "Dispute" appeal under this agreement, to litigation, to the settlement of claims arising out of such performance, or to costs or items to which an audit exception has been taken, shall be maintained and made available until 1 year after the date of resolution of such appeal, litigation, claim, or exception.

TAXES:

4.06.22 Cost of all sales and other taxes for which the CONTRACTOR is liable under the Contract shall be included in the Contract Price stated by the CONTRACTOR. The CONTRACTOR shall maintain records and provide the OWNER with written copy of all sales taxes paid at the end of the project.

RECORD DRAWINGS:

4.06.23 The CONTRACTOR will keep one record copy of all Specifications, Drawings, Addenda, Modifications, and Shop Drawings at the site in good order and annotated to show all changes made during the construction process. These shall be available to the ENGINEER and shall be delivered to him for the development of the Owner's "As-Built" Drawings upon completion of the Project. These shall be used for this purpose only. Final Payment may be withheld until the receipt of the CONTRACTOR'S "record copy".

SAFETY AND PROTECTION:

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

4.06.24.1 All employees on the Work and other persons who may be affected thereby,

4.06.24.2 All the work and all materials or equipment to be incorporated therein, whether in storage on or off the site; and,

4.06.24.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavement, roadways, structures and utilities not designated for removal, relocation and replacement in the course of construction.

The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He will erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection, and in addition he will comply with all requirements and applicable recommendations of the U. S. Department of Labor and Local Safety and Health Regulations for Construction. He will notify OWNERS of adjacent utilities when prosecution of the Work may affect them. All damage, injury or loss to any property referred to in paragraph 4.06.24.2 or 4.06.24.3 caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, will be remedied by the CONTRACTOR; except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

4.06.25 The CONTRACTOR will designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the CONTRACTOR'S superintendent unless otherwise designated in writing by the CONTRACTOR to the OWNER.

EMERGENCIES:

4.06.26 In emergencies affecting the safety of persons or the Work of property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, is obligated to act, at his discretion, to prevent threatened damage, injury or loss. He will give the ENGINEER prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the Changes and deviations involved. If the CONTRACTOR believes that additional work done by him in an emergency which arose from causes beyond his control entitles him to an increase in the Contract Price or an extension of the Contract Time, he may make a claim therefor as provided in 4.11 and 4.12.

SHOP DRAWINGS AND SAMPLES:

4.06.27 After checking and verifying all field measurements, the CONTRACTOR will submit to the ENGINEER for review, in accordance with the accepted schedule of Shop Drawing submissions (see paragraph 4.02.8) five (5) copies (or at the ENGINEER'S option, one (1) reproducible copy) of all Shop Drawings, which shall have been checked by and stamped with the approval of the CONTRACTOR and identified as the

ENGINEER may require. The failure of the CONTRACTOR to properly stamp and sign that he has checked and reviewed the Shop Drawings sent to the ENGINEER will result in the return of the Shop Drawings until such review and stamp has been completed. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable the ENGINEER to review the information as required.

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

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

4.06.30 The ENGINEER will review with reasonable promptness Shop Drawings and samples, but his review shall be only for general conformance with the design concept of the Project and for general compliance with the information given in the Contract Documents. The ENGINEER's review of a separate item as such will not indicate review of the assembly in which the item functions nor approval that the submitted item is of the proper size or dimension to function within the Contract Drawings. The CONTRACTOR will make any corrections required by the ENGINEER and will return the required number of corrected copies of Shop Drawings and resubmit new samples until the review is satisfactory to the ENGINEER. The CONTRACTOR shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections call for by the ENGINEER on previous submissions. The CONTRACTOR'S stamp of approval shall constitute a representation to the OWNER and the ENGINEER that the CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog number and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the Work and the Contract Documents.

4.06.31 No Work requiring a Shop Drawing or sample submission shall be commenced until the submission has been reviewed by the ENGINEER. A copy of each 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.

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

CLEANING UP:

4.06.33 **SITE:** The CONTRACTOR shall clean up behind the Work as much as is reasonably possible as the Work progresses. Upon completion of the Work, and before acceptance of and Final Payment for the Project by the OWNER, the CONTRACTOR shall remove all his surplus and discarded materials, excavated material and rubbish from the roadways, sidewalks, parking areas, lawns and all adjacent property; shall restore, in an acceptable manner, all property, both public and private, which has been disturbed or damaged during the prosecution of the work; and shall leave the whole in a neat and presentable condition. The Owner reserves the first right of refusal of all surplus soil excavated from this project. Such waiver shall be validated in writing.

4.06.34 **BUILDING:** Clean-up operations shall consistently be carried on by the CONTRACTOR at all times to keep the premises free from accumulation of waste materials and rubbish. Upon completion of the Work he shall remove all rubbish, tools, scaffolding, surplus materials, etc., from the building and shall leave his work "broom clean", or its equivalent, unless more exactly specified. The GENERAL CONTRACTOR shall do the following specific cleaning for all trades upon completion of the Work;

4.06.34.1 Remove putty stains and paint from and wash and polish all glass. Do not scratch or otherwise damage glass.

4.06.34.2 Remove all marks, stains, fingerprints and other soil and dirt from painted, stained and decorated work.

4.06.34.3 Remove all temporary protections and clean and polish floors.

4.06.34.4 Clean and polish all hardware for all trades; this shall include removal of all stains, dust, dirt, paint, etc.

4.06.35 **GENERAL:** In case of dispute, the Owner may remove the rubbish and charge the cost to the several contractors as the ENGINEER shall determine to be just.

PUBLIC CONVENIENCE AND SAFETY:

4.06.36 The CONTRACTOR shall, at all times, conduct the Work in such a manner as to insure the least practicable obstruction to public travel. The convenience of the general public and of the residents along and adjacent to the area of the Work shall be provided for in a satisfactory manner, consistent with the operation and local conditions. "Street Closed" signs will be placed immediately adjacent to the Work, in a conspicuous position, at such locations as traffic demands. At any time that streets are required to be closed, the CONTRACTOR shall notify law enforcement agencies, fire departments, and parties operating emergency vehicles before the street is closed and again as soon as it is opened. Access to fire hydrants and other fire extinguishing equipment shall be provided and maintained at all times.

SANITARY PROVISIONS:

4.06.37 The General CONTRACTOR shall furnish necessary toilet conveniences, secluded from public observation, for use of all personnel on the Work, whether or not in his employ. They shall be kept clean and sanitary and shall comply with the requirements and regulations of the Public Authorities having jurisdiction. He shall commit no public nuisance. Temporary sanitary facilities shall be removed upon completion of the Work and the premises shall be left clean.

INDEMNIFICATION:

4.06.38 To the fullest extent provided by law, the CONTRACTOR agrees to indemnify and hold harmless the OWNER and the ENGINEER, and their successors, agents, servants and employees, from and against any and all claims, damages, liabilities, losses and expenses of any kind, including their reasonable attorneys' fees and other litigation costs and expenses that are caused by any act or omission of the Contractor or any of his agents or subcontractors, arising out of, resulting from, or relating to the performance of the Work or any obligation under the Contract. By way of illustration, and not limitation, this indemnity agreements includes any and all claims, damages, liabilities, losses or expenses of any kind (including but not limited to compensatory damages and economic losses):

- (a) that are (1) attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, or to injury or destruction of the Work itself during the period of construction, and (2) caused by any negligent act or omission 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; or
- (b) that are caused by the failure of the CONTRACTOR to satisfactorily complete the Work or perform any aspect of the contract between OWNER and CONTRACTOR; or
- (c) that are caused by the failure of the CONTRACTOR to complete the work within the time prescribed by the contract between the OWNER and the CONTRACTOR; or
- (d) that are caused by any delays in the CONTRACTOR'S completion of the Work, regardless of whether such delays are attributable to any negligent act or omission by the CONTRACTOR; or
- (e) that are caused by the CONTRACTOR'S default under this Agreement; or

- (f) resulting from any claims whatsoever filed by any Subcontractor, Sub-subcontractor, mechanic, laborer or material man making claims arising from the Work by, through, or under the CONTRACTOR; or
- (g) that are attributable to the failure of the CONTRACTOR, its Subcontractors, or Sub-subcontractors to comply with any of the terms or provisions of the Contract Documents.

In no event, however, shall the CONTRACTOR be required to indemnify any other party for that party's own negligence.

4.06.39 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 any one for whose acts any of them may be liable, the indemnification obligation under paragraph 4.06.38 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 Workmen's Compensation acts, disability benefit acts or other employee benefit acts. 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 pay 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. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the Contract Documents by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

PIPE AND CONDUIT SLEEVES:

4.06.41 Sleeve location and setting drawings shall be provided by plumbing, sprinkler, heating, ventilating, air conditioning and electrical trades requiring pipe or sheet metal sleeves in concrete or masonry construction. Sleeve location and setting drawings shall be submitted in accordance with requirements specified for Shop Drawings.

4.06.41.1 All sleeves shall be furnished, placed and maintained until completion of concrete pours and/or placing of surrounding masonry by the trades requiring

such sleeves. The CONTRACTOR placing the concrete or masonry shall cooperate fully with other trades in this matter.

4.06.41.2 Cast-in-place sleeves shall be used for all piping passing through concrete construction unless otherwise required by the Project Specifications or the Drawings.

4.06.41.3 Pipes or large conduit passing through concrete floor and roof construction in pipe chases or furred areas which are completely enclosed by partitions may be run through sheet metal sleeves.

4.06.41.4 Pipes or large conduit passing through floors in all finished areas shall be run in pipe sleeves made of standard black steel pipe placed so as to extend 3/8 inch above finished floor. The size of the sleeves shall be as small as practical. Pipe sleeves for such areas shall be in place and checked before concrete is poured and shall provide a watertight joint with the concrete. After a pipe or conduit is placed through such sleeves, escutcheons shall be installed so as to conceal pipe sleeve projection above floor.

4.06.41.5 Pipes or conduit passing through concrete or masonry walls shall be provided with black steel pipe sleeves with ends set flush with wall faces. Where water-tightness is necessary through such walls, or through floors, the joint between pipe or conduit and pipe sleeves shall be thoroughly caulked.

4.06.41.6 THE GENERAL CONTRACTOR shall provide double joists, headers, filler slabs or widened beams, additional framing, bracing or other supports, as applicable, where the structural system is affected in any manner by sleeves. See paragraph 4.07.5 through 4.07.10.

RESPONSIBILITY FOR CONNECTING TO EXISTING WORK:

4.06.42 It shall be the express responsibility of the CONTRACTOR to connect his Work to each part of the existing work or work previously installed as required by the drawings and specifications to provide a complete installation.

WORK IN STREET, HIGHWAY AND OTHER RIGHTS-OF-WAY:

4.06.43 Excavation, grading, fill, storm drainage, paving and any other construction or installation in rights-of-way of streets, highways, public carrier lines, utility lines (either aerial, surface or subsurface), etc., shall be performed in accordance with requirements of the authorities having jurisdiction and of applicable requirements of the specifications. The CONTRACTOR shall make all necessary arrangements with the proper authorities, including the obtaining of permits, approval of construction methods, etc., and shall pay all costs charged in connection with the Work. Upon completion of such work, the CONTRACTOR shall present to the ENGINEER certificates, in triplicate, from the proper authorities stating that the Work has been done in accordance with their

requirements, and that all costs charged to the Work by them have been paid in full. See paragraph 4.04.1.

4.06.43.1 The OWNER will cooperate with the CONTRACTOR in obtaining action from any utilities or public authorities involved in the above requirements.

4.06.43.2 The CONTRACTOR shall be responsible for obtaining elevations of curbs and gutters, pavement, storm drainage structures, and other such items which must be established by governmental departments as soon as grading operations are begun on the site and, in any case, sufficiently early in the construction period to prevent any adverse effect on the project. The ENGINEER shall assist the CONTRACTOR in obtaining the above information; however, the responsibility shall remain that of the CONTRACTOR.

COOPERATION WITH GOVERNMENTAL DEPARTMENTS, PUBLIC UTILITIES, ETC.:

4.06.44 The CONTRACTOR shall be responsible for making all necessary arrangements with governmental departments, public utilities, public carriers, service companies and corporations owning or controlling roadways, railways, water, sewer, gas, electrical, telephone, and telegraph facilities such as pavements, track, piping, wires, cables, conduits, poles, guys, etc., including incidental structures connected therewith, that are encountered in the Work in order that such items may be properly stored, supported and protected, or the CONTRACTOR may relocate them if he so desires. He shall give all proper notice, shall comply with requirements of such parties in the performance of his Work, shall permit entrance of such parties on the project in order that they may perform their necessary work, and shall pay all charges and fees made by such parties for this work.

4.06.44.1 The CONTRACTOR'S attention is called to the fact that there may be delays on the Project due to work to be done by Governmental departments, public utilities, and others in repairing or moving poles, conduits, etc. The CONTRACTOR shall cooperate with the above parties, in every way possible, so that the construction can be completed in the least possible time.

4.06.44.2 The CONTRACTOR shall have made himself familiar with all codes, laws, ordinances and regulations which in any manner affect those engaged or employed in the Work, or materials and equipment used in or upon the Work, or in any way affect the conduct of the Work, and no plea of misunderstanding will be considered on account of his ignorance thereof.

USE OF PREMISES:

4.06.45 CONTRACTOR shall confine his apparatus, storage of materials, and operations of his workmen to limits required by law, ordinances, permits, and directions of ENGINEER and OWNER, and shall not necessarily encumber any part of site.

4.06.45.1 CONTRACTOR shall not overload or permit any part of any structure to be loaded with such weight as will endanger its safety.

4.06.45.2 CONTRACTOR shall enforce ENGINEER'S and OWNER'S instructions as well as State and Local Codes in connection with signs, advertisements, fires and smoking.

4.06.45.3 CONTRACTOR shall arrange and cooperate with OWNER in routing and parking of automobiles of his employees, Subcontractors and other personnel, and in routing material delivery trucks and other vehicles to the project site.

4.06.45.4 CONTRACTOR shall notify the ENGINEER with a copy to the OWNER of all blasting operations at least 48 hours before such blasting unless otherwise approved by the ENGINEER.

PROTECTION OF EXISTING PROPERTY IMPROVEMENTS:

4.06.46 Any existing surface or subsurface improvements, such as pavements, curbs, sidewalks, pipes or utilities, footings, or structures (including portions thereof), trees and shrubbery, not indicated on the Drawings or noted in the Specifications as being removed or altered shall be protected from damage during construction of the Project. Any such improvements damaged during construction of the Project shall be restored to a condition equal to that existing at time of award of contract.

TEMPORARY HEAT:

4.06.47 The CONTRACTOR shall provide heat, fuel and services as necessary to protect all work and materials, within all habitable areas of permanent building construction, for all contracts against injury from dampness and cold until final acceptance of all work and materials for the Project, unless building is fully occupied by the OWNER prior to such acceptance, in which case the Owner shall assume all expenses of heating from date of full occupancy. In areas outside those covered above, each prime contractor shall be responsible for providing such temporary heat, fuel, and services as required to protect his work or shall make all necessary arrangements with the CONTRACTOR for providing such temporary heat, fuel, and services. Unless otherwise specifically permitted by SPECIAL CONDITIONS, the permanent heating system shall not be used to provide temporary heat. CONTRACTOR'S proposed methods of heating shall be submitted for approval.

4.07 WORK BY OTHERS:

4.07.1 The OWNER may perform additional work related to the project by himself, or he may let other direct contracts therefor which shall contain General Conditions similar to these. The CONTRACTOR will afford the other contractors who are parties to such direct 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.

4.07.2 If any part of the CONTRACTOR'S Work depends, for proper execution of results, upon the work of any such other contractor (or the OWNER), the CONTRACTOR will inspect and promptly report to the ENGINEER in writing any defects or deficiencies in such work that renders it unsuitable for such proper execution and results. His failure to report shall constitute an acceptance of the other work as fit and proper for the relationship of his Work except as to defects and deficiencies, which may appear in the other work after the execution of his Work.

4.07.3 The CONTRACTOR will do all cutting, fitting and patching of his Work that may be required to make its several parts come together properly and fit it to receive or be received by such other work. The CONTRACTOR will not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of the OWNER or ENGINEER.

4.07.4 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 CONTRACTOR 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 therefor as provided in 4.11 and 4.12.

4.07.5 Where practicable the GENERAL CONTRACTOR shall build around the work of other separate contractors or shall leave chases, slots and holes as required to receive and to conceal within the general construction work the work of such other separate contractors as directed by them. Where such chases, slots, etc., are impracticable, the work shall require specific approval of the ENGINEER.

4.07.6 Necessary chases, slots and holes not built or left by the CONTRACTOR shall be cut by the separate contractor requiring such alterations after approval of the CONTRACTOR. The CONTRACTOR shall do all patching and finishing of his Work where cut by other contractors at the expense of such other contractors.

4.07.7 Cooperation is required in the use of site facilities and in the detailed execution of the Work. Each CONTRACTOR shall coordinate his operations with those of the other contractors for the best interest of the Work in order to prevent delay in the execution thereof.

4.07.8 Each CONTRACTOR shall keep himself informed of the progress of the work of other contractors. Should lack of progress or defective workmanship on the part of other contractors interfere with his operations, the CONTRACTOR shall notify the ENGINEER immediately. Lack of such notice to the ENGINEER will be construed as acceptance by the CONTRACTOR of the status of the work of other contractors as being satisfactory for proper coordination of his own Work.

4.07.9 Each CONTRACTOR shall give notices of the progress of his work so as to allow other contractors adequate opportunity to properly direct and coordinate their work. The CONTRACTOR shall give notice of the progress of his Work so that work of other contractors, when required to be concealed, may be placed before the general construction Work. All such notices shall be submitted to the ENGINEER with copies to other prime contractors to coordinate their work.

4.07.10 The cost of extra work resulting from lack of notices, untimely notices, failure to respond to notices, defective work or lack of coordination shall be borne by the CONTRACTOR responsible for such lack of notices, etc.

4.08 OWNER'S RESPONSIBILITIES:

4.08.1 The OWNER will issue all communications to the CONTRACTOR through the ENGINEER.

4.08.2 In case of termination of the employment of the ENGINEER, the OWNER will appoint an engineer against whom the CONTRACTOR makes no unreasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

4.08.3 The OWNER will furnish the data required of him under the Contract Documents promptly and shall make payments to the CONTRACTOR promptly after they are due as provided in paragraph 4.14.

4.08.4 The OWNER'S duties in respect of providing lands, boundary surveys, etc., are set forth in paragraphs 4.04.1 and 4.04.2 and his duty to establish reference points is set forth in paragraph 4.04.5.

4.08.5 The OWNER'S responsibilities in respect to liability and property insurance are set forth in paragraph 4.05.8 and 4.05.9.

4.08.6 In addition to his rights to request changes in the Work in accordance with 4.10, the OWNER (especially in certain instances as provided in paragraph 4.10.4) will be obligated to execute Change Orders.

4.08.7 In connection with the OWNER'S right to stop Work or suspend Work, see paragraphs 4.13.8 and 4.15.1. Paragraph 4.15.3 deals with the OWNER'S right to terminate services of the CONTRACTOR under certain circumstances.

4.08.8 The OWNER shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding the fact that the time for completing the entire Work or any portion thereof may not have expired: but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the Work, the CONTRACTOR shall be entitled to such extra compensation or extension

of time or both, except by prior agreement as the OWNER or ENGINEER may determine. See paragraph 4.14.11.

4.09 ENGINEER'S STATUS DURING CONSTRUCTION:

OWNER'S REPRESENTATIVE:

4.09.1 The ENGINEER shall be the OWNER'S representative during the construction period. The duties and responsibilities and the limitations of authority of the ENGINEER as the OWNER'S representative during construction are set forth in 4.01 through 4.17 of these General Conditions and shall not be extended without written consent of the OWNER and the ENGINEER.

4.09.1.1 The ENGINEER'S decision, in matters relating to aesthetics, shall be final, if within the terms of the Contract Documents.

4.09.1.2 Except as expressly provided above or elsewhere in the Contract Documents, all the ENGINEER'S decisions are final.

VISITS TO SITE:

4.09.2 The ENGINEER will make periodic visits to the site to generally observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. He will not be required to make exhaustive or continuous on-site observations to check the quality or quantity of the Work. His efforts will be directed toward assisting the OWNER in ensuring generally that the Project as completed by the Contractor and accepted by the Engineer should conform to the requirements of the Contract Documents. On the basis of his on-site observations as an experienced and qualified design professional, he will keep the OWNER informed of the progress of the Work. While ENGINEER will endeavor to guard the OWNER against defects and deficiencies in the Work of the contractors, it is expressly understood that the CONTRACTOR is solely responsible for its means and methods and for performance in accordance with all applicable standards of care and workmanship. ENGINEER's periodic visits cannot substitute for the appropriate, daily, continuous on-site supervision of all Work by the CONTRACTOR, who shall remain solely responsible for such on-site supervision of all Work by CONTRACTOR and its subcontractors.

CLARIFICATIONS AND INTERPRETATIONS:

4.09.3 The ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents (in the form of Drawings or otherwise) as he may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

MEASUREMENTS OF QUANTITIES:

4.09.4 All work completed under the contract will be measured by the ENGINEER according to the United States Standard Measures. All linear surface measurements will be made horizontally or vertically as required by the item measured.

REJECTING DEFECTIVE WORK:

4.09.5 The ENGINEER and OWNER will have authority to disapprove or reject Work, which is "defective" which term is hereinafter used to describe Work that is unsatisfactory, faulty or defective, or does not conform to the requirements of the Contract Documents or does not meet the requirements of any inspection, test or approval referred to in paragraph 4.13.2. The ENGINEER and OWNER will also have authority to require special inspection or testing of the Work as provided in paragraph 4.13.6 and 4.13.7 whether or not the Work is fabricated, installed or completed.

SHOP DRAWINGS, CHANGE ORDERS AND PAYMENTS:

4.09.6 In connection with the ENGINEER'S responsibility as to Shop Drawings and samples, see paragraphs 4.06.27 through 4.06.32, inclusive.

4.09.7 In connection with the ENGINEER'S responsibility for Change Orders, see 4.10, 4.11, and 4.12.

4.09.8 In connection with the ENGINEER'S responsibility in respect of Application for Payments, etc., see 4.14.

RESIDENT PROJECT REPRESENTATIVE:

4.09.9 If the OWNER and ENGINEER agree, the ENGINEER will furnish a full time Resident Project Representative and assistants to assist the ENGINEER in carrying out his responsibilities at the site. The duties, responsibilities and limitations of authority of any such Resident Project Representative and assistants shall be as set forth in an exhibit to be incorporated in the Contract Documents. The CONTRACTOR shall provide and maintain office space for the resident project representative, unless noted otherwise in the Supplemental General Conditions. Any such project representative does not relieve CONTRACTOR of his independent obligations under these General Conditions, including but not limited to CONTRACTOR's duty to supervise the work of his subcontractors.

DECISIONS ON DISAGREEMENTS:

4.09.10 The ENGINEER will be the initial interpreter of the terms and conditions of the Contract Documents and the judge of the performance thereunder. In his capacity as interpreter and judge he will exercise his best efforts to insure faithful performance by both the OWNER and the CONTRACTOR. He will not show partiality to either and

shall not be liable for the result of any interpretation or decision rendered in good faith. Claims, disputes, and other matters relating to the execution and progress of the Work or the interpretation or performance under the Contract Documents shall be referred initially to the ENGINEER for decision; which he shall render in writing within a reasonable time.

LIMITATIONS OF ENGINEER'S RESPONSIBILITY:

4.09.11 Neither the ENGINEER'S authority to act under this nor any decision made by him in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of the ENGINEER to the CONTRACTOR, any Subcontractors, any of their agents or employees or any other person performing any of the Work.

4.09.12 The ENGINEER will not be responsible for the CONTRACTOR'S supervision role, construction means, methods, techniques, sequences or procedures, or the safety precautions and programs incidental thereto, and he will not be responsible for the CONTRACTOR'S failure to perform the Work in accordance with the Contract Documents nor the CONTRACTOR'S failure to comply with Laws and Regulations applicable to the performance of this Work.

4.09.13 The ENGINEER will not be responsible for the acts or omissions of the CONTRACTOR, or any Subcontractors, or any of his or their agents or employees, or any other persons performing any of the Work.

4.10 CHANGES IN THE WORK:

4.10.1 Without invalidating the Agreement, the OWNER, may, at any time or from time to time, order additions, deletions or revisions in the Work; these will be authorized by Change Orders. Upon receipt of a Change Order, the CONTRACTOR will proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any Change Order causes an increase or decrease in the Contract Time, an equitable adjustment will be made as provided in 4.11 or 4.12.

4.10.2 The ENGINEER may authorize minor changes or alterations in the Work not involving extra cost and not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order.

4.10.3 Additional Work performed by the CONTRACTOR without authorization of a Change Order will not entitle him to an increase in the Contract Price or an extension of the Contract Time, except in the case of an emergency as provided in paragraph 4.06.26 and except as provided in paragraphs 4.10.2, 4.13.2 and 4.13.7.

4.10.4 The OWNER will execute appropriate Change Orders prepared by the ENGINEER covering changes in the Work to be performed as provided in paragraph 4.04.4, and Work performed in an emergency as provided in paragraph 4.06.26 and any

other claim of the CONTRACTOR for a change in the Contract Time or the Contract Price which is approved by the ENGINEER.

4.10.5 It is the CONTRACTOR'S responsibility to notify his Surety of any changes affecting the general scope of the Work or change in the Contract Price and the amount of the applicable Bonds shall be adjusted accordingly. The CONTRACTOR will furnish proof of such adjustment to the Owner.

4.11 CHANGE OF CONTRACT PRICE:

4.11.1 The Contract Price constitutes the total compensation payable to the CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by the CONTRACTOR shall be at his expense without change in the Contract Price.

4.11.2 The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contract Price, shall be in writing delivered to the OWNER and the ENGINEER within fifteen (15) days of the occurrence of the event-giving rise to the claim. All claims for adjustments in the Contract Price shall be determined by the ENGINEER if the OWNER and CONTRACTOR cannot otherwise agree on the amount involved. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order.

4.11.3 The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

4.11.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved. Should the Work (by quantity) be increased by 15 percent from that stipulated in the Contract Documents, the OWNER and the CONTRACTOR may request adjustment of the unit prices by negotiation.

4.11.3.2 By mutual acceptance of a lump sum.

4.11.3.3 By cost and a mutually acceptable fixed amount for overhead and profit.

4.11.3.4 If none of the above methods is agreed upon, the value shall be determined by the ENGINEER on the basis of costs and a percentage for overhead and profit. Costs shall only include labor (payroll), payroll taxes, fringe benefits, Workmen's Compensation, etc., materials, equipment and other incidentals directly related to the Work involved. The maximum percentage, which shall be allowed by CONTRACTOR'S combined overhead, and profit shall be as follows:

4.11.3.4.1 For all such Work done by his own organization, the CONTRACTOR may add up to the following percentages to his actual net increase in cost:

(a) For Labor	20%
(b) For Equipment	10%
(c) For Materials	5%

4.11.3.4.2 For all such Work done by Subcontractors, each Subcontractor may add up to ten percent (10%) of his actual net increase in costs for combined overhead and profit and the CONTRACTOR may add up to five percent (5%) of the Subcontractor's total for his combined overhead and profit; provided that no overhead or profit shall be allowed on costs incurred in connection with premiums for public liability insurance or other special insurance directly related to such work. If required by the Engineer, the CONTRACTOR shall obtain competitive Bids from Sub-Contractors acceptable to him and deliver them to the ENGINEER, who with advice from the OWNER, will determine the acceptable Bid.

In such case and also under paragraph 4.11.3.3 the CONTRACTOR will submit in form prescribed by the ENGINEER an itemized cost breakdown together with supporting data.

4.11.4 The amount of credit to be allowed by the CONTRACTOR to the OWNER, for any such change which results in net decrease in cost, will be the amount of the actual net decrease as determined by the ENGINEER. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net increase, if any.

CASH ALLOWANCES:

4.11.5 It is understood that the CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such material men, suppliers or Subcontractors and for such sums within the limit of the allowances as the ENGINEER may approve. Upon final payment, the Contract Price shall be adjusted as required and an appropriate Change Order issued. The CONTRACTOR agrees that the original Contract Price includes such sums as he deems proper for costs and profit on account of cash allowances. No demand for additional cost or profit in connection therewith will be allowed.

4.12 CHANGE OF THE CONTRACT TIME:

4.12.1 The CONTRACTOR shall commence work to be performed under this agreement on a date to be specified in a written Notice to Proceed from the OWNER or ENGINEER and shall fully complete all work hereunder within the number of consecutive calendar days stated in the Advertisement. For each day in excess of the stated number of days, the CONTRACTOR shall pay the OWNER the sum stated in the Supplemental General

Conditions as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the OWNER by reason of failure of said CONTRACTOR to complete work within the time specified, such time being in the essence of this contract and a material consideration thereof. On projects involving more than one CONTRACTOR, the ENGINEER will be the judge as to division of responsibility between the several CONTRACTORS, and shall apportion the amount of liquidated damages to be paid by each of them according to delay caused by any or all of them.

4.12.2 The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time, shall be in writing delivered to the OWNER and the ENGINEER within fifteen (15) days of the occurrence of the event-giving rise to the claim. All claims for adjustment in the Contract Time shall be determined by the ENGINEER. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.

4.12.3 If the CONTRACTOR is delayed at any time in the progress of the Work by an act of the OWNER or the ENGINEER, or of any employee of either, or by any separate CONTRACTOR employed by the OWNER, or by changes ordered in the Work, or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any causes beyond the CONTRACTOR'S control, or by any cause which the ENGINEER or OWNER shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the ENGINEER or OWNER may decide.

4.12.4 No such extension shall be made for delay occurring more than ten (10) days before the claim therefor is made in writing to the ENGINEER. In the case of a continuing cause of delay, only one claim is necessary.

4.12.5 No claim for delay shall be allowed because of failure to furnish drawings until two (2) weeks after demand for such drawings and not then unless such claim be reasonable.

4.12.6 This article does not exclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

4.12.7 All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of 4.12 shall not exclude recovery for damages (including compensation for additional professional services) for delay or errors by either party. The rates for professional services shall be set forth in the Supplemental General Conditions.

4.12.8 No claim for extension of time will be considered because of unusual weather conditions, unless the CONTRACTOR can prove with the National Weather Service data that the weather experienced deviates from the normal weather for the period of the Contract, and no reparation shall be made to the CONTRACTOR for damages to the Work resulting therefrom, except as stipulated in paragraph 4.15.2 and noted herein.

4.13 WARRANTY AND GUARANTEE: TESTS AND INSPECTIONS: CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK:

WARRANTY AND GUARANTEE:

4.13.1 The CONTRACTOR warrants and guarantees to the OWNER and the ENGINEER that all materials and equipment will be new unless otherwise specified and that all Work will be of good quality and free from faults or defects and in accordance with the requirements of the Contract Documents and of any inspections, tests, or approvals referred to in paragraph 4.13.2. All unsatisfactory Work, all faulty or defective Work and all Work not conforming to the requirements of the Contract Documents or of such inspections, tests or approvals shall be considered defective. Prompt notice of all defects shall be given to the CONTRACTOR. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this 4.13. The Contract Performance Bond shall remain in full force and effect through the guarantee period.

4.13.1.1 Except as otherwise specified, all Work shall be guaranteed by the CONTRACTOR and his Sureties against defects resulting from the use of faulty or inferior materials, equipment or workmanship for one (1) year from date of final completion of the Work as signified by acknowledgement of receipt of Final PAYMENT by the CONTRACTOR, or from date of notice of Substantial Completion or use of the facility by the OWNER, whichever is earlier, or from the date of final completion as established by the OWNER, the ENGINEER and the CONTRACTOR in a joint meeting as applicable.

4.13.1.2 If, within any guarantee period, repairs or changes are required in connection with guaranteed work, which in the opinion of the ENGINEER, are rendered necessary as the result of the use of the materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract, the CONTRACTOR shall, promptly upon receipt of notice from the OWNER, and without expense to the OWNER:

4.13.1.2.1 Place in satisfactory condition, in every particular, all of such guaranteed work.

4.13.1.2.2 Make good all damage to the building or site, or equipment or contents thereof, which in the opinion of the ENGINEER, is the result of the use of materials, equipment, or workmanship which are inferior, defective or not in accordance with the terms of the Contract;

4.13.1.2.3 Correct all defects therein; and

4.13.1.2.4 Make good any work or material, or the equipment and contents of said building or site, disturbed in fulfilling any such guarantee.

4.13.1.3 If in fulfilling the requirements of the Contract or of any guarantee embraced therein or required thereby, the CONTRACTOR disturbs any work

guaranteed under another contract, he shall restore such disturbed work to the same extent as it was guaranteed under such other contract.

4.13.1.4 If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the OWNER may have defects corrected and the CONTRACTOR and his Surety shall be liable for all expenses incurred.

4.13.1.5 All special guarantees applicable to definite parts of the Work that may be stipulated in the Specifications or other papers forming a part of the contract shall be subject to the terms of this paragraph during the first year of the life of such special guarantee. Manufacturer's standard guarantees or warranties, which do not comply with the time limit specified herein, shall be extended by the CONTRACTOR automatically without further action on the part of the OWNER or the ENGINEER.

TESTS AND INSPECTIONS:

4.13.2 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, require 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 therefor. The CONTRACTOR will furnish the ENGINEER the required certificates of inspection, testing or approval. All such tests will be in accordance with the methods prescribed by the American Society for Testing and Materials or such other applicable organization as may be required by law or the Contract Documents. If any such Work required to be inspected, tested or approved is covered without written approval of the ENGINEER, it must, if requested by the ENGINEER, be uncovered for his observation at the CONTRACTOR'S expense. The cost of all such inspections, tests, and approvals shall be borne by the CONTRACTOR unless otherwise provided.

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

TESTING AND USE OF INCOMPLETE PORTIONS OF THE WORK:

4.13.4 The CONTRACTOR shall be responsible in every respect for failure to observe the necessary precautions to avoid injury to personnel or property during testing and use of any incomplete portions of the work in whole or in part while the tests are being conducted, and the OWNER or his agents shall not be liable therefor.

ACCESS TO THE WORK:

4.13.5 The ENGINEER and his representatives and other representatives of the OWNER will at all times have access to the Work. The CONTRACTOR will provide proper facilities for such access and observation of the Work and also for any inspection, or testing thereof by others.

UNCOVERING WORK:

4.13.6 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.

4.13.7 If any Work has been covered which the ENGINEER has not specifically requested to observe prior to its being covered, or if the ENGINEER considers it necessary or advisable that covered Work be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order shall be issued. 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 if he make a claim therefor as provided in 4.11 and 4.12.

OWNER MAY STOP THE WORK:

4.13.8 If the Work is defective or the CONTRACTOR fails to supply sufficient skilled workmen or suitable materials or equipment, or if the CONTRACTOR fails to make prompt payments to Subcontractors for labor, materials or equipment, the OWNER may order the CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the OWNER to stop the Work shall not give rise to any duty on the part of the OWNER to exercise this right for the benefit of the CONTRACTOR or any other party.

CORRECTION OR REMOVAL OF DEFECTIVE WORK:

4.13.9 If required by the ENGINEER prior to approval of final payment, the CONTRACTOR will promptly, without cost to the OWNER as specified by the ENGINEER, either correct any defective Work, whether or not fabricated, installed or completed, or if the Work has been rejected by the ENGINEER, remove it from the site and replace it with non-defective Work. If the CONTRACTOR does not correct such defective Work or remove and replace such rejected Work within a reasonable time, all

as specified in a written notice from the ENGINEER, the OWNER may have the deficiency corrected or the rejected Work removed and replaced. All direct or indirect costs of such correction or removal and replacement, including compensation for additional professional services, shall be paid by the CONTRACTOR, and an appropriate deductive Change Order shall be issued. The CONTRACTOR will also bear the expenses of making good all work of others destroyed or damaged by his correction, removal or replacement of his defective Work.

ACCEPTANCE OF DEFECTIVE WORK:

4.13.10 If, instead of requiring correction or removal and replacement of defective Work, the OWNER (and prior to approval of final payment, also the ENGINEER) prefers to accept it, he may do so. In such case, if acceptance occurs prior to approval of final payment, a Change Order shall be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract Price, or if the acceptance occurs after approval of final payment, an appropriate amount shall be paid by the CONTRACTOR to the OWNER.

NEGLECTED WORK BY CONTRACTOR:

4.13.11 If the CONTRACTOR should neglect to prosecute the Work in accordance with the Contract Documents, including any requirements of the progress schedule, the OWNER, upon written notice to the CONTRACTOR, after three (3) days from receipt of such notice by the CONTRACTOR and without prejudice to any other remedy he may have, may make good such deficiencies and the cost thereof (including compensation for additional professional services) shall be charged against the CONTRACTOR if the ENGINEER approves such action, in which case a Change Order shall be issued incorporating the necessary revisions in the Contract Documents including an appropriate reduction in the Contract Price. If the payments then or thereafter due the CONTRACTOR are not sufficient to cover such amount, the CONTRACTOR will pay the difference to the OWNER.

4.14 PAYMENTS AND COMPLETION:

SCHEDULES:

4.14.1 The CONTRACTOR shall submit and keep current schedules shown below:

SCHEDULE OF VALUES:

4.14.1.1 At least ten (10) days prior to submitting the first Application for a progress payment, the CONTRACTOR will submit a schedule of values of the work including quantities and unit prices, aggregating the Contract Price. This schedule shall be satisfactory in form and substance to the ENGINEER and shall subdivide the work into component parts in sufficient detail to serve as the basis for progress payments during construction. Upon approval of the schedule of values by the ENGINEER, it shall be

incorporated into the form of Application for payment furnished by the ENGINEER. Failure of the CONTRACTOR to submit a schedule of values will constitute justification for the ENGINEER, in ENGINEER's sole discretion, to withhold processing of progress payments until such time that an appropriate schedule has been received.

PROGRESS SCHEDULE:

4.14.1.2 Within fifteen (15) calendar days after execution of the Agreement but not later than ten (10) calendar days prior to submitting an Application for a progress payment, the CONTRACTOR will submit a *current* Progress Schedule indication the starting and completion dates of the various stages of Work in the Agreement. The progress schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. Changes in the prosecution of the Work under this Agreement shall be kept current by the CONTRACTOR as changes in the Progress Schedule. Failure of the CONTRACTOR to keep the Progress Schedule as current as the last approved progress payment, will constitute justification for the ENGINEER to withhold processing of progress payments, at ENGINEER's sole discretion, until such time that an updated schedule has been received.

APPLICATIONS FOR PROGRESS PAYMENT:

4.14.2 At least twenty (20) days before each progress payment falls due (but not more than once a month), the CONTRACTOR will submit to the ENGINEER for review the Application for Payment filled out and signed by the CONTRACTOR covering ninety-five percent (95%) of the Work completed and ninety-five percent (95%) of the value of stored materials as the date of the Application and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of the materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect his interest therein, including insurance on materials stored off the site.

CONTRACTOR'S WARRANTY OF TITLE:

4.14.3 The CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by an Application for Payment, whether incorporated in the Project or not, will have passed to the OWNER prior to the making of the Application for Payment, free and clear of all liens, claims, security interests and encumbrances (hereinafter in these General Conditions referred to as "Liens"); and that no Work, materials or equipment covered by an Application for Payment will have been acquired by the CONTRACTOR or by any other person performing the work at the site or furnishing materials and equipment for the Project, is subject to an agreement under which an

interest therein or encumbrance thereon is retained by the seller or otherwise imposed by the CONTRACTOR or such other person.

APPROVAL OF PAYMENTS:

4.14.4 The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing approval of payment, and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing the 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 (10) days of presentation of an approved partial payment estimate, review, approve, and submit the partial pay estimate to the funding agency. Within three (3) workdays of the receipt of funds the OWNER will pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate less the retainage.

4.14.5 The ENGINEER'S approval of any payment requested in an Application for Payment shall constitute a representation by him to the OWNER, based on the ENGINEER'S on-site observations of the Work in progress as an experienced and qualified design Professional and on his review of the Application for Payment and the supporting data, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the work as a functioning project upon substantial completion, to the results of any subsequent tests called for in the Contract Documents and any qualifications stated in his approval); and that the CONTRACTOR is entitled to payment of the amount approved. However, by approving any such payment, the ENGINEER shall not thereby be deemed to have represented that he made exhaustive or continuous on-site observations to check the quality or the quantity of the work, or that he has reviewed the means, methods, techniques, sequences, and procedures of construction or that he has made any examination to ascertain how or for what purpose the CONTRACTOR has used the monies paid or to be paid to him on account of the Contract Price.

4.14.6 The CONTRACTOR shall make the following certification on each request for payment:

"I hereby certify that the labor and materials listed on this request for payment have been used in the construction of this Work, or that all materials included in this request for payment and not yet incorporated into the construction are now on the site; and that all lawful charges for labor, materials, etc., covered by previous Certificates for Payment have been paid and that all other lawful charges on which this request for payment is based have been paid for in full or will be paid for in full from the funds received in payment of this request within ten (10) calendar days from receipt of this partial payment from OWNER."

4.14.7 The ENGINEER'S approval of final payment shall constitute an additional representation by him to the OWNER that, to his knowledge, the conditions precedent to the CONTRACTOR'S being entitled to final payment as set forth in paragraphs 4.14.13 and 4.14.14 have been fulfilled.

4.14.8 The ENGINEER may refuse to approve the whole or any part of any payment if, in his opinion, he is unable to make such representations to the OWNER. He may also refuse to approve any such payment, or because of subsequently discovered evidence or the results or subsequent inspections or tests, nullify any such payment previously approved, to such extent as may be necessary in his opinion to protect the OWNER from loss because:

4.14.8.1 The Work is defective.

4.14.8.2 The Work for which payment is requested cannot be verified.

4.14.8.3 Claims have been filed or there is reasonable evidence indicating the probable filing thereof.

4.14.8.4 The Contract Price has been reduced because of Modifications.

4.14.8.5 The OWNER has been required to correct defective Work or complete the Work in with paragraph 4.13.11, or

4.14.8.6 Of unsatisfactory prosecution of the Work, including failure to clean up as required by paragraph 4.06.33 and 4.06.34.

SUBSTANTIAL COMPLETION:

4.14.9 Prior to final payment, the CONTRACTOR may, in writing to the OWNER and the ENGINEER, certify that the entire Project is substantially complete and request that the ENGINEER issue a Certificate of Substantial Completion. Within a reasonable time thereafter, the OWNER, CONTRACTOR, and ENGINEER will review the Project to determine that status of completion. If the ENGINEER does not consider the Project substantially complete, he will notify the CONTRACTOR in writing giving his reasons therefor. If the ENGINEER considers the Project substantially complete, he will prepare and deliver to the OWNER a tentative Certificate of Substantial Completion which shall fix the date of Substantial Completion and the responsibilities between the OWNER and the CONTRACTOR for maintenance, heat, and utilities. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment, and the certificate shall fix the time within which such items shall be completed or corrected, said time to be within the Contract Time.

The OWNER shall have seven (7) days after receipt of the tentative certificate during which he may make written objection to the ENGINEER as to any provisions of the

certificate or attached list. If, after considering such objections the ENGINEER concludes that the Project is not substantially complete, he may notify the CONTRACTOR in writing, stating his reasons therefor. If, after said seven (7) days and after consideration of the OWNER'S objections, the ENGINEER considers the Project substantially complete, he will execute and deliver to the OWNER and the CONTRACTOR a definite Certificate of Substantial Completion (with a reviewed tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as he believes justified after consideration of any objections from the OWNER.

4.14.10 The OWNER shall have the right to exclude the CONTRACTOR from the Project after the date of Substantial Completion, but the OWNER will allow the CONTRACTOR reasonable access to complete or correct items on the tentative list.

PARTIAL UTILIZATION:

4.14.11 Prior to final payment, the OWNER may request the CONTRACTOR in writing to permit him to use a specified part of the Project, which he believes he may use without significant interference with construction of the other parts of the Project. If the CONTRACTOR agrees, he will notify the OWNER and ENGINEER that said part of the Project is substantially complete and request the ENGINEER to issue a Certificate of Substantial Completion for that part of the Project. Within a reasonable time thereafter the OWNER, CONTRACTOR, and ENGINEER will make an inspection of that part of the Project to determine its status of completion. If the ENGINEER does not consider that it is substantially complete, he will notify the OWNER and CONTRACTOR in writing giving his reason therefor. If the ENGINEER considers that part of the Project to be substantially complete, he will execute and deliver to the OWNER and CONTRACTOR a certificate to that effect, fixing the date of Substantial Completion as to that part of the Project, attaching thereto a tentative list of terms to be completed or corrected before final payment and fixing the responsibility between the OWNER and CONTRACTOR for maintenance, heat and utilities as to that part of the Project. The OWNER shall have the right to exclude the CONTRACTOR from any part of the Project which the ENGINEER has so certified to be substantially complete, but the OWNER will allow the CONTRACTOR reasonable access to complete or correct items on the tentative list. See paragraph 4.08.8.

FINAL REVIEW:

4.14.12 Upon written notice from the CONTRACTOR that the Project is complete, the ENGINEER will make a final review of the Project with the OWNER and the CONTRACTOR, and will notify the CONTRACTOR in writing of any particulars in which this review reveals that the work is defective. The CONTRACTOR shall immediately make such corrections as are necessary to remedy such defects.

FINAL APPLICATION FOR PAYMENT:

4.14.13 After the CONTRACTOR has completed any such corrections to the satisfaction of the ENGINEER and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, Certificates of Inspection and other documents -- all as required by the Contract Documents, he may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by such supporting data as the ENGINEER may require, together with complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of the Contract Documents and the labor and services performed and material and equipment furnished thereunder. In lieu thereof and as approved by the OWNER, the CONTRACTOR may furnish receipts of releases in full; an affidavit of the CONTRACTOR that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills and other indebtedness connected with the Work for which the OWNER or his property might in any way be responsible, have been paid or otherwise satisfied; and consent to the Surety, if any, to final payment. If any Subcontractor or supplier fails to furnish a release or receipt in full, the CONTRACTOR may furnish a Bond satisfactory to the OWNER to indemnify him against any lien.

APPROVAL OF FINAL PAYMENT:

4.14.14 If, on the basis of his observation and review of the Work during construction, his final review of the Project and his review of the final Application for Payment; all as required by the Contract Documents, he has fulfilled all of his obligations under the Contract Documents, the ENGINEER will, within ten (10) days after receipt of the final Application for Payment, indicate in writing his approval of payment and present the Application to the OWNER for payment. Otherwise, he will return the Application to the CONTRACTOR, indicating in writing his reasons for refusing to approve final payment, in which case the CONTRACTOR will make the necessary corrections and resubmit the Application. The OWNER will, within ten (10) days of presentation to him of an approved final Application for Payment, pay the CONTRACTOR the amount approved by the ENGINEER.

4.14.15 If after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the CONTRACTOR, and the ENGINEER so confirms, the OWNER shall, upon certification by the ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in 4.05, the written consent of the Surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the CONTRACTOR to the ENGINEER prior to certification of such payment. Such payment shall be made under the terms and conditions governing final payment except that it shall not constitute a waiver of claims.

CONTRACTOR'S CONTINUING OBLIGATION:

4.14.16 The CONTRACTOR'S obligation to perform the Work and complete the Project in accordance with the Contract Documents shall be absolute. Neither approval of any progress or final payment by the ENGINEER nor issuance of a Certificate of Substantial Completion, nor any payment by the OWNER to the CONTRACTOR under the Contract Documents, nor any use or occupancy of the Project or any part thereof by the OWNER, nor any act of acceptance by the OWNER nor any failure to do so, nor any correction of defective work by the OWNER shall constitute an acceptance of Work not in accordance with the Contract Documents.

WAIVER OF CLAIMS:

4.14.17 The making and acceptance of final payment shall constitute:

4.14.17.1 A waiver of all claims by the OWNER against the CONTRACTOR other than those arising from unsettled Liens, from defective work appearing after final payment or from failure to comply with the requirements of the Contract Documents or the terms of any special guarantees specified therein; and,

4.14.17.2 A waiver of all claims by the CONTRACTOR against the OWNER other than those previously made in writing and still unsettled.

4.15 SUSPENSION OF WORK AND TERMINATION:

OWNER MAY SUSPEND WORK:

4.15.1 The OWNER may, at any time and without cause, suspend the work or any portion thereof for a period of not more than ninety (90) days by notice in writing to the CONTRACTOR and the ENGINEER, which shall fix the date on which Work shall be resumed. The CONTRACTOR will resume the Work on the date so fixed. The CONTRACTOR will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if he makes a claim therefor as provided in 4.11 and 4.12.

WORK DURING INCLEMENT WEATHER:

4.15.2 No work shall be done under these specifications, except by permission of the ENGINEER, when the weather is unfit for good and careful work to be performed. Should the severity of the weather continue, the CONTRACTOR, upon the direction of the ENGINEER, shall suspend all work until instructed to resume operations by the ENGINEER and the contract time shall be extended to cover the duration of the order. Work damaged during periods of suspension due to inclement weather shall be repaired and/or replaced by the CONTRACTOR at his own expense.

OWNER MAY TERMINATE:

4.15.3 If the CONTRACTOR is adjudged as 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 similar 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, 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 seven (7) days' written notice, terminate the services of the CONTRACTOR and take possession of the Project and 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 services, 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.

4.15.3.1 Prior to the issuance of the Notice to Proceed and if the contract has been executed by the Owner, the Owner can terminate the Contract. In the event the Owner exercises this option, the Contractor will be entitled to documented expenses incurred, including bonds and materials, but shall not be entitled to any anticipated profit or quantum meruit.

4.15.4 Where the CONTRACTOR'S services have been so terminated by the OWNER, said terminations shall not affect any rights of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retentions or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from liability.

4.15.5 Upon seven (7) days' written notice to the CONTRACTOR and the ENGINEER, the OWNER may without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the agreement. In such case, the CONTRACTOR shall be paid for all Work executed and any expense sustained plus a reasonable profit.

REMOVAL OF EQUIPMENT:

4.15.6 In the case of termination of this Contract before completion, for any cause whatever, the CONTRACTOR, if notified to do so by the OWNER, shall promptly remove any part or all of his equipment and supplies from the property of the OWNER. Should the CONTRACTOR not remove such equipment and supplies, the OWNER shall have the right to remove them at the expense of the CONTRACTOR. Equipment and

supplies shall not be construed to include such items for which the CONTRACTOR has been paid in whole or in part.

CONTRACTOR MAY STOP WORK OR TERMINATE:

4.15.7 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 Application for Payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR any sum approved by the ENGINEER within thirty (30) days of its approval, and presentation, then the CONTRACTOR may, upon seven (7) days' written notice to the ENGINEER, terminate the Agreement and recover from the OWNER payment for all work executed and any expense sustained plus a reasonable profit. In addition and in lieu of terminating the Agreement, if the ENGINEER has failed to act on an Application for Payment or the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon seven (7) days' notice to the OWNER and the ENGINEER stop the Work until he has been paid all amounts then due.

OWNER FURNISHED EQUIPMENT:

4.15.8 In cases where the OWNER furnishes equipment to the CONTRACTOR for installation, but fails to deliver it to the CONTRACTOR as required by SUPPLEMENTARY CONDITIONS OR SPECIAL CONDITIONS, and in case such failure causes the CONTRACTOR additional expense or need for extension of time, the CONTRACTOR may make such claims upon the OWNER and obtain adjustments as provided herein.

LIQUIDATED DAMAGES:

4.15.9 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 Special Conditions for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the Contract Documents.

4.16 MISCELLANEOUS:

4.16.1 Whenever any provision of the Contract Documents requires the giving of written notice it shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to him who gives the notice.

4.16.2 All monies not paid when due hereunder shall bear interest at twelve percent (12%) per annum.

4.16.3 All Specifications, Drawings, and copies thereof furnished by the ENGINEER shall remain his property. They shall not be used on another Project, and with the execution of the Agreement, shall be returned to him on request upon completion of the Project.

4.16.4 The duties and obligations composed by these General Conditions and the rights and remedies available hereunder, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon the CONTRACTOR by paragraph 4.06.38, 4.06.39, 4.06.40, 4.13 and 4.14.3, and the rights and remedies available to the OWNER and the ENGINEER thereunder, shall be in addition to and not a limitation of any rights otherwise imposed or available by law, by special guarantee or other provisions of the Contract Documents.

4.16.5 Should the OWNER or the CONTRACTOR suffer injury or damage to its person or property because of any error, omission or act of the other or of any of his employees or agents or others for whose acts he is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observance of such injury or damage.

4.16.6 The Contract Documents shall be governed by the law of the place of the Project.

**SPECIAL CONDITIONS
SUPPLEMENTAL GENERAL CONDITIONS**

A) SPECIAL REQUIREMENT – MINORITY BUSINESS ENTERPRISE PARTICIPATION

Contractors bidding on this project shall follow all requirements of the following:

- 1) Each bidder shall identify on the bid the minority businesses that it will use on the project and an affidavit listing the good faith efforts it has made pursuant the requirements listed below, and the total dollar value of the bid that will be performed by minority businesses. A Contractor that performs all of the work under a contract with its own workforce may submit an affidavit to that effect in lieu of the affidavit otherwise required. The apparent lowest responsible, responsive bidder shall also file the following within 30 days of his bid:
 - a) An affidavit that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or in excess of the 10% participation goal. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort; or
 - b) Documentation of its good faith effort to meet the goal. The documentation must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations, and evidence of other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.
- 2) Within 30 days after award of the contract, a list of all identified subcontractors that the Contractor will use on the project shall be submitted.
- 3) Failure to file a required affidavit or documentation demonstrating that the Contractor made the required good faith effort is grounds for rejection of the bid.

No subcontractor who is identified and listed pursuant to this section can be replaced by a different subcontractor except as follows:

- a) If the subcontractor's bid is later determined by the Contractor to be non-responsible or non-responsive, or is the listed subcontractor refuses to enter into a contract for the complete performance of the bid work; or
- b) With the approval of the Town for good cause.

All bidders shall undertake the following good faith efforts to the extent possible. Contractors bidding on the project should be able to document that they have followed at least five of the ten steps listed as follows:

- c) Contacting minority businesses that reasonable could have been expected to submit a quote and that were known to the Contractor or available on State or local government maintained lists at least 10 days before the bid opening or proposal date and notifying them of the nature and scope of the work to be performed.

- d) Making the construction plans, specifications, and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids or proposals are due.
- e) Breaking down or combining elements of work into economically feasible units to facilitate minority participation.
- f) Working with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- g) Attending any pre-bid meetings scheduled by the Town.
- h) Providing assistance in getting required bonding or insurance or providing alternatives to bonding and insurance for subcontractors.
- i) Negotiating in good faith with interested minority businesses and not rejecting them as unqualified without sound reasons based on the capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- j) Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- k) Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on this project.
- l) Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash flow demands.

By definition, the term "minority business" means a business:

- (1) In which at least fifty-one percent (51%) is owned by one or more minority persons or socially and economically disadvantaged individuals, or in the case of a corporation, in which at least fifty one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
- (2) Of which the management and daily operations are controlled by one or more of the minority persons or socially and economically disadvantaged persons who own it.

The term "minority person" means a person who is a citizen of lawful permanent resident of the United States and who is:

- 1) Black, that is, a person having origins in any of the black racial groups of Africa;
- 2) Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race; or
- 3) Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, or the Pacific Islands; or

- 4) American Indian, that is, a person having origins in any of the original Indian peoples of North America; or
- 5) Female.

The term “socially and economically disadvantaged individual” means the same as defined in 15 U.S.C. 637.

4.0 GENERAL

Copies of approved permits for this project are included as part of this Contract Document. Inclusion of these permits makes the conditions of the permits part of this Contract. Contractors are advised to familiarize themselves with the conditions of these permits prior to preparing their bid.

4.02 PRELIMINARY MATTERS

4.02.5 The bidding Contractors may secure one (1) set of Contract Documents for the price of \$200. Upon returning, in good condition, the purchased Contract Documents, **all Contractors who submit a formal Proposal to the Owner**, successful or unsuccessful, will be refunded 100% of the price of the **first set** purchased.

After Award, the successful bidder shall be issued a maximum of three (3) sets of Contract Documents for the construction phase. All additional sets will be made available at the rate of \$150 per set.

4.02.8 A representative of Construction Grants and Loans will also be at the pre-construction conference.

4.02.11 Contractor will have his bid security refunded under these conditions for this project.

4.05 CONTRACTOR'S LIABILITY INSURANCE

4.5.5 The limits of coverage shall be as noted in the General Conditions.

4.06 CONTRACTOR'S RESPONSIBILITIES

4.06.21 Contractor shall submit monthly sales tax reports along with his invoices.

4.06.44.4 Contractor shall notify the NC-DENR regional office prior to blasting.

4.09 ENGINEER'S STATUS DURING CONSTRUCTION

4.09.9 The Contractor is not required to provide and maintain office space for the Engineer and/or his Construction Observer.

4.09.10 Dispute Resolution – A public entity shall use the dispute resolution process adopted by the State Building Commission pursuant to G.S. 143-135.26(12), or shall adopt another dispute resolution process, which shall include mediation, to be used as an alternative to the dispute resolution process adopted by the State Building Commission. This dispute resolution process will be available to all the parties involved in the public entity's construction project including the public entity, the architect, the construction manager, the contractors, and the first-tier and lower-tier subcontractors and shall be available for any issues arising out of the contract or construction process. The public entity may set a reasonable threshold, not to exceed fifteen thousand dollars (\$15,000), concerning the amount in controversy that must be at issue before a party may require other parties to participate in the dispute resolution process. The public entity may require that the costs of the process be divided between the parties to the dispute with at least one-third of the cost to be paid by the public entity, if the public entity is a party to the dispute. The public entity may require in its contracts that a party participate in mediation concerning a dispute as a precondition to initiating litigation concerning the dispute.

4.12 CHANGE OF CONTRACT TIME

4.12.1 The liquidated damages for this project shall be \$500.00 per day. The project shall be completed within the time period specified in the Proposal. This time period shall be considered as consecutive calendar days beginning on the date specified in the written "Notice to Proceed".

4.12.7 The rates payable to the Owner for extra work compensation due the Construction Observer and/or Engineer on this Project shall be as follows:

Construction Observer	\$70.00 per hour
Engineer	\$100.00 per hour

Such compensation shall become due to the Owner when extra charges to the Contractor exist because of the Project not being completed within the specified time period plus any authorized time extensions or for weekend and holiday work or work beyond the normal forty (40) hour week, when such work is due to Contractor's errors.

4.13 ACCEPTANCE OR OCCUPANCY OF WORK

No progress or final payment, nor any project final by Engineers, nor any partial or entire use of occupancy of the work or improvements, nor acceptance thereof, by the Owner shall be evidence of the performance of the contractor or construed to be acceptance of defective work or improper materials, either wholly or in part. The contractor's obligation to perform and complete the work in accordance with the Contract Documents shall be absolute.

Disadvantage Business Owners List							
Company Name	Mailing Address	Contact Name	Phone	Fax	Email	Certifications	
1ST AND GOAL HAULING	121 BLUE CLAW BAY ROAD,JACKSONVILLE, NC 28540	DEKOTA MARSHALL	910-340-1244		DEKOTA.MARSHALL@YAHOO.COM	DBE, MBE, SBE, HUB	
ATLANTIC COAST TRUCKING INC	PO Box 88,HOLLY RIDGE, NC 28445	WENDY HARDEE	910-279-3626	910-803-0363	ATB2126@GMAIL.COM	DBE, WBE, HUB	
B & B CRANE SERVICE LLC	PO Box 1594,SHALLOTTE, NC 28459-1594	MEGAN POWELL	910-755-5668	910-754-9381	OFFICE@BANDBCRANESERVICE.COM	DBE, WBE, HUB	
CEKRA INC	PO Box 7964,WILMINGTON, NC 28406	ANITA NAGY KRATSA	910-338-3643	866-893-5798	TIBI@CEKRA.COM	DBE, WBE, HUB	
CLIFTON CONSTRUCTION CO INC	1435 GIDDENSVILLE ROAD,FAISON, NC 28341	SANDRA CLIFTON	910-592-6918	910-267-0131	SKCFAISON@INTRSTAR.NET	DBE, WBE	
D HEWETT TRUCKING LLC	947 SOUTHPORT SUPPLY RD SE,BOLIVIA, NC 28422	DONALD R HEWETT JR	910-232-2551	910-754-8525	DHEWETTTRUCKING@YAHOO.COM	DBE, MBE, SBE, HUB	
DOSS TRUCKING INC	479 FOY LOCKAMY RD,JACKSONVILLE, NC 28540	SHARON B. DOSS	910-347-5381	910-347-4138	SBDOSS@HOTMAIL.COM	DBE, WBE	
E S & J ENTERPRISES INC	1555 HOLLAND RD,AUTRYVILLE, NC 28318-7827	SANDRA C. CARROLL-WILLIAMS	910-567-6138	910-567-2891	ESANDJ@INTRSTAR.NET	DBE, WBE, HUB	
ECH DEVELOPMENT LLC DBA COREY HALL TRUCKING	PO Box 531,WILMINGTON, NC 28402	EMMETT COREY HALL	910-520-2600	910-623-9090	ECHDEVELOPMENT@YAHOO.COM	DBE, MBE, SBE, HUB	
HUMPHREY TRUCKING INC	151 THOMAS HUMPHREY RD,JACKSONVILLE, NC 28546	PHYLISS HUMPHREY	910-938-7861	910-938-2396	HUMPHREYTK@YAHOO.COM	DBE, WBE, SBE	
J G DUMP TRUCK SERVICES LLC	507 GRACE STREET,WILMINGTON, NC 28401	JONATHAN GARRIS	910-336-6446	517-727-6010	JOHNGARRIS28@GMAIL.COM	DBE, MBE, SBE, HUB	
JAMES L MORGAN TRUCKING INC	2090 TURKEY TRAP RD SW,SUPPLY, NC 28462	JAMES L. MORGAN	910-209-5885	910-846-3257	MORPIETRUCKING@AOL.COM	DBE, MBE, SBE	
LAMONTS TRUCKING LLC	1230-208 MAPLE TREEDRIVE,LELAND, NC 28451	LAMONT HANKINS	919-219-4746		LAMONT_HANKINS@YAHOO.COM	DBE, MBE	
M TRANSPORT INC	690 CECIL ODIE RD,CLINTON, NC 28328	TIMOTHY MATTHIS	910-385-8840		M.TRANSPORTINC@YAHOO.COM	DBE, MBE, SBE	
MAR-TECH LAND DEVELOPERS INC	PO Box 418,SHALLOTTE, NC 28459	MARTIE BILLINGS	910-755-5523	910-755-5554	DIRTCHEAP3@ATMC.NET	DBE, WBE, HUB	
METTS CONSTRUCTION & LANDSCAPING	250 J METTS DRIVE,SUPPLY, NC 28462	JAMEEL METTS	910-471-9113	910-754-4344	METTSCONSTRUCTION@YAHOO.COM	DBE, MBE, SBE, HUB	
MILITARY & FEDERAL CONSTRUCTION CO	846 BELL FORK RD,JACKSONVILLE, NC 28540	MELISSA A LEIFHEIT	910-353-3797	910-353-3073	MLEIFHEIT@MILITARYANDFEDERAL.COM	DBE, MBE, HUB	
MORGAN TRUCKING & GENERAL CONSTRUCTION INC	PO Box 91,SHALLOTTE, NC 28459	TARKESSIO LANDIS MORGAN	910-386-9407	910-842-8085	MORGANTRUCKING10@GMAIL.COM	DBE, MBE, SBE, HUB	
TRIPPS TRUCKING LLC	PO Box 126,ASH, NC 28420	JULIA FORT TRIPP	910-287-3234	910-755-7898	TRIPPSTRUCKINGLLC@ATMC.NET	DBE, MBE, HUB	
VIVIAN & SONS TRUCKING INC	1265 HOLDEN BEACH RD SW,SUPPLY, NC 28462	TERESA MCCALL	910-846-2772	910-846-3086		DBE, WBE	

* The following list was generated from the NCDOT website. The bidding contractors are responsible for completing their own search for DBE listings.

PROPOSAL

THE FOLLOWING PROPOSAL IS HEREBY MADE TO:

Lynn Barbee, Mayor
TOWN OF CAROLINA BEACH, North Carolina

The undersigned hereby signifies that it is _____ intention and
(his or their)
purpose to enter into a contract to furnish all labor, materials, equipment, apparatus, etc., as required and to do all Work, as listed and described in the PROPOSAL for the TOWN OF CAROLINA BEACH, North Carolina, in accordance with the terms of the Advertisement, the foregoing Specifications, this Proposal and the Contract Drawings.

BIDDER'S INTEREST

By submission of this Bid, each Bidder certifies, and in the case of a joint Bid each party thereto certifies as to its own organization, that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid with any other Bidder or with any competitor.

KNOWLEDGE OF CONTRACT DOCUMENT

The Bidder further declares that he has examined the Contract Document relative to his Work, read all special provisions therein, satisfied himself with the equipment to be furnished, visited all sites of construction and has informed the Engineer of any deficiencies or conflicts found.

CONTRACT AMOUNT

The Bidder hereby proposes and agrees, if this Proposal is accepted, to contract with TOWN OF CAROLINA BEACH, NC, to furnish all specified materials, equipment, shipping costs, services, etc. that may be required by the Contract Documents, as related to this work, to the full and entire satisfaction of the TOWN OF CAROLINA BEACH, NC.

LOW BID DETERMINATION

The Owner shall award this project on the basis of the lowest responsible, responsive bid. The Owner may choose to award the Bid at their discretion. The Owner also reserves the right to reject bids based on budget constraints, or to reject all bids for the project.

WARRANTY

All equipment and work shall be warranted one (1) full calendar year beginning on the date of issuance of a Certificate of Substantial Completion by the Engineer.

**Town of Carolina Beach
Ocean Boulevard Sidewalk Project**

Item #	Item Description	Quantity	Units	Unit Price	Cost
1	Concrete Sidewalk 5 ft. wide, 4" Thick (1,976 LF)	1,098	SY		
2	Concrete Sidewalk 5 ft. wide, 6" Thick (205 LF)	115	SY		
3	ADA Ramp w/Truncated Domes	20	EA		
4	Crosswalk Stripes per NCDOT	215	LF		
5	Site Grading	1	LS		
6	NCDOT Asphalt Patch 10" Thick	0	SY		
7	Town Street Asphalt Remove & Replace	105	SY		
8	Concrete Driveway (6") Removal & Replace	50	SY		
9	Asphalt Driveway Removal & Replace	0	SY		
10	Gravel Driveway (6") Removal & Replace	22	SY		
11	NCDOT Concrete Curb and Gutter	25	LF		
12	15" RCP Class III, Storm Drain Pipe, w/Stone Bedding	259	LF		
13	18" RCP Class III, Storm Drain Pipe, w/Stone Bedding	953	LF		
14	24" RCP Class III, Storm Drain Pipe, w/Stone Bedding	211	LF		
15	30" RCP Class III, Storm Drain Pipe, w/Stone Bedding	48	LF		
16	15" RCP Flared End Section	1	EA		
17	18" RCP Flared End Section	4	EA		
18	24" RCP Flared End Section	0	EA		
19	2'-2"x3' Precast DOT Box w/Frame & Grate	53	EA		
20	3'x3' Precast DOT Box w/Frame & Grate	8	EA		
21	4'x4' Precast DOT Box w/Frame & Grate	0	EA		
22	3'x5' Precast DOT Box w/Frame & Grate & MH Lid	1	EA		
23	Interference - Precast DOT Box w/Frame & Grate	1	EA		
24	6" Water Line Relocation	1	EA		
25	Fire Hydrant Relocation	3	EA		
26	Silt Fencing	1,500	LF		
27	Drop Inlet Control Sediment Devices	64	EA		
28	Seeding, Erosion & Dust Control	1	LS		
29	Traffic Control	1	LS		
30	Mobilization (Max. 3%)	1	LS		

The Total Bid for the Items listed above (Items 1 – 30), and as shown by the Contract Plans and specified by these Contract Specifications, including all labor, equipment, materials and appurtenances for a complete project is:

BID TOTAL:

\$

PROJECT COMMENCEMENT

The Contract for this project shall be awarded within 60 calendar days of the Bid date if not modified by addendum. The project Notice to Proceed shall be issued within 60 calendar days of the Award date. The project construction shall commence within 30 calendar days of the Notice to Proceed.

TIME OF COMPLETION

The Contract Time will be for a total period of 125 calendar days from the Notice to Proceed date. Time is of the essence for this project.

BID SECURITY

The bid security attached, in the sum of not less than five percent (5%) of the above quoted amount, is furnished to the Owner as a guarantee that the Agreement will be executed within ten (10) consecutive calendar days after the bidder's receipt of the NOTICE OF AWARD of the Contract to the Undersigned in accordance with the provisions of the Instructions to Bidders and the General Conditions.

EXECUTION OF AGREEMENT

The undersigned further agrees that in the case of failure on his part to execute the said Agreement within the time period noted in "BID SECURITY" above, the check, cash or bid bond accompanying this Proposal shall be paid into the funds of the Owner's account set aside for this Project as liquidated damages for such failure; otherwise the check, cash or bid bond accompanying this Proposal shall be returned to the Undersigned.

OWNER'S RIGHTS RESERVED

The undersigned understands that the Owner reserves the right to reject any and all proposals or to waive any formality or technicality in any proposal that is in the best interest of the Owner.

LIQUIDATED DAMAGES

The bidder agrees to pay the TOWN OF CAROLINA BEACH, NC the sum of \$500.00 for each consecutive calendar day after the Time of Completion. Also see section 4.12.7 of the Supplementary General conditions for engineering charges that may apply.

ADDENDA

The undersigned acknowledges the receipt of ADDENDA Nos. ().

This Proposal respectfully submitted, this ____ day of _____, 20__.

(Signature of Person, Firm
or Corporation making Bid)

Title _____

Address _____

CONTRACTOR'S INFORMATION SHEET

Submittal of the information requested on this sheet is considered part of the Bid itself. Bidding Contractors will need to fully complete the information requested on this sheet for their bid to be considered a **RESPONSIVE AND RESPONSIBLE** bid. Inaccurate or incomplete information can disqualify a bid. Please try to fully answer all questions, and use additional sheets of paper as necessary. Information provided may be used to determine whether or not a Contractor may be deemed qualified to perform the work required for this project.

- How long has the Contractor been in business?
- How many municipal contracts similar to the one being bid has the Contractor successfully completed over the last five years?
- Has the Contractor ever refused to complete a contract with a municipality, threatened legal action against a municipality, had legal action taken against them by a municipality, or failed for any reason to complete 75% of the value of the original contract? If the answer to any of these questions is yes, please provide a list of all contracts unsuccessfully completed or legal actions taken.
- Is the Contractor currently involved in any litigation with a municipality? If so, please provide details about each occurrence.
- Has the Contractor ever had to rely on his bonding company to complete a job that he was unable or unwilling to complete? If so, please provide details about each occurrence.
- List the last three (3) municipal contracts completed, the names of the projects, the budget for the project, the Engineering firm of record, and a contact person's name with the municipality that is familiar with the project.

NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement Instructions

(This package combines the various aspects of State of NC HUB program requirements and Federal DBE requirements into a single compliance supplement in order to eliminate redundancy and ambiguity)

Item	What to do with it
Good Faith Efforts Form	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table A (Summary of firms on job)	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table B (per item being subbed)	Provided by low bidder if SRF project or SRP/SEL* that obtains less than 10% M/WBE utilization (see page 2)
Provide documentation of anything you did that is mentioned later in this supplement	- Proof of trade paper advertisement - Printouts of DBE sources used - Solicitation emails and/or letters
Additional Forms for SRF Projects (these forms are currently not applicable)	
6100-3 (per M/WBE firm)	Provided by low bidder if SRF project
6100-2	Distributed to M/WBE firms if SRF project
Subs submit concerns on 6100-2 forms to:	Michael Pigram Region 4, Atlanta Federal Center 61 Forsyth Street Atlanta, GA 30303-8960

NOTES on this Compliance Supplement

Verifiable Goals

- | | |
|---|-----------|
| EPA MBE/WBE participation goals: | MBE 10.9% |
| | WBE 10.4% |

These are goals that the State reports against and are not quotas. *The good faith efforts must be adhered to and all forms provided regardless of what percentage utilization is achieved.*

- | | |
|--|----------------|
| State of NC MBE/WBE participation goal: | 10% (combined) |
|--|----------------|

Table B is not required for SRP and SEL projects if you achieve 10% utilization.

DBE (MBE or WBE) Certification

In order for a firm to count towards the goals, a firm must be properly certified. Table A and Table B both provide spaces to note who certified the firm. The North Carolina Department of Administration and North Carolina Department of Transportation are the most common certifications we see listed. Division of Water Infrastructure staff verify all certifications listed.

For SRF projects, please note the EPA’s six Good Faith Efforts found in 40 CFR 33

Filling out the Good Faith Efforts Form and providing Table B (if subcontracting is achieved) constitutes compliance with EPA’s six good faith efforts.

- (1) Ensure MBE/WBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and local Government recipients, this will include placing MBE/WBEs on solicitation lists and soliciting them whenever they are potential sources.
- (2) Make information of forthcoming opportunities available to MBE/WBEs and arrange time for contracts and establish delivery schedules, where requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- (3) Consider in the contracting process whether firms competing for large contracts could subcontract with MBE/WBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities in order to increase opportunities for participation by MBE/WBEs in the competitive process.
- (4) Encourage contracting with a consortium of MBE/WBEs when a contract is too large for one of these firms to handle individually.
- (5) Use the services and assistance of the SBA and the MBDA.
- (6) If the prime contractor awards subcontracts, require the prime contractor to take the steps in subparagraphs (1)-(5) of this section.

Pertinent State of North Carolina Administrative Code Regarding M/WBE Compliance. The provisions in this Compliance Supplement constitute compliance with the Rules below.

Owner Requirements	01 NCAC 30I .0306
Contractor Requirements	01 NCAC 30I .0308

Resources

Some sources for identifying MBE/WBE (DBE) firms

- <https://www.ips.state.nc.us/vendor/SearchVendor.aspx> (NCDOA)
- <https://www.ebs.nc.gov/VendorDirectory/default.html> (NCDOT)
- http://dsbs.sba.gov/dsbs/search/dsp_dsbs.cfm (US SBA)

Some sources for finding minority trade papers for potential solicitation advertisements and Federal advertising options

- <http://web.sba.gov/subnet/> (US SBA Subnet advertising website)
- <https://www.mbda.gov/> (US Dept. of Commerce)
- <https://ncadmin.nc.gov/businesses/hub> (NC HUB Office)

Good Faith Efforts Form

Attempts to provide subcontracting opportunities for MBE/WBE firms.

Per 01 NCAC 30I .0101, 50 points must be claimed below by the bidder.

(This is identical to State of NC Affidavit A)

- 1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- 2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- 3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- 4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- 5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- 6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- 7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- 8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- 9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- 10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

Results of Good Faith Efforts Undertaken (you must check one box below)

- No subcontractors are being used for this contracted work. Fill out Table A listing only the Prime Contractor. (This statement takes the place of State of NC Affidavit B)
- Subcontractors are being used. Fill out Table A and B for each trade. **Each Table B lists 3.**
- Subcontractors are being used. If any Table B has fewer than 3 solicitations you must also advertise in an M/WBE trade paper and indicate what source of M/WBE firms you used (*must list at least one*). Some possible papers and sources of M/WBE firms are listed in the Instructions of this Supplement.

Name of the Trade Paper: _____

Submit proof of advertisement with package

M/WBE Sources: Source: _____ Source: _____

Submit printouts from M/WBE source(s)

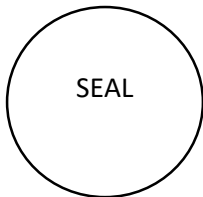
Certification Statement and Affidavit of Contractor.

The below affidavit constitutes compliance with 01NCAC 30I .0308(7)(a) and (b) and takes the place of State of North Carolina Affidavits C and D.

I have read the information in this compliance supplement and all information provided to the State in this package is accurate and true to the extent of my knowledge including the calculated percentages and the good faith efforts presented herein.

Prime Contractor Company Name (Print)

Prime Contractor Representative (Sign & Date)



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My Commission Expires _____

Certification of Project Owner/Funding Applicant

Funding Applicant (City, Town etc)

Applicant Authorized Representative (Sign & Date)

Division of Water Infrastructure Project Number

Table A: Prime Contractor and list of selected subcontractors

List Prime and ALL of the selected subcontractors (both DBE's and non-DBE's) being used on the project. Each Trade listed on this sheet should have a completed Table B: Subcontract Solicitation List showing the DBE firms contacted and given opportunities to bid.

Company Name (list prime first then subs)	Company Address and Phone	Trade (Above) and Price (Below)	MBE or WBE and certifying agency <u>if applicable</u>	(State use only) Listed in EPLS as Debarred?
		\$		
		\$		
		\$		
		\$		

Calculate M/WBE utilization as a percent (00.00%) of the prime contract. Limited to 100% even if the Prime is a DBE.

MBE and WBE subs total	\$	_____ %
Prime Contract Price	\$	

Note: Table A substitutes for both the State of NC "Identification of Minority Participation" form and EPA Form 6100-4.

Table B: Subcontract Solicitation List

Table B is required if:

- 1) Project is Federally funded (SRF) OR;
- 2) Project is a State Reserve Project or State Emergency Loan (SRP or SEL) and Utilization % on Table A is less than 10%
- 3)

Trade: _____ (enter the trade being solicited, paving, hauling etc.)

List the firm being used on the project first. If three MBE or WBE firms are not listed, additional information must be provided showing advertisements and/or sources used to identify MBE/WBE subs.

Use as many of these sheets as are necessary to cover every trade being subbed out.

Company Name	Company Address and Phone	MBE or WBE and certifying agency if applicable.	How was this firm contacted (email, letter, phone) and what was the result of the solicitation?*

*Must submit copies of emails or letters. If phone calls were made this sheet can serve as documentation of calls.

MBE/WBE (DBE) – Change or Add a Subcontractor Form

According to EPA guidance on 40 CFR 33.302

If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor.

Please provide the information below **if the subcontracted work in question was included in previously submitted good faith efforts documentation:**

Prime Contractor:

Subcontracted work:

Previous Subcontractor:

Reason this firm did not complete the work:

New subcontractor and DBE status:

MBE

WBE

N/A

If this is a new trade being subcontracted, or was not documented in the original Project Bid Information submittal to the State then good faith efforts to solicit a DBE firm must be documented. As the original DBE instructions indicate, please provide a Table B from those original instructions, showing all the DBE firms contacted to perform this work. If three (3) firms are not listed on Table B, then additionally you must submit proof of an advertisement in a minority trade paper and evidence that there were not three reasonably available firms in the work area. The EPA provides in 33.301(a) that good faith efforts are to be carried out "...to the fullest extent practicable...". If solicitations were not carried out due to being impracticable, please attach this explanation to this form.

Please follow the steps below for new subcontracted work:

Indicate the new trade being subcontracted:

Indicate the firm being used and DBE status:

MBE

WBE

N/A

Attach Table B

(For State Use) Is this sub debarred?

Yes

No

Project Owner/Applicant:

Project Number:

Signature of Prime Contractor's Representative

BID BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT _____
 _____ as Principal, hereinafter called Principal, and
 _____ of
 _____ a corporation duly organized under the laws of
 the State of _____ as Surety, hereinafter called the Surety, are
 held and firmly bound unto _____ as Obligee, hereinafter
 called Obligee, in the penal sum of _____
 _____ Dollars (\$ _____), good and
 lawful money of the United States of America, for the payment of which, well and truly
 to be made, we bind ourselves, our heirs, administrators, executors, successors and
 assigns, jointly and severally, firmly by these presents.

SIGNED, sealed and dated this ____ day of _____, 20 ____.

WHEREAS, the above bounden Principal has entered into a certain written
 Proposal with the above named Obligee, dated the _____ day of _____,
 2012.

which Proposal is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein for the purpose of explaining but not of varying or enlarging the obligation.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, That if the above bounden Principal shall well and truly keep, do and perform, each and every, all and singular, the matters and things in said Proposal set forth and specified to be by the said Principal kept, done and performed at the time and in the manner in said contract specified, and shall pay over, make good and reimburse to the above named Obligee, all loss and damage which said Obligee may sustain by reason of failure or default on the part of said Principal, then this obligation shall be void; otherwise, to be and remain in full force and effect.

PROVIDED, however, this bond is executed by the Surety, upon the express condition that no right of action shall accrue upon or by reason hereof, to or for the use or benefit of anyone other than the Obligee named herein; and the obligation of the Surety is and shall be construed strictly as one of the suretyship only.

_____	By: _____ (Seal)
(Witness)	(Principal)

	(Title)
_____	_____ (Seal)
(Witness)	(Surety)

	(Title)

POWER OF ATTORNEY

**AWARD OF CONTRACT
COPY OF MINUTES
OF THE
TOWN OF CAROLINA BEACH, NORTH CAROLINA**

At a _____ meeting of the Board of Commissioners for the TOWN OF CAROLINA BEACH, NC duly held on the _____ day of _____, 20____ pursuant to due and lawful notice to all Commissioners, _____, Chairman, presiding and _____

Commissioners present.

OBJECT OF THE MEETING: The acceptance of proposals and the award of the contracts on all those parts of the work bid in the Form of Proposal, incorporated herein for the

**OCEAN BOULEVARD SIDEWALK PROJECT
FOR THE TOWN OF CAROLINA BEACH, NC**

The bids on the aforementioned work were received unsealed and read in open meeting and all of same were tabulated, computed and canvassed; thereupon, after consideration of the several bids by the Commissioners in consultation with the Engineer, it was determined that the acceptance of the Proposal and bid of _____ would be to the best interest of the Board, and consequent upon which the following resolution was proposed by _____ and duly seconded by _____.

WHEREAS, all of the bids duly and regularly made on the parts of the several Works, specifically referred to in the Form of Proposal, above referred to, were duly opened, read, tabulated, and canvassed, and

WHEREAS, after due consideration, it was determined that the acceptance of the Proposal and Bid of _____ would best serve the interest of the TOWN OF CAROLINA BEACH, North Carolina.

NOW, THEREFORE, be it resolved that the TOWN OF CAROLINA BEACH Board of Commissioners do and hereby does award the Contract for all of said parts of said works to the said

at and for the rates and prices set out in said Proposal, said award being subject to all conditions and stipulations set out in the Instructions to Bidders, Specifications, Proposal and Contract above mentioned, and the Mayor and Clerk are hereby authorized and direct to execute said Contract on behalf of the TOWN OF CAROLINA BEACH, North Carolina.

The foregoing resolution was adopted by the Board, _____

Commissioners voting Aye, _____; and Commissioners voting No. _____.

Clerk

WITNESS: A TRUE COPY:

NOTICE OF AWARD

TO: _____

Project Description: _____

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____, 20____, and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$ _____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER's acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20_____.

**LOCAL GOVERNMENT CONCURRENCE
APPROVED BY:**

ISSUED BY:

Local Government Representative

Owner

By _____

By _____

Title _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above **NOTICE OF AWARD** is hereby acknowledged by:

Contractor's Full Business Name

this the _____, 20_____

By: _____

Title: _____

CONTRACT

THIS CONTRACT, made this _____ day of _____, 20____, by _____ hereinafter called Contractor, and the Town of Carolina Beach, North Carolina, hereinafter called the Owner.

WITNESSETH:

THAT WHEREAS, A CONTRACT FOR:

has recently been awarded to Contractor by the Owner, at and for a sum equal to the aggregate cost of the work to be done and materials, equipment, apparatus and supplies furnished at the prices and rates respectively named therefor, in the Proposal attached hereto;

AND WHEREAS, it was provided in said award that a formal contract would be executed by and between Contractor and the Owner, evidencing the terms of said award, and that Contractor would commence the work to be performed under this agreement on a date to be specified in a written order by the Owner, and would fully complete all work thereunder by _____, 20 ____, or within _____ calendar days from said date;

NOW, THEREFORE, Contractor doeth hereby covenant and agree with the Owner that he will well and faithfully perform and execute such work and furnish such labor, materials, equipment, apparatus, and supplies, in accordance with each and every one of the conditions, covenants, stipulations, terms and provisions contained in said Specifications and in accordance with the Plans, at and for a sum equal to the aggregate cost of the work done and labor, materials, equipment, apparatus and supplies furnished at the prices and rates respectively named therefor in the Proposal attached hereto, and will well and faithfully comply with and perform each and every obligation imposed upon him by said Plans and Specifications and terms of said Award.

Contractor shall promptly make payments to all persons supplying materials in the prosecution of the work, and to all laborers and others employed thereon.

Contractor shall be responsible for all damages to the property of the Town of Carolina Beach, North Carolina, that may be consequent upon the normal procedure of his work or that may be caused by or result from the negligence of Contractor, his employees or agents, during the progress of or connected with the prosecution of the work, whether within the limits of the work or elsewhere. Contractor must restore all property so injured to a condition as good as it was when Contractor entered upon the work.

Contractor shall furthermore be responsible for and required to make good at his expense any and all damages of whatever nature to persons or property, arising during the period of the Contract, caused by carelessness, neglect, or want of due precautions on the part of Contractor, its agents, employees, or workmen. Contractor shall also indemnify and save harmless the Town of Carolina Beach, North Carolina, or the officers and agents thereof, for or on account of any injuries or damages to persons or property received or sustained by any person or persons, firm or workmanship in his construction, or by or on account of any accident, or of any other act or omission of Contractor, his agents, employees, servants or workmen.

It is agreed and understood that the General Specifications, the accepted Proposal and the enumerated Addenda and Drawings are parts and parcels of this Contract, to the same extent as if incorporated herein in full.

It is further mutually agreed that, if at any time after the execution of this agreement and the surety bond hereto attached, for its faithful performance, the Owner shall deem the surety or sureties upon such bond to be unsatisfactory, or if, for any reason, such bond ceases to be adequate to cover the performance of the work, Contractor shall, at his expense, within five (5) days after the receipt of notice from the Owner to do so, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the Owner. In such event, no further payment to Contractor shall be deemed to be due under this agreement until new or additional security for a faithful performance of the work shall be furnished in manner and form satisfactory to the Owner.

And the Owner doeth hereby covenant and agree with Contractor that he will pay to Contractor, when due and payable under the terms of said Specifications and said Award, the above mentioned sum, and that Contractor will well and faithfully comply with and perform each and every obligation imposed upon him by said Specifications and the terms of said Award.

Whenever used herein, the singular shall include the plural, the plural the singular, and the use of any gender shall be applicable to all genders as the context may require.

Upon and after completion of the contract between OWNER and CONTRACTOR, OWNER shall indemnify and hold harmless ENGINEER from all claims, damages, losses and expenses, including their reasonable attorneys' fees and other litigation costs and expenses, arising out of or resulting from the OWNER'S negligent

use, operation or maintenance of the facilities, equipment or materials provided by the ENGINEER under this Agreement. The OWNER and the CONTRACTOR agree that the ENGINEER is intended to be, and shall be, a third-party beneficiary of the indemnity provisions noted by this document.

It is understood and agreed that ENGINEER has no constructive use of OWNER's site; has no control or authority over the means, methods, and sequences of construction; and therefore has no ongoing responsibility whatsoever for construction site safety, a responsibility that has been wholly vested in the general contractor. Notwithstanding the above, ENGINEER has a duty to preserve and protect public health, safety, and welfare. Accordingly, it is ENGINEER'S professional responsibility to take what ENGINEER believes are prudent measures should ENGINEER encounter situations that ENGINEER believes create a danger to public health, safety, or welfare. OWNER understands this situation and agrees to defend ENGINEER and hold ENGINEER harmless from claims arising from ENGINEER'S exercise of professional responsibility in this regard.

IN TESTIMONY WHEREOF, Contractor and the Owner have duly signed and sealed this Contract in the year and day first mentioned above, this Contract being one required by law, to be approved by the Board of Commissioners for the, Town of Carolina Beach, North Carolina, said Board considered the same at a (regular) meeting, at which a quorum was present, the ____ day of _____, 20____, and duly approved the same and authorized this endorsement on the Contract.

This ____ day of _____, 2023.

The Town of Carolina Beach, North Carolina

By: _____
Mayor

ATTEST: _____

FURTHER AGREEMENTS

Contractor shall, upon completion of all work under this contract, furnish to Owner invoices or copies of invoices for all materials purchased for said work, and such invoices shall state the amount of North Carolina Sales Tax paid for said material, and Contractor shall also furnish the Town an affidavit certifying the total costs of materials purchased for all work performed under this Contract and total amount of North Carolina Sales Tax paid for said materials.

(Imprint corporate seal below this line.)

Contractor

By: _____

Title: _____

ATTEST: _____

The Town of Carolina Beach, North Carolina

By: _____

Title: _____

ATTEST: _____

INSTRUCTIONS ON PROPER SIGNING

NOTE: If Contractor is an individual sign on first line **only**, and designate trade name below first line, thus:

_____ John Jones _____ (Seal)
Trading as Jones Paving Company

If Contractor is a partnership, sign partnership name of first line; have at least one general (not limited) partner sign on second line, and put his designation as partner on third line, thus:

_____ JONES PAVING COMPANY _____ (Seal)

By: _____ John Jones _____ (Seal)

Title: _____ General Partner _____

If Contractor is a corporation, sign corporate name on first line (exactly as such name appears on the corporate seal), have the President or a Vice-President sign on second line, put his title on third line, have the Secretary or Assistant Secretary sign on the left "Attest" line (adding the word "Assistant" before the word "Secretary", if the Assistant Secretary is signing), and imprint corporate seal above the word "Attest", thus:

_____ JONES PAVING COMPANY, INC. _____ (Seal)

SEAL By: _____ John Jones _____ (Seal)

ATTEST: Title: _____ President _____

_____ Thomas Jones _____
(Assistant) Secretary

The Corporate surety shall sign thus:

_____ RELIABLE SURETY COMPANY, INC. _____ (Seal)

(Imprint corporate
surety's corporate
seal below)

By: _____ William Baker _____ (Seal)

Title: _____ Its Attorney-In-Fact _____

Witness:

and shall have same person sign on the "Witness" line as having witnessed said attorney-in-fact signing, and shall attach to this bond a certified copy of the authority under which such attorney-in-fact has acted.

PREAUDIT CERTIFICATE

I, the undersigned _____, duly authorized and acting Finance Officer of the Town of Carolina Beach, NC do hereby certify as follows:

Provision for the payment of the moneys to fall due under this agreement has been made by appropriations duly made or by bonds or notes duly authorized, as required by the "Local Government Finance Act".

Date: _____

Signature

Attest: _____

CERTIFICATE OF ATTORNEY FOR THE TOWN COUNCIL
OF THE
TOWN OF CAROLINA BEACH, NORTH CAROLINA

This is to certify that I have examined the attached contract documents, that after such examination I am of the opinion that such documents conform to the laws of the State of North Carolina, that the execution of the Contract and the contract bond is in due and proper form, that the representatives of the respective contracting parties have full power and authority to execute such construction contract and contract bond on behalf of the respective contracting parties and that the foregoing agreements constitute valid and binding obligations on such parties.

Attorney for Town of Carolina Beach, NC

This the ____ day of _____, 2023.

CERTIFICATE OF FINANCE OFFICER
OF THE
TOWN OF CAROLINA BEACH, NORTH CAROLINA

Provision for the payment of the monies to fall due under this agreement has been made by appropriation duly made or by bonds or notes duly authorized.

Finance Officer

CONTRACT PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, THAT WE _____
 _____ of _____
 _____ as Principal, and _____
 of _____ as Surety, are held and firmly bound unto the
 Town of Carolina Beach, North Carolina, in the full and just sum of
 _____ Dollars (\$ _____),
 lawful money of the United States to be paid to said Town of Carolina Beach, North
 Carolina, or its certain attorney, to which payment well and truly to be made and done we
 bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and
 severally, firmly by these presents.

WHEREAS, Principal has entered into a contract with said Town of Carolina
 Beach, North Carolina, dated the _____ day of _____, 20____ for:

upon certain terms and conditions in said Contract more particularly mentioned, a copy of
 which said Contract is incorporated herein by reference and is made a part hereof as if
 fully copied herein and,

WHEREAS, it was one of the conditions of the award by said Town of Carolina
 Beach, North Carolina, pursuant to which said Contract was entered into, that these
 presents should be executed.

NOW THEREFORE, the condition of this obligation is such that if Principal shall faithfully perform the terms and conditions of the Contract in all respects on its part, and shall fully pay all obligations incurred in connection with the performance of such Contract on account of labor and materials used in connection therewith, and all such other obligations of every form, nature and character, and shall save harmless the Town of Carolina Beach, North Carolina from all and any liability of every nature, kind and character which may be incurred in connection with the performance or fulfillment of such contract or other such liability resulting from negligence or otherwise on the part of such Principal, and further shall save harmless the Town of Carolina Beach, North Carolina, from all costs and damage which may be suffered by reason of failure to fully and completely perform said Contract and shall fully reimburse and repay the Town of Carolina Beach, North Carolina expenditures of every kind, character and description which may be incurred by the Town of Carolina Beach, North Carolina, in making good any and every default which may exist on the part of Principal in connection with the performance of said Contract; and further that Principal shall pay all lawful claims of all persons, firms, partnerships or corporations for all labor performed and materials furnished in connection with the performance of the Contract, and that the failure to do so with such persons, firms, partnerships or corporations shall give them a direct right of action against Principal and Surety under this obligation; then this obligation shall become null and void, otherwise to remain in full force and effect.

And provided, however, that no suit, action or proceeding by reason of any default whatever shall be brought on this bond after twelve months from the date on which the final payment on the Contract falls due.

And said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the Specifications.

Whenever used herein, the singular shall include the plural, the plural the singular, and the use of any gender shall be applicable to all genders as the context may require.

IN TESTIMONY WHEREOF, Principal and Surety have duly signed and sealed this Contract Bond this _____ day of _____, 20 _____.

(Imprint corporate seal below this line)

(SEAL)

By: _____

Title: _____

ATTEST:

PRINCIPAL

.....

_____ (SEAL)

(SEAL)

By: _____

Title: _____

WITNESS:

SURETY

INSTRUCTIONS ON PROPER SIGNING

NOTE: If Contractor is an individual sign on first line **only**, and designate trade name below first line, thus:

_____ John Jones _____ (Seal)
Trading as Jones Paving Company

If Contractor is a partnership, sign partnership name of first line; have at least one **general** (not limited) partner sign on second line, and put his designation as partner on third line, thus:

___ JONES PAVING COMPANY ___ (Seal)

By: _____ John Jones _____ (Seal)

Title: _____ General Partner _____

If Contractor is a corporation, sign corporate name on first line (exactly as such name appears on the corporate seal), have the President or a Vice-President sign on second line, put his title on third line, have the Secretary or Assistant Secretary sign on the left "Attest" line (adding the word "Assistant" before the word "Secretary", if the Assistant Secretary is signing), and imprint corporate seal above the word "Attest", thus:

___ JONES PAVING COMPANY, INC. ___ (Seal)

SEAL

By: _____ John Jones _____ (Seal)

Title: _____ President _____

ATTEST:

_____ Thomas Jones _____
(Assistant) Secretary

The Corporate surety shall sign thus:

___ Reliable Surety Company, Inc. ___ (Seal)

(Imprint corporate surety's corporate seal below)

By: _____ William Baker _____ (Seal)

Title: ___ Its Attorney-In-Fact _____

Witness:

and shall have same person sign on the "Witness" line as having witnessed said attorney-in-fact signing, and shall attach to this bond a certified copy of the authority under which such attorney-in-fact has acted.

POWER OF ATTORNEY

LABOR AND MATERIAL PAYMENT BOND

KNOW all men by these presents:

THAT _____ as principal hereinafter called Principal, and _____ of _____, a corporation organized, and existing under the laws of the State of _____ as Surety, hereinafter called Surety, are held and firmly bound unto _____ as Obligee, hereinafter called Owner, for the use and benefit of claimants as herein below defined, in the amount of _____ Dollars (\$ _____), for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____, 20 _____, entered into a contract with Owner for _____

in accordance with drawings and specifications prepared by Engineering Services, PA, PO Box 1849, Garner, NC 27529, which contract is by reference made a part hereof, and hereafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Principal shall promptly make payment to all claimants as hereinafter defined, for all labor used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct contract with the Principal or with a Subcontractor of the Principal for labor used or reasonably required for use in the performance of the contract.

2. The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined who has not been paid in full

before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, and were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.
3. No suit or action shall be commenced hereunder by any claimant:
 - (a) Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: the Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party for whom the work or labor was done or performed. Such notice shall be served by mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.
 - (b) After the expiration of one (1) year following the date on which Principal ceased work on said Contract, it being understood; however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
 - (c) Other than in a state court of competent jurisdiction in and for the County or other political subdivision of the state in which the Project, or any part thereof, is situated, or in the United States District Court for the district in which the Project, or any part thereof, is situated, and not elsewhere.
4. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

IN TESTIMONY WHEREOF, Principal and Surety have duly signed and sealed this Contract Bond this _____ day of _____, 20 _____.
(Imprint corporate seal below this line)

_____(Seal)

By: _____(Seal)

Title: _____

ATTEST: _____

PRINCIPAL

.....

_____(Seal)

By: _____(Seal)

Title: _____

WITNESS:

SURETY

INSTRUCTIONS ON PROPER SIGNING

NOTE: If Contractor is an individual sign on first line **only**, and designate trade name below first line, thus:

_____ John Jones _____ (Seal)
Trading as Jones Paving Company

If Contractor is a partnership, sign partnership name of first line; have at least one general (not limited) partner sign on second line, and put his designation as partner on third line, thus:

_____ JONES PAVING COMPANY _____ (Seal)

By: _____ John Jones _____ (Seal)

Title: _____ General Partner _____

If Contractor is a corporation, sign corporate name on first line (exactly as such name appears on the corporate seal), have the President or a Vice-President sign on second line, put his title on third line, have the Secretary or Assistant Secretary sign on the left "Attest" line (adding the word "Assistant" before the word "Secretary", if the Assistant Secretary is signing), and imprint corporate seal above the word "Attest", thus:

_____ JONES PAVING COMPANY, INC. _____ (Seal)

SEAL

By: _____ John Jones _____ (Seal)

Title: _____ President _____

ATTEST:

_____ Thomas Jones _____
(Assistant) Secretary

The Corporate surety shall sign thus:

_____ RELIABLE SURETY COMPANY, INC. _____ (Seal)

(Imprint corporate surety's corporate seal below)

By: _____ William Baker _____ (Seal)

Title: _____ Its Attorney-In-Fact _____

Witness:

and shall have same person sign on the "Witness" line as having witnessed said attorney-in-fact signing, and shall attach to this bond a certified copy of the authority under which such attorney-in-fact has acted.

POWER OF ATTORNEY

NOTICE TO PROCEED

TO: _____

Date: _____
Project: Town of Carolina Beach
Ocean Boulevard Sidewalk Projects

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 2023, on or before _____, 2023, and you are to complete the WORK within _____ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 2023.

**LOCAL GOVERNMENT CONCURRENCE
APPROVED BY:**

ISSUED BY:

Local Government Representative

Town of Carolina Beach, NC
Owner

By _____

By _____

Title _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above **NOTICE TO PROCEED**

is hereby acknowledged by:

Contractor

this the _____, 20 _____

By: _____

Title: _____

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

CHANGE IN CONTRACT TIMES:

Original Contract Price:

\$ _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change Order:

\$ _____

Original Contract Times: Working days Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____
Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

ACCEPTED:

By: _____
Owner (Authorized Signature)

Date: _____

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS
1.0 CLEARING AND GRUBBING

1.01 GENERAL

1.01.1 SCOPE OF WORK

(a) All labor, materials, equipment, tools, and services required for the work under this section shall be furnished and performed in compliance with the following General Specification, the Project Specifications which precede all General Specifications and the Contract Drawings.

(b) This General Specifications designated as Section 1.0 CLEARING AND GRUBBING covers the description of work generally utilized and the specifications for performing such work. The Project Specifications and the Contract Drawings designate the specific work to be performed under the Contract. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

(c) The Contractor shall accept conditions at the site of the work as found and shall assume the risk of any variation of the condition of site or buildings thereon which may occur subsequent to signing of the Contract. The Contractor must assume the risk of meeting, and the Contract price shall include, the cost of removal of quicksand, hardpan, boulders, clay, rubbish, unforeseen obstacles, underground conduits, gas pipe, drain tile, trees, roots, timber or masonry structures, railroad tracks, pavements and sidewalks and the delay or damage occasioned by the same, whether or not these obstacles are shown on the Contract Drawings. No claim for an amount of money beyond the Contract price of the work will be entertained or allowed on account of existing conditions.

(d) The work of clearing shall consist of the cutting of all vegetation and removal of debris. All timber within the clearing and grubbing limits shall become the property of the Contractor to cut and dispose of unless noted otherwise in the Project Specifications. The work of grubbing shall consist of the removal and satisfactory disposal of all vegetation and all surface debris.

(e) The work of clearing and grubbing shall also include the removal and satisfactory disposal of crops, weeds, and other annual growth; the removal and satisfactory disposal of fences, steps, walls, building foundations, and other rubble and debris and the filling of holes and depressions. This work shall also be performed in all non-wooded areas between the construction limits and the limits of the project right of way or

easements shown on the project plans upon which seeding and mulching, sprigging, or sodding is to be performed.

(f) Clearing and grubbing operations shall be completed sufficiently in advance of grading operations as may be necessary to prevent any of the debris from the clearing and grubbing operations from interfering with the excavation or embankment operations.

1.01.2 CLEARING

(a) Existing pavements, foundations, structures and similar work encountered which will interfere with the new construction operations shall be demolished and removed. All existing construction and obstructions in areas to be occupied by new buildings or structures shall be removed as indicated on the Contract Drawings. All pipe and sewer services shall be sealed during demolition. All such existing construction and obstructions shall be disposed of off the project site unless otherwise noted.

(b) The Engineer will designate all areas of growth or individual trees which are to be preserved due to their desirability for landscape or erosion control purposes. When the trees to be preserved are located within the construction limits, they will be so shown on the plans or designated by the Engineer.

(c) In embankment areas where the depth of the embankment exceeds 6 feet in height, unless otherwise directed by the Engineer, sound trees shall be cut at a height of not more than 6 inches above natural ground. When trees are to be cut outside of construction limits and the Engineer has designated that the area is not to be grubbed, the trees shall be cut off reasonably close to the natural ground surface. In swamp areas, trees may be cut off to approximately 6 inches above low water level.

(d) Branches of trees which overhang the roadbed or obstruct sight distances and which are less than 16 feet above the elevation of the finished grade shall be trimmed or cut in a manner that will not endanger the health of the tree. Cut surfaces more than 1 inch in diameter shall be covered thoroughly with an asphaltum base tree paint.

1.01.3 GRUBBING

(a) The work of grubbing shall be performed on all areas cleared, with the following exceptions:

- (1) In embankment areas, when the depth of embankment exceeds 6 feet in height, sound stumps shall be cut off no more than 6 inches above the existing ground level and not grubbed. Unsound or decayed stumps shall be removed to a depth of approximately 2 feet below the natural ground surface.
 - (2) When authorized by the Engineer, stumps outside of construction limits may be allowed to remain in place. Such stumps shall be cut off reasonably close to the natural ground surface.
 - (3) Stumps in swamp areas shall be cut off to approximately 6 inches above low water level and not grubbed.
 - (4) Grubbing will not be required in areas where waste or unsuitable material is to be deposited unless such areas are to become a part of future construction.
- (b) All areas where piles are to be driven shall be grubbed regardless of fill height. In graded and/or planted areas, all obstructions shall be removed to a point 12 inches below proposed ground level.
- (c) Within the areas between construction limits and the limits of clearing and grubbing, all holes and other depressions shall be filled, and the area brought to sufficiently uniform contour that subsequent mowing operations will not be hindered by irregularity of terrain. This work shall be done regardless of whether the irregularities were the result of the Contractor's operations or were originally existing.

1.01.4 BURNING

- (a) All brush, roots, stumps, tree limbs, timber and other vegetation, shall be disposed of by the Contractor either by burning the vegetation within the area cleared or by disposal in locations obtained by the Contractor and approved by the Engineer.
- (b) When the vegetation is disposed of by burning, all burning shall be done in such a manner as to prevent injury to property within or outside of the project limits. Burning shall be in compliance with all local, state, and federal laws, ordinances, and regulations. The securing of necessary burning permits shall be the responsibility of the Contractor. All burning shall be under the constant care of competent watchmen. Burning shall be thorough and shall not be permitted to smolder and result in dense smoke.

(c) When the timber and debris are to be disposed of in locations off of the right-of-way and out of sight of the project, the Contractor shall furnish the Engineer, before final acceptance of the project, a written release from the property owner, or his authorized agent, granting the servitude of his lands.

1.01.5 PROTECTION OF VEGETATION TO REMAIN

(a) The Contractor shall conduct his operations in a manner to prevent limb, bark, or root injuries to trees, shrubs, or other types of vegetation that are to remain growing and also to prevent damage to adjacent property. When any such injuries unavoidably occur, all rough edges of scarred areas shall first be made reasonably smooth in accordance with generally accepted horticultural practice, and the scars then thoroughly covered with an asphaltum base tree paint. Any such plants that are damaged by any construction operations to such an extent as to destroy their value for shade or their landscape purposes, shall be cut and disposed of by the Contractor, without extra compensation, when so directed by the Engineer.

1.01.6 PROTECTION OF PROPERTY

(a) Necessary arrangements shall be made by the Contractor with all persons, firms/corporations owning or using any poles, pipes, tracks or conduits, etc., affected by the work included under this Section to maintain and protect such facilities. The cost of any such protection shall be paid by the Contractor and included in the Contract price.

(b) Excavated materials shall be deposited in areas designated by the Engineer. The Contractor shall avoid depositing excavated materials on pavements, sidewalks or grass plots, except on authorization of the Engineer, and then only when adequate temporary provisions have been made for passage and protection of pedestrians and vehicles. Adequate bridging and planked crossings must be provided and maintained across all open trenches for pedestrians and vehicles.

(c) The Contractor shall protect all adjacent property which might be disturbed during the progress of the work. The Contractor will be held liable for any damage which may result to neighboring property from operations performed under this section.

(d) Where excavation or demolition is to be carried on adjacent to property or construction owned by others, the Contractor shall give due and legal notice to such owner and shall take all steps necessary to protect adjacent construction from damage arising out of his operations; and he

shall protect the Owner named in the Contract and his agents from any and all claims arising due to work covered in this section.

1.01.7 EROSION

(a) All work under this section shall be performed in a manner which will cause a minimum of soil erosion. The Contractor shall perform such erosion control work, temporary or permanent, as may be directed by the Engineer, indicated on the Contract Drawings, or required by local regulations in order to satisfactorily minimize erosion resulting from clearing and grubbing operations.

(b) Failure on the part of the Contractor to perform the required erosion control measures will be just cause for the Engineer to direct the suspension of clearing and grubbing operations. The suspension will be in effect until such time as the Contractor has satisfactorily performed the required erosion control work. In the event the Contractor fails to perform the directed work within a reasonable length of time, the Engineer may have the work performed by others. See General Conditions 4.13.11 NEGLECTED WORK BY CONTRACTOR.

1.02 MEASUREMENT FOR PAYMENT AND COMPENSATION

(a) All measurement of clearing and grubbing will be made horizontally.

(b) Work performed in cleaning up non-wooded areas shall be in accordance with Section 1.01. However, the removal of weeds, vines, plant stalks, loose rock, and small scattered trees; will be considered as a minor and incidental part of the work of clearing and grubbing and no measurement or payment will be made of such work.

(c) On lump sum contracts, and on lump sum items in a unit price contract, no separate measurement or payment will be made. On unit price contracts and on unit price items in a lump sum contract, measurement will be made based on the actual surface area cleared and grubbed at the unit price allowed in the proposal. On site borrow areas, approved by the Owner and the Engineer, shall be cleared and grubbed, and paid for in the above manner.

(d) When the Contractor is required to furnish borrow sources, material sources, or waste areas, or when the Engineer permits the Contractor to obtain borrow or deposit waste on any area within the right of way in lieu of borrow and waste areas which were to have been

furnished by the Contractor, no measurement of clearing and grubbing will be made for such areas.

GENERAL SPECIFICATIONS
2.0 STRUCTURES - EXCAVATION AND BACKFILL

2.01 GENERAL

2.01.1 SCOPE OF WORK

(a) All labor, materials, equipment, tools, and services required for the making of all excavations for structures, the placing of backfill for structures and general site grading required in the Contract shall be furnished and performed in compliance with the following General Specification, the Project Specifications which precede all General Specifications and the Contract Drawings.

(b) This General Specification designated as Section 2.0, Structures - Excavation and Backfill, covers the description of methods usually employed in excavation and backfill for structures and general grading operations. The Project Specifications and the Contract Drawings designate the specific work, the lines, grades and details and the excavation and backfill for structures to be constructed under this Contract. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

Excavation includes loosening and removing, transporting, storing and disposing of items whose removals are not specified under another contract section and which are necessary to be removed for the construction and completion of all work under the Contract. Excavation shall be made to the widths and depths shown on the plans or as specified herein.

When rock is encountered, excavation shall be performed in accordance with the section headed "ROCK EXCAVATION". The term "Excavation" shall be deemed to cover the price bid for any and all items including "excavation" for any or all of the following operations:

- (1) Removing, storing and rehandling of all paving materials of any name and nature.
- (2) Sheet piling, sheetpiling, shoring and bracing including driving, and removing.
- (3) Ditching, pumping, cofferdamming, or bailing or other methods of disposing of water.

- (4) Refilling of all ditches, pits, sump areas, and the compaction of all fill materials.
- (5) Maintenance and protection of traffic.
- (6) Protection of all sidewalks, trees, shrubs, structures, underground conduits or the replacement thereof.
- (7) Temporary paving, fencing, warning lights, traffic guards for direction and control of traffic during rush hours.

The term "Earth" as used herein shall include all materials except rock requiring blasting and larger than twelve (12) cubic feet but shall specifically exclude all ledge and bed rock.

The term "Spoil" includes material not used or not suitable for use as backfill or fill.

The term "Backfill" includes acceptable materials for backfilling of all excavations and ditches up to the original ground surface.

The term "Embankments" shall include fills constructed of selected materials above the original surface of the ground to the compaction specified herein.

2.01.2 SHOP DRAWINGS

- (a) Attention is directed to the provisions in the General Conditions of the Contract requiring the submission to the Engineer of descriptive details and of shop and setting drawings. On Structures - Excavation and Backfill operations, which include the installation of cofferdam work, such submission shall include drawings and details of the cofferdam proposed.

2.02 CONSTRUCTION METHODS

2.02.1 GENERAL

- (a) The Contractor shall accept conditions at the work site as found and shall assume the risk of any variation of the condition of site or buildings thereon which may occur subsequent to signing of the Contract. The Contractor must assume the risk of meeting, and the Contract price shall include, the cost of removal of quicksand, hardpan, boulders, clay, rubbish, unforeseen obstacles, underground conduits, gas pipe, drain tile, trees, roots, timber or masonry structures, railroad tracks, pavements and sidewalks and the delay or damage occasioned by the same, whether or not

these obstacles are shown on the Contract Drawings. No claim for an amount of money beyond the Contract price will be entertained or allowed on account of the character of the ground in which the excavation is made unless rock as defined hereinafter is encountered and removed.

(b) The location of utilities systems and structures as shown on the Contract drawings has been selected to provide the least possible interference with existing utilities and facilities. The Owner reserves the right to make minor variations in the location of proposed work during the construction. No extra payment will be allowed the Contractor for such shifts in alignment or location.

(c) Soils investigation data may be available upon request of the Engineer. When available it is presented only for the general information of the Contractor as stated in the General Conditions of the Contract. If, after excavation is made, conditions are disclosed which are unsuitable for the type of foundations shown on the Contract Drawings, the Contractor shall perform additional excavation, drive foundation piles, or take other measures as directed by the Engineer. Any such work ordered will be paid for under provisions of Section 4.10 and 4.11 in the General Conditions of the Contract or at Contract Unit Prices. However, the Contractor is reminded that the costs for all compaction tests, etc. shall be a part of his Contract bid.

2.02.2 PROTECTION OF PROPERTY

(a) Necessary arrangements shall be made by the Contractor with all persons, firms, corporations owning or using any poles, pipes, tracks or conduits, etc., affected by construction included under this Section to maintain and protect such facilities during construction. The cost of any such protection shall be paid by the Contractor and included in the Contract price.

(b) In the event that any existing gas pipes, water pipes, conduits, sewers, tile drains, poles or other utilities are blocked or interfered with by construction operations, the Contractor shall maintain them in continuous operation, and restore them to the same condition as they were prior to the start of the project, all at no additional compensation.

(c) Excavated materials shall be deposited in areas designated by the Engineer. The Contractor shall avoid depositing excavated materials on pavements, sidewalks or grass plots, except on authorization of the Engineer, and then only when adequate temporary provisions have been made for passage and protection of pedestrians and vehicles. Adequate

bridging and planked crossings must be provided and maintained across all open trenches for pedestrians and vehicles.

(d) The Contractor shall shore up or otherwise protect all fences, buildings, walls, walks, curbs or other property adjacent to any excavation which might be disturbed during the progress of the work. The Contractor will be held liable for any damage which may result to neighboring property from excavation, backfill or grading operations performed under this Section.

(e) Where excavation or demolition is to be carried on adjacent to property or construction owned by others, the Contractor shall give due and written legal notice to such owner and shall take all steps necessary to protect adjacent construction from damage arising out of his operations; and he shall protect the Owner named in this Contract and his agents from any and all claims arising from excavation or demolition operations.

2.02.3 PROTECTION AGAINST WATER

(a) The Contractor shall take all steps necessary, such as ditching, diking, pumping, well pointing and bailing, construct necessary drains and channels to keep the excavation clear of ground water, sewage or storm water, during the progress of the work and until the finished work is safe from injury. Water shall not be allowed to rise over and come in contact with masonry, concrete or mortar, until at least 24 hours have elapsed after placement of same, and no stream shall be allowed to flow over such work without the Engineer's permission.

(b) Adequate measures and protection shall be provided for vaults, reservoirs, tanks, basements, etc., from effects of possible uplift due to storm or ground water where bouyancy might lift structures or floor failures which may occur during construction.

2.02.4 EXCAVATION

(a) Excavation shall include the loosening, loading, removing, transporting and disposing of all materials, wet or dry, necessary to be removed to construct all work included in this Section, to the lines, grades and locations shown on the Contract Drawings. Excavated materials shall be piled in locations that will not interfere with construction operations.

(b) Excavation for structures shall conform to the depth and dimensions necessary for the proper installation of all structures detailed on the Contract Drawings. Unless specifically directed by the Engineer, excavation shall not be carried below the elevations indicated on the

Contract Drawings. Where any excavation is made below the elevations indicated on the Contract Drawings, the excavations, if under slabs, shall be restored to the proper elevation with compacted well-graded granular foundation material conforming to N.C. Department of Transportation standard gradation for size 67 stone, or if under footings, the depths of the walls or footings shall be increased at no additional expense to the Owner. In any event, the operations necessary to correct an excess of excavation shall meet with the approval of the Engineer. If deemed necessary, concrete shall be used to correct unauthorized excavations. No compensation will be allowed for any unauthorized excavation, slides, falls or cave-ins.

(c) The Contractor shall furnish and install all temporary sheeting, shoring, timbering, bracing and steel sheet piling required to maintain the excavation in a condition to permit the safe and efficient installation of all items of Contract work. Upon completion of the various Contract items, all temporary forms, shores and bracing shall be removed. While being withdrawn all vacancies left by the sheeting and bracing shall be carefully filled with sand and compacted or puddled as directed by the Engineer.

(d) Under certain conditions, sheeting and bracing may be ordered by the Engineer to be left in place. Any sheeting so ordered left in place will be paid for on the basis of the Contract unit price for such work. If no Contract unit price is established for this work, payment will be established in accordance with provisions for Extra Work in the General Conditions of the Contract.

(e) Sheet piling indicated on the Contract Drawings to be placed for the purpose of retaining the stability of soil adjacent to excavations shall be driven to lines and grades indicated thereon and left in place. When so noted, depth of penetration, type and weight of piling shall be as designated on the Contract Drawings. Cost of such permanent sheet piling shall be included in the Contract lump sum price.

(f) When soil materials encountered in any excavation are determined by the Engineer to be unsuitable for structural foundations, the Contractor shall furnish and place granular foundation material of well-graded crushed stone and gravel backfill conforming to N.C. Department of Transportation standard gradation for size 67 stone, in 6 inch layers, as directed by the Engineer. The cost of additional excavation and disposal of excavated materials shall be merged into the Contract unit price for granular foundation material. If no Contract unit price is established for this work, payment will be made in accordance with the provisions for Extra Work in the General Conditions of Contract.

(g) All areas to be excavated or regraded shall have topsoil stripped and deposited in stockpiles convenient to the areas which are subsequently to receive application of topsoil. Topsoil shall be used exclusively for finished grading as specified in Section 4.0, Site Work.

(h) Unsuitable and surplus excavated material and debris not incorporated in the project shall be disposed of by the Contractor at his own expense outside the limits of the Project site or as directed by the Engineer.

(i) If private land is used as a spoil site, the Contractor shall obtain written permission from the owner of the land, or his agent, and provide the project Owner with a certified copy of such agreement.

(j) When, for any reason, the work is left unfinished for extended periods, all trenches and excavations shall be filled and all roadways and sidewalks left unobstructed with their surfaces in a safe and satisfactory condition.

(k) When it is necessary to haul material over the streets or pavements, the Contractor shall provide suitable tight vehicles so as to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles, the Contractor shall clean up the same as often as directed and keep the cross-walks, streets, and general pavement clean.

(l) Surface of the ground in streets and elsewhere shall in all cases be left in as good a condition as it was prior to the commencement of the work. Curbs, gutters, and culverts disturbed on account of the work of the Contractor shall be repaired and restored. The work of restoring and repairing shall be as specified in the General Specification Section 17.0, Clean-up and Restoration, the Project Specifications and the Contract Drawings.

2.02.5 ROCK EXCAVATION

(a) Wherever the word "Rock" appears, it shall be interpreted to mean any material encountered of a uniform hardness of three (3) in the scale of mineral hardness and/or any material which cannot be removed from its original position with a 300 hp (minimum), 70,000 lb. working weight (minimum) dozer with a rock ripping attachment, in good condition, without continuous drilling and blasting. The Contractor will be responsible for proving, by demonstration and photographic evidence that slate, shale, sandstone or other hard material encountered cannot be removed with heavy equipment without continuous drilling and blasting. Other materials shall not be classed as rock, although it may be more

economical to remove same by blasting. Boulders will not be classified as rock unless larger than 1/2 cubic yard.

(b) Should rock be encountered in the excavation, it shall be removed by blasting or other approved methods. Where blasts are made, the excavation shall be carefully covered with suitable brush, timber or matting to prevent danger to life and property. The Contractor shall secure all permits required by Law for blasting operations and any additional hazard insurance required, the cost of such permits and insurance to be borne by the Contractor. The Contractor shall strip the rock of overburden, such stripping to be done in sections and approved by Engineer. No blasting shall be done by the Contractor until he has notified the Engineer and until the necessary cross-sections of the top of the rock have been taken. No loaded holes shall be left unattended or overnight without approval from the Engineer. Blasting will not be permitted within 25 feet of completed pipelines or structures nor will it be permitted within 25 feet of any existing structure, pipeline or conduit. Adequate warning and danger signals shall be given before firing dynamite explosives. Adequate records shall be kept by the Contractor of all explosives kept at the site of the work. All explosives shall be used and handled, stored and exploded in conformance with all state and local laws and regulations.

(c) Materials classified as "Rock" in these Specifications, if encountered, shall be excavated to the grade of the bottom of structures to be installed unless specifically shown on the Contract Drawings to be removed to a greater depth. After such rock is removed the excavation, when required, shall be backfilled with clean low-void sand or other non-compressible fine low-void material satisfactory to the Engineer, and consolidated to place the top surface at the grade established on the Contract Drawings for the bottom of the structure. The cost of furnishing, placing and consolidating of such fill material shall be entered as the unit price for granular foundation material, except in Proposals that do not have this item as a unit price. In these projects, this cost shall be merged in the unit price bid for rock excavation if the proposal has unit price excavation for rock. In Proposals that do not have rock as a unit price item, the cost for rock excavation, granular foundation material, and fill material shall be considered to be unclassified and shall be merged with the Lump Sum bid for the Project.

2.02.6 BACKFILLING, EMBANKMENT AND CUT AREAS

(a) All backfilling shall be made to lines and grades shown on the Contract Drawings. Backfill adjacent to and under structures, foundations and concrete slabs shall be placed in horizontal layers not in excess of 6 inches in thickness, loose measurement, with optimum moisture content

required for maximum compaction. Backfill under structures, foundations and concrete slabs shall be made using well-graded sands or sand and gravel mixtures subject to approval of the Engineer. Vibratory methods shall be used for compaction. Each horizontal layer shall be compacted to 100% of maximum dry weight density in pounds per cubic foot as determined by the Standard Proctor Compaction Test, unless otherwise specified by the Engineer or the Contract Documents. A minimum of two (2) tests and not less than one (1) test for each 15,000 square feet of area shall be taken for each three (3) feet. All tests shall be at the Contractor's expense.

(b) Embankments shall be constructed to established lines and grades at the locations shown on the Contract Drawings and as directed by the Engineer. Embankment material shall be natural soil free from excessive moisture or deleterious materials. Embankments shall be obtained from materials at the site or acceptable borrow pits. In either case, acceptable materials shall be well graded from fine to coarse with a very minimum of silt. The entire surface to be covered with embankment shall be stripped of all topsoil before any embankment material is placed.

(c) Embankments and fills for general site grading shall be made using cohesive or cohesionless materials, as approved by the Engineer. Before any Embankment or fill is placed, the entire area shall be cleared, as previously specified. If embankments and fills are constructed in winter, snow and ice shall be removed from the area. The site shall be thoroughly plowed before any fill is placed to insure a proper bonding of the materials. So far as is practicable, each layer shall extend the entire length of the embankment or fill. They shall be constructed in layers not exceeding 6 inches in thickness. Sheepsfoot rollers shall be used to compact all soils except sands or gravels and shall have a weight on each row of feet of not less than 200 nor more than 500 pounds per square inch of foot surface. Pneumatic- tired rollers or vibrators shall be used to compact sands and gravels and shall be so constructed that the weight per tire shall be not less than 1,000 pounds nor more than 2,000 pounds. Pneumatic-tired rollers shall have a width of not less than four (4) feet.

Where required to do so in order to properly compact the soil, the Contractor shall add sufficient water during rolling and tamping to assure consolidation of the fill materials. Unless specifically shown otherwise on the Contract Drawings or specified differently herein, all embankments shall be compacted in accordance with method "C" of ASTM D698 (Standard Proctor Compaction Test) to the following minimum percentages expressed as a percent of maximum density at optimum moisture content:

Under Roadways and parking areas (except the upper three feet) and water holding embankments	----	95 percent of maximum dry density and 90 pounds per cubic foot dry density
Under proposed structures and the upper three feet under roadways and parking areas	----	100 percent of maximum dry density and 95 pounds per cubic foot dry density
Areas not otherwise specified	----	90 percent of maximum dry density

Compaction curves shall be developed for each type of soil proposed for use in embankment. The development of the curves from the standard density or compaction test shall be done at or by an approved testing laboratory at the Contractor's expense. Not less than one (1) test for compacted density shall be taken on each three (3) feet for each 10,000 square feet of embankments and fills for general site grading.

(d) All materials required for backfill, embankment or fill in excess of that available on the site shall be obtained by the Contractor from other sources as approved by the Engineer. All costs thereof shall be merged in the Contract price for the project.

(e) Backfill shall not be placed against structure walls until the concrete has:

- (1) Attained a strength of 3,000 pounds per square inch.
- (2) Intermediate floors and/or framing levels have been poured.

(f) Backfill shall be brought up evenly on each side of buried structures such as tunnels, galleries, pump stations, wet wells, etc., to prevent imposing unbalanced forces against these structures.

(g) Where slabs are to be poured on soil, it shall be the Contractor's responsibility to take all precautions and necessary steps to facilitate the placing of concrete, i.e.; well pointing, trenching and dewatering, placement of a concrete mud slab, etc., as required. All such costs shall not be paid for as separate items, but shall be merged into the applicable lump sum or unit price items listed for the project.

(h) Cut areas where roadways, drives or structures are to be located shall be scarified to a depth of six (6") inches. These areas shall then be compacted and tested in the same manner and to the same extents as embankment areas or as specified by Section 2.02.6(c) of these General Specifications or as modified by the Project Specifications.

2.02.7 SITE GRADING

(a) Upon completion of construction operations, the entire site within limits designated in the Project Specifications or indicated on the Contract Drawings shall be brought to the finished rough grades indicated on the Contract Drawings. All surfaces shall be smoothed and left in condition to permit placing of topsoil. The Contractor's attention is directed to other sections of these General Specifications, the Project Specification and the Contract Drawings covering the placing of topsoil, grassing and erosion control.

2.03 MEASUREMENT FOR PAYMENT AND COMPENSATION

2.03.1 LUMP SUM CONTRACTS AND LUMP SUM ITEMS

(a) On lump sum contracts and lump sum items in a unit price contract, no separate measurement or payment will be made for excavation (except where allowed for rock as a unit price), or for dewatering, temporary sheeting, backfill or final grading.

2.03.2 UNIT PRICE CONTRACTS AND UNIT PRICE ITEMS

On unit price contracts and on unit price items for excavation in a lump sum contract, measurement for payment and compensation will be as follows:

(a) EXCAVATION - Measurement for payment will be made from the ground surface to the bottom of the slab, and within a vertical plane around the perimeter of the structure which is 3 feet distant from the extreme edge of the base slab. Compensation will be at the unit price per cubic yard named in the Contract for material removed, computed on the basis defined above, which shall cover removing material, backfill, grading and the removal of excess excavated material from the site. Otherwise the cost of such material shall be included in the appropriate lump sum item.

(b) **ROCK EXCAVATION** - Rock excavation will be measured from the average top surface of the rock to a plane coincidental with the bottom of the structural slab or as noted on the Contract Drawings and to a vertical plane around the perimeter of the structure, measuring three (3) feet outside the extreme limit of the base slab. Compensation will be made at the Contract unit price for rock removed, computed on the basis defined above, which shall cover removal of rock, dewatering if required, and the removal of excess excavated material from the site. Otherwise the cost of such material shall be included in the appropriate lump sum item.

(c) **SHEETING AND BRACING LEFT IN PLACE** - Temporary timber sheeting and bracing ordered left in place will be measured on the basis of the actual quantity of lumber left in place, computed on nominal lumber sizes. Compensation will be made on the basis of the Contract unit price per thousand feet board measure (MFBM), which shall include the furnishing and placing of material and all cutting, splicing, bracing and spiking or bolting. Otherwise the cost of such material shall be included in the appropriate lump sum item.

(d) **GRANULAR FOUNDATION MATERIAL** - Compensation for sand and gravel or crushed stone foundation material ordered placed will be based upon the Contract unit price for such material, multiplied by the actual tonnage or cubic yards placed. Such compensation shall include the cost of removal and disposal of excavated material, wet or dry, and the furnishing, placing and compacting of refill material. Granular foundation material specifically shown on the Contract Drawings or called for in the Project Specifications, such as sand and gravel layers under slabs, and at relief valve locations, will be paid for as granular foundation material where a unit price exists. Otherwise the cost of such material shall be included in the appropriate lump sum item.

(e) **BACKFILLING AND EMBANKMENT** - There will be no direct payment for this item. Payment at the contract unit prices for the various items listed above in this Section 2.03.2 shall be full compensation for all work covered by this item.

GENERAL SPECIFICATIONS

3.0 PAVEMENT, SIDEWALK, CURB & GUTTER AND RELATED WORK

3.01 GENERAL

3.01.1 SCOPE OF WORK

All labor, materials, tools and services required for the furnishing, installation and adjusting of all asphalt pavement, concrete sidewalk, concrete curb and gutter, concrete drives, concrete wheelchair ramps and concrete steps shall be furnished and installed in compliance with the following General Specifications, the Project Specifications and the Contract Drawings. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

3.01.2 STANDARDS

Where materials and methods are indicated as being in conformance with a standard specification, it shall refer in all cases to the latest edition of the North Carolina Department of Transportation Standard Specifications for Roads and Structures; (N.C.D.O.T. Standard).

3.02 MATERIALS

3.02.1 PAVEMENT MATERIALS

- (a) All materials listed herein are subject to review and revision by the N.C. Highway Commission District Engineer. The materials used for this project shall be as herein specified unless amended by the Project Specifications.
- (b) Base Course shall be eight (8) inches of A.B.C.; Aggregate Base Course graded in accordance with the N.C.D.O.T. Standard - Section 520.
- (c) Prime Coat shall be applied at the rate of 0.4 gallons per square yard minimum unless pooling occurs over the compacted base course at which time the application rate will be reduced. Lower application rates may be approved by the Engineer if ponding is evident six (6) hours after application to the base course. The prime coat shall comply with the N.C.D.O.T. Standard - Section 600.
- (d) Surface Course shall conform to N.C.D.O.T. Standard Section 645 for Bituminous Concrete Surface Course, Type I-2. The surface course shall be a minimum of two (2) inches deep. The surface course shall

contain approximately 7.0% content of asphalt cement. The exact content will be based on the mix design and N.C. D.O.T. allowable standard. The Contractor shall have this mix design approved prior to use.

3.02.2 CONCRETE SIDEWALK, CURB AND GUTTER AND RELATED WORK

(a) All materials listed herein shall be supplied and constructed in accordance with the appropriate N.C.D.O.T. Standard, Section 9.0 - CONCRETE of these General Specifications, this General Specification, the Project Specifications and the Contract Drawings.

(b) All concrete shall be Class C, 2500 psi (Section 9.0 - CONCRETE). All sidewalks, drives and wheelchair ramps shall be reinforced with one (1) layer of 6 x 6 - W2.9 welded wire mesh unless otherwise noted by the Project Specifications or the Contract Drawings. All concrete work shall utilize a one-half (1/2) inch non-extruded joint material conforming to the ASTM specification for Preformed Expansion Joint Filler; ASTM D1751. All concrete work shall be cured with polyethylene film or burlap as per N.C.D.O.T. Section 926. See the Contract Drawings for details regarding dimensions, reinforcing, etc. utilized in the construction of concrete steps.

3.03 CONSTRUCTION METHODS

3.03.1 ASPHALT PAVEMENT AND AGGREGATE BASE COURSE

All construction procedures shall be in accordance with the requirements of the D.O.T. Subdivision Roads Minimum Construction Standards and/or the D.O.T. Standard Specifications for Roads and Structures.

3.03.2 CURB AND GUTTER

The curb and gutter shall be North Carolina Department of Transportation Standard 846.01 for two feet six inches (2'-6") curb and gutter and the concrete shall be as specified above in Section 3.02.2(b) of this General Specification.

All construction procedures shall be in accordance with the requirements of the STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, North Carolina Department of Transportation, latest published edition, Section 846 - CONCRETE CURB, CURB AND GUTTER, AND GUTTER and Section 825 - INCIDENTAL CONCRETE CONSTRUCTION.

3.03.3 SIDEWALKS, DRIVES AND WHEELCHAIR RAMPS

(a) SUBGRADE PREPARATION - The subgrade for sidewalks, driveways and wheelchair ramps shall be formed by excavating to the required depth, shaped to the proper cross-section and thoroughly compacted by rolling or tamping before placing any concrete. Where tree roots are encountered, they shall be removed to a depth of one foot for the full width of the walk.

All soft and spongy places shall be removed and all depressions filled with suitable material which shall be thoroughly compacted in layers not exceeding six (6) inches in thickness.

Where existing sidewalks or driveways are removed, they shall be removed for their entire depth and disposed of in a satisfactory manner. Entire sections of a sidewalk slab between joints shall be removed except when directed by the Engineer.

(b) DIMENSIONS - Sidewalk slabs shall have an area of not more than thirty-six (36) square feet and the length of slab shall be equal to the width providing; however, that where sidewalks are being repaired the size of the slab replaced shall be of the same dimensions as those remaining in the old walk.

The minimum thickness of a sidewalk shall be four (4) inches except where it is crossed by a driveway and then it shall be a minimum of six (6) inches.

The minimum width of a sidewalk shall be four (4) feet except in the following cases, and when approved by the Engineer.

- (1) Where an existing sidewalk is to be repaired the new walk shall match the existing walk's width unless otherwise noted.
- (2) Where required specifically by the Project Specifications or the Contract Document to be some other width.

(c) ALIGNMENT AND GRADES - Sidewalks shall be constructed in conformance with the lines and grades established by the Contract Drawings. Sidewalks shall have a uniform slope perpendicular to the curb of not less than one-quarter (1/4) inch per foot nor greater than one-Half (1/2) inch per foot for the distance from curb line to the front edge of the sidewalk.

The rate of change of the longitudinal slope of a sidewalk shall not exceed one-half (1/2) inch per foot.

(d) DRAINAGE - A four inch (4") cast iron pipe shall be provided where necessary to carry the drainage from down spouts under the sidewalk and parkway and through the curb where required by the Contract Drawings.

(e) FORMS - Forms used in constructing sidewalks shall be of wood or metal, of the full depth of the concrete, straight, free from warp, and of sufficient strength. They shall be staked securely enough to resist the pressure of the concrete without springing. If of wood, they shall be of two inch (2") surfaced plank. All forms shall be subject to the approval of the Engineer. All wood forms shall be thoroughly wetted and metal forms oiled before placing concrete. All forms shall be thoroughly cleaned before re-use.

(f) PLACING CONCRETE - No concrete shall be placed until the forms and subgrades have been approved by the Engineer. The subgrade shall be thoroughly spaded and rammed and struck off with a template to the required grade and cross-section. Successive batches of concrete shall be deposited in a continuous operation until individual sections are completed.

(g) JOINTS - Contraction joints shall be provided uniformly to separate the slab and shall be cut in a straight line to a depth equal to at least one-third (1/3) of the total slab thickness. The joint shall not be less than one-eighth (1/8) inch nor more than one-fourth (1/4) inch in width.

A one-half (1/2) inch expansion joint filled with joint filler shall be placed between all sidewalks and adjoining backs of curbs and between the intersection of two sidewalks, between all sidewalks and driveways and sidewalk and steps. Sidewalks constructed adjacent to buildings shall be separated from the building with a similar joint. The maximum distance between transverse expansion joints shall be fifty (50) feet).

The joint filler shall extend the full depth of the concrete and shall be one-fourth (1/4) of an inch below the finished surface of the sidewalk.

(h) FINISHING - After the freshly poured concrete has been brought to the established grade, it shall be floated with a wooden float to produce a surface free from irregularities. The final surface shall be obtained by troweling with a steel trowel or hard float and brushing lightly with a light weight brush in a transverse direction so as to produce a uniform gritty

surface of the proper texture. All edges and joints shall be rounded to one-fourth (1/4) of an inch radius.

(i) COLD WEATHER POURING - Concreting operations shall not be undertaken or continued when the surrounding air temperature is below 40 degrees F. or the current weather reports indicate the possibility of temperatures of 32 degrees F. or lower within the ensuing 24 hours unless provisions are made to insulate or heat the concrete in a manner satisfactory to the Engineer. In any event, the Contractor shall plan and protect his work in a manner which will assure satisfactory results. Any concrete damaged by freezing shall be removed and replaced by the Contractor at his own expense.

Concrete then deposited in the forms shall have a temperature of not less than 50 degrees nor more than 90 degrees F. The concrete shall be maintained at a temperature of not less than 50 degrees F. for a period of at least 72 hours. Concrete shall not be deposited on a frozen subgrade.

(j) CURING AND PROTECTION - As soon as the concrete has hardened sufficiently to prevent damage, it shall be sprinkled with water and covered with burlap, polyethylene, sand or earth and kept wet for three (3) days. Sufficient barricades, signs and warning devices shall be provided by the Contractor to protect the finished concrete.

(k) REMOVAL OF FORMS AND BACKFILLING - After the concrete has set sufficiently, the forms shall be removed and the spaces on both sides shall be backfilled with suitable earth, uniformly spread and compacted. The areas between the curb and sidewalk, and immediately back of the sidewalk, shall be left in a smooth, neat, workmanlike condition.

(l) REMOVAL OF DEFECTIVE WORK - The Engineer shall have the authority to and shall require the removal of any sidewalk, driveway or portion thereof laid under these specifications which does not conform to the requirements as set herein. Upon notification in writing by the Engineer, the Contractor shall take immediate action to correct the faulty work at his own expense.

3.03.3 REMOVAL OF EXISTING PAVEMENT, SIDEWALK OR CURB AND GUTTER

(a) This work includes the removal and disposal of any Portland cement concrete or bituminous pavement and aggregate required to be joined by new work as required by the Contract Drawings.

(b) The material to be removed shall be saw cut providing a neat edge between the existing material and the material to be removed. All sawing shall be to a depth of approximately 2 inches before any ensuing breaking and/or removal operations are undertaken. All materials removed shall be disposed of off site by the Contractor unless provided for differently by the Project Specifications or the Contract Drawings.

3.04 MEASUREMENT FOR PAYMENT AND COMPENSATION

3.04.1 GENERAL

If any or all of the work to be performed under this Contract is on a unit price basis, the actual number of units of each price item of work actually performed may be more or less than the number stated in the Bidding Schedule of the Proposal, or included in the Contract, but no variation in the Contract unit price will be made on that account. Payment will be made only for the actual number of units incorporated in the work, or for the actual number of units of work performed, and at the Contract unit price for each such unit with measurement for payment made as defined in the following paragraphs.

3.04.2 AGGREGATE BASE COURSE

Measurement for installed aggregate base course shall be on a tonnage base computed from the actual number of square feet laid times the depth in feet times 147 pounds per cubic foot. Payment shall be on the basis of actual number of tons utilized.

3.04.3 PRIME COAT

Measurement for prime coat shall be on a per gallon basis of the applied quantity. No adjustment shall be allowed because of temperature. Payment shall be on the basis of the actual number of gallons utilized.

3.04.4 BITUMINOUS CONCRETE SURFACE COURSE, TYPE I-2

Measurement for Type I-2 surface course shall be on a tonnage basis computed from the actual number of square feet laid times the depth in feet times 140 pounds per cubic foot. Payment shall be on the basis of the actual number of tons utilized.

3.04.5 CONCRETE SIDEWALK

Measurement for concrete sidewalk installed shall be on the basis of square yard surface area and shall include all required work and materials. Payment shall be on the basis of the actual number of square yards measured.

3.04.6 PAVEMENT, CONCRETE SIDEWALK, DRIVEWAY OR WHEEL-CHAIR RAMP REMOVAL

Measurement for payment of pavement (including aggregate base course), concrete sidewalk, driveway or wheelchair ramp removed shall be on the basis of the actual number of square yards required to be removed as measured prior to removal operations.

3.04.7 CONCRETE CURB AND GUTTER

Measurement for concrete curb and gutter installed shall be on the basis of the number of linear feet installed including all required work and materials. Payment shall be on the basis of the actual number of linear feet measured.

3.04.8 CONCRETE CURB AND GUTTER REMOVAL

Measurement for payment of concrete curb and gutter removed shall be on the basis of the actual number of linear feet removed as measured prior to removal operations.

3.04.9 CONCRETE DRIVEWAYS

Concrete driveways shall be paid for as a Lump Sum Item for each width of drive noted and shall include all required materials and work.

3.04.10 WHEELCHAIR RAMPS

Wheelchair ramps shall be paid for as a Lump Sum Item as shown and shall include all required materials and work.

3.04.11 CONCRETE STEPS

Concrete steps shall be paid for as a Lump Sum Item as shown and shall include all required materials and work.

3.04.12 SAW CUTTING

Any required saw cutting shall be paid for as a Unit Price Item for the actual number of linear feet of material cut.

GENERAL SPECIFICATIONS
4.0 SITE WORK

4.01 GENERAL

4.01.1 SCOPE OF WORK

(a) All labor, materials, equipment, tools and services required to fulfill the requirements of this Contract for Site Work shall be furnished and installed in compliance with the following General Specification, the Project Specifications, and the Contract Drawings.

(b) The General Specification designated as Section 4.0 Site Work covers the description of work and materials generally utilized in site work and erosion control and the specification for performing that work. The Project Specifications and the Contract Drawings designate specific work to be performed under the Contract. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

4.02 CLEARING AND GRUBBING

(a) Clearing and grubbing of the site shall be in full conformance with Section 1.0, Clearing and Grubbing, of the General Specifications. The limits of clearing and grubbing and specific details concerning the work shall be as set forth in the Project Specifications and the Contract Drawings.

(b) All trenches, ditches, and holes resulting from the work of this section shall be filled with clean earth and compacted to the level of the surrounding elevations.

4.03 GRADING

4.03.1 EXCAVATION

(a) GENERAL

(1) Excavation shall include the loosening, loading, removing, transporting, and disposing of all materials, wet or dry, necessary to be removed in order to meet the lines, grades and elevations shown on the Contract Drawings. The Contractor must assume the risk of meeting and the Contract price shall include the cost of removal of quicksand, hardpan, boulders, clay, rubbish, unforeseen obstacles, underground conduits, gas pipe, drain tile, trees, roots, timber or masonry structures,

railroad tracks, pavements, and sidewalks; and the delay or damage occasioned by the same, whether these obstacles are shown on the Contract Drawings or not.

(2) No claim for any amount of money beyond the Contract price of the work will be entertained or allowed on account of the character of the ground in which the excavation is made unless rock as defined hereinafter is encountered and removed, and only then when rock appears as a unit price item. The quantities for payment shall be determined on the basis established in Section 4.03.3 of this General Specification.

(3) The location of existing piping and underground utilities, such as gas mains, water mains, electric duct lines, telephone conduits, etc., as shown on the Contract Drawings as approximate. The Owner does not assume responsibility for the possibility that during construction utilities other than those shown may be encountered, or that actual location of those shown may be different from the locations designated on the Contract Drawings.

(4) At the locations wherein detailed positions of these facilities become necessary to the new construction, the Contractor shall, at his own expense, furnish all labor and tools to either verify and substantiate the record drawing location, or definitely establish the position of the facilities.

(5) Necessary arrangements shall be made by the Contractor with all persons, firms, corporations owning or using any poles, pipes, tracks, or conduits, etc., affected by the construction of this Project, to maintain and protect such facilities during construction with the cost of such protection paid by the Contractor and included in the contract price. In the event that any existing gas pipes, water pipes, conduits, sewers, tile drains or poles are blocked or interfered with by the excavation required on this project, the Contractor shall maintain them in continuous operation, and restore them to the same condition as they were prior to the start of construction of this Project, all at no additional compensation.

(6) Excavated material shall not be placed on grass plots unless there is no other suitable place to put it. Excavated material shall be placed on pavements or sidewalks only on the explicit approval of the Engineer.

(7) Sidewalks and pavements must in no case be blocked or obstructed by excavated material, except on the authorization of the Engineer, and then only when adequate provisions have been made for a satisfactory temporary passage of pedestrians and vehicles. Adequate bridging and planked crossings must be provided and maintained across all open trenches for pedestrians and vehicles. Barriers, lights, flares, and watchmen shall be provided and maintained by the Contractor at all excavations, and embankments at no additional compensation, as provided in the General Conditions of the Contract.

(8) Topsoil shall be stripped and stockpiled on the job site. Topsoil shall be removed to the depth of fertility, except that in no instance shall topsoil be stripped below a depth of 12 inches. Topsoil shall be stripped only when friable. Topsoil shall be free of clay, stones 2" and larger, and debris. Upon completion of construction, topsoil is to be distributed as set forth in the Project Specifications and Contract Drawings.

(9) Excavated material shall be deposited so as to interfere as little as possible with the execution of the whole work or its several parts, and in such manner that for each purpose the most suitable material may be placed in its final position but not in a manner to interfere with the satisfactory carrying out of the work. Such material as cannot be placed in its final position in fills and embankments shall be removed to a temporary spoil bank, from which it shall later be taken and placed in embankment or fills.

(10) Unsuitable and surplus excavated material not incorporated in the improvement shall be disposed of by the Contractor at his own expense unless otherwise designated in the Project Specifications, or on the Contract Drawings. Any excess soils desired by the Owner shall be available for his use without any additional cost. The Contractor shall be responsible for obtaining written release from the Owner for the excess soil materials prior to their disposal.

(11) If private land is used by the Contractor as a spoil site, the Contractor shall obtain written permission from the Owner or Agent of the land agreeing to its use for this purpose, and provide the project Owner with a certified copy of such agreement.

(12) All cuts shall be brought to the grade and cross section shown on the Contract Drawings, or established by the Engineer, prior to final inspection and acceptance by the Engineer.

(13) All subgrades to a depth of 6" under proposed structures, roadways and parking areas shall be compacted in accordance with method "C" of ASTM D698, Standard Proctor Compaction Test, to the following minimum percentage expressed as a percent of the maximum density at optimum moisture content: 100 percent of maximum dry density in pounds per cubic foot.

(b) UNDERCUT

(1) Undercut excavation shall be in accordance with Section 225-4 of the STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, North Carolina Department of Transportation, published July 1978.

(2) The backfilling of undercut excavation shall be in accordance with Section 4.03.2 (EMBANKMENT) of these General Specifications.

(3) Backfilling of undercut excavation shall not be a pay item unless specifically called for in the Project Specifications. The cost of backfilling shall be included in the cost of undercut excavation.

4.03.2 EMBANKMENT

(a) GENERAL

(1) Embankment includes the transporting, placing, compacting and testing of suitable fill material as indicated in the Project Specifications and on the Contract Drawings. It shall include the preparation of the areas upon which the embankment is to be constructed; the formation, compaction, stability, and maintenance of the embankment; the placing and compacting of approved material within areas where unsuitable material has been removed; and the placing and compaction of embankment materials in holes, pits, and other depressions within the area.

(2) Only suitable materials shall be used in the construction of embankments and backfills. No frozen material, roots, sod, or other objectionable material shall be incorporated or placed in the embankments or backfills. The top 6 inches of any embankment shall not contain any material larger than will pass a 3 inch sieve except where written permission is given by the Engineer.

(b) EMBANKMENT PREPARATION

(1) Before embankment construction is begun, all vegetation and rubbish shall be removed from the area within the limits of the embankment. This material shall be disposed of as directed by the Engineer, or required by these Specifications. Mowed sod may be plowed and left in place where the height of the embankment to be constructed is greater than 6 feet, unless otherwise noted.

(2) Where embankments are to be placed and compacted on hillsides, or when new embankments are to be compacted against existing embankments, or when embankments are built in part widths, the slopes that are steeper than 4:1 shall be loosened or plowed to a minimum depth of 6 inches or, if in the opinion of the Engineer, the nature of the ground is such that greater precautions should be taken to bind the fill to the original ground, then benches shall be cut in the existing ground.

(3) All portions of the surface upon which an embankment is to be placed shall be thoroughly plowed or scarified and all cleavage planes broken up before beginning the embankment.

(c) EMBANKMENT FORMATION

(1) The material shall be deposited and spread in successive, uniform, approximately horizontal layers of not more than 6 inches in depth, loose measurement, for the full width of the cross section, and shall be kept approximately level by the use of effective spreading equipment. Each layer of the embankment shall be thoroughly compacted as hereinafter specified. Hauling shall be distributed over the full form during the construction of the embankment. The embankment shall be properly drained at all times.

(2) Where embankments are to be constructed across ground which will not support the weight of trucks or other hauling equipment, the first layer of the embankments may be constructed by dumping successive truck or other equipment loads in a uniform distributed layer of a thickness not greater than that necessary to support the trucks or hauling equipment while placing subsequent layers. The remainder of such embankments shall then be constructed in layers as above specified.

(3) Where it is necessary to place embankment material in a swamp or in water, unsuitable surge material shall be kept in a fluid state or removed to prevent any of this material from being trapped in or under the embankment.

(4) No rock lifts shall be placed within 2 feet of the finished grade. No rock or broken pavement shall be placed in embankments where piles are to be placed or driven.

(5) In valleys, ravines, and at the foot of slopes on side hills, a limited amount of end or side dumping will be allowed, when permitted by the Engineer, to form a satisfactory base in the formation of the embankment, after which the layers shall be constructed parallel with the finished grade as hereinbefore specified.

(d) EMBANKMENT COMPACTION

(1) All embankment material shall be compacted as specified herein unless otherwise stipulated by the Contract or directed by the Engineer. Compaction equipment used by the Contractor shall be adequate to produce the required compaction and produce a uniformly constructed embankment with all layers uniformly bound to all preceding layers.

(2) One compaction test shall be made for each 10,000 square feet of fill three (3) feet deep. Compaction shall be accomplished with other than heavy machinery where that machinery may cause damage to facilities. See Section 2.0: Structures - Excavation and Backfill.

(3) All fill shall be compacted in accordance with method "C" of ASTM D698 (Standard Proctor Compaction Test) to the following minimum percentages expressed at a percent of the maximum density at optimum moisture content:

Under Roadways and parking areas (except the upper three feet) and water holding embankments	----- 95 percent of maximum dry density and 90 pounds per cubic foot dry density
Under proposed structures and upper three feet under roadways and parking areas	----- 100 percent of maximum dry density and 95 pounds per cubic foot dry density
Areas not otherwise	----- 90 percent of maximum dry

specified

density

(e) MAINTENANCE

(1) The Contractor shall be responsible during construction and until final acceptance for the maintenance of all embankments made under the Contract.

(2) During construction and until final acceptance the Contractor shall construct temporary or permanent earth berms along the outer edges of the top surface of the embankment, construct temporary ditches, shape the embankment surface to provide for the drainage of surface runoff along and throughout the length of the embankments, and use any other methods necessary to maintain the work covered by this section so that the work will not contribute to excessive soil erosion.

(3) The Contractor shall replace, at no cost, any portion of embankments which have become displaced or damaged due to carelessness or neglect on the part of the Contractor.

(4) All embankments shall be brought to the grade and cross section shown on the Contract Drawings, or established by the Engineer, prior to final inspection and acceptance.

4.03.3 ROCK EXCAVATION

(a) Wherever the word "Rock" appears, it shall be interpreted to mean any material encountered of a uniform hardness of three (3) in the scale of mineral hardness and/or any material which cannot be removed from its original position with a 300 Hp (minimum), 70,000 lb. working weight (minimum) dozer with a rock ripping attachment in good condition without continuous drilling and blasting will be considered rock, provided that the Contractor proves by demonstration and photographic evidence that slate, shale, sandstone or other hard material encountered cannot be removed with heavy equipment without continuous drilling and blasting. Other materials shall not be classed as rock, although it may be more economical to remove same by blasting. Boulders will not be classified as rock unless larger than 1/2 cubic yard.

(b) Should rock be encountered in the excavation, it shall be removed by blasting or other approved methods. Where blasts are made, the excavation shall be carefully covered with suitable brush, timber or matting to prevent danger to life and property. The Contractor shall secure all permits required by Law for blasting operations and any

additional hazard insurance required, the cost of such permits and insurance to be borne by the Contractor. The Contractor shall strip the rock of over-burden, such stripping to be done in sections and approved by the Engineer. No blasting shall be done by the Contractor until he has notified the Engineer and until the necessary cross-sections of the top of the rock have been taken. No loaded holes shall be left unattended or overnight without approval from the Engineer. Blasting will not be permitted within 25 feet of completed pipe lines or structures nor will it be permitted within 25 feet of any existing structure, pipe line or conduit. Adequate warning and danger signals shall be given before firing dynamite explosives. Adequate records shall be kept by the Contractor of all explosives kept at the site of the work. All explosives shall be used and handled, stored and exploded in conformance with all state and local laws and regulations.

(c) Materials classified as "Rock" in these Specifications, if encountered, shall be excavated to the grade of the bottom of structures to be installed unless specifically shown on the Contract Drawings to be removed, to a greater depth. After such rock is removed, the excavation, when required, shall be backfilled with clean low-void sand or other non-compressible fine low-void material satisfactory to the Engineer, and consolidated to place the top surface at the grade established on the Contract Drawings for the bottom of the structure.

(d) The cost of furnishing, placing and consolidating of such fill material shall be entered as part of the embankment unit price bid, except in Proposals that do not have unit prices for this item, in which case it becomes part of the Lump Sum Base Bid. In Proposals that have unit price schedules for rock excavation, the cost of removing and disposing of rock shall be entered into the Rock Excavation unit price. In Proposals that do not have unit prices, the cost for Rock Excavation shall become part of the Lump Sum Base Bid.

4.04 FINAL GRADING

(a) The following tolerances from the established grades will be permitted, unless otherwise specified by the Project Specifications.

- 1) general site grading: plus or minus 0.20 foot
- 2) subgrade under structures, roadways and parking areas:
plus or minus 1/2 inch

(b) Scrape grade away from building walls and grade entire areas outside of building to smooth uniform surface. Finish grades, not otherwise indicated, shall be uniform levels or slopes between points where levels are given or between such

points and existing finish grades. Abrupt changes in scapes shall be rounded. Should figures for finish elevations conflict with finish contours shown, the figures shall govern.

(c) Topsoil shall then be spread on the ground areas and shall be smoothed down to a loose depth of not less than three inches. Areas to receive topsoil shall be scarified 12" deep and all construction debris picked out and hauled off before spreading of topsoil. After topsoil has been spread, the entire area shall be left smooth and all stones, roots, debris, etc., measuring 2" and larger shall be removed. Topsoil required, over the amount in the stockpile, shall be furnished by the Contractor at the unit cost as set forth in the Contract Documents.

4.05 EROSION AND SEDIMENT CONTROL

4.05.1 GENERAL

(a) The Contractor shall provide erosion and sediment control as detailed in the Project Specifications and the Contract Drawing, during the period of construction. The Contractor shall protect and maintain all temporary erosion and sediment control features required by construction of this project. Maintenance is to include, but is not limited to, removal of sediment as it accumulates in and around structures and basins, maintenance of temporary diversion swales, which will include, regrading and seeding, if deemed necessary by the Inspector or the Engineer.

(b) Temporary erosion control measures shall include but not be limited to the use of temporary berms, dikes, dams, drainage ditches, silt basins, silt ditches, slope drains, structures, vegetation, mulches, mats, netting, gravel, or any other methods or devices that are necessary. Temporary erosion control measures may include work outside the right of way or construction limits where such work is necessary as a result of construction such as borrow operations, haul roads, plant sites, equipment storage sites, and disposal of waste or debris. The Contractor shall be liable for all damages to public or private property caused by silting or slides originating in waste areas furnished by the Contractor.

Materials for temporary erosion control measures shall have been approved by the Engineer before being used or shall be as directed by the Engineer.

Erosion control measures installed by the Contractor shall be acceptably maintained by the Contractor.

(c) The sediment and erosion measures implemented on this project are subject to periodic review by the State of North Carolina Department of Environment and Natural Resources and are to be kept in operating condition at all times. All erosion control measures are subject to the requirements of the N. C. Sedimentation Pollution Control Act.

(d) The sequence of construction shall be as set forth in the Project Specifications and the Contract Drawings.

(e) At the conclusion of project construction, the Contractor shall completely remove and dispose of all temporary erosion and sediment control measures, unless otherwise specified in the Project Specifications of the Contract Drawings. Temporary diversion swales shall be regarded to the lines and grades shown on the Contract Drawings.

(f) During the application of fertilizer and of asphalt binding material, or other approved binding materials which may cause damage, adequate precautions shall be taken to prevent damage to traffic, structures, guardrails, traffic control devices, or any other appurtenances. The Contractor shall either provide adequate covering or change methods of application as required to avoid such damage. When damage occurs the Contractor shall repair it, including any cleaning that may be necessary, at his own expense.

4.05.2 TEMPORARY SILT FENCE

(a) The Contractor shall construct a temporary silt fence for retention of silt. The Contractor shall construct the temporary silt fence at locations shown on the Contract Drawings or as directed by the Engineer.

(b) Fabric shall be a minimum of 32" high, have 14 gauge wire mesh, with 6 inch spacing.

(c) Posts -- Posts may be either wood or steel. If wood, they shall be a minimum of six feet long, relatively straight, and three to four inches in diameter. Wire fabric shall be fastened to wooded posts with not less than a number 9 wire staple, 1-1/2" long.

If steel posts are used, they shall be five feet in length and shall be of the self-fastener angle steel type.

No more than three feet of any post, shall protrude from the ground. Extra posts if needed, will be considered an incidental addition to the silt fence and no additional payment will be made for them.

(d) Silt barrier shall be a synthetic filter fabric, or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yarn, certified by the manufacturer as meeting the requirements of the N. C. Department of Environment and Natural Resources, Division of Land Resources, "Erosion and Sediment Control Planning and Design Manual".

(e) The Contractor will be required to maintain the silt fence in a satisfactory condition for the duration of the project or until its removal is requested by the Engineer and shall remove and dispose of silt accumulations at the silt fence when so directed by the Engineer. After vegetation is established, the Engineer shall determine if the silt fence is to be removed or to be left in place. If the temporary silt fence is removed, it will become the property of the Contractor, but the contractor will also be required to dress up and seed and mulch the area to give a pleasing appearance as directed by the Engineer.

(f) All dressing up, seeding and mulching, required in the above paragraph shall comply with this General Specification Section 4.0 and all applicable requirements of the "Seeding and Mulching" provisions included herein.

(g) After the temporary silt fence has served its purpose at one location, it may be used at other temporary locations providing it is still in satisfactory condition.

(h) Pay items associated with the use of the temporary silt fence shall be as allowed by Section 4.08 of this specification.

4.06 PERMANENT COVER

4.06.1 GROUND PREPARATION

(a) Areas to be seeded shall have been cleared, grubbed and graded. Excessively wet areas shall be allowed to dry; dry areas shall be lightly sprinkled the day before seeding is accomplished. Operations shall be accomplished during favorable weather conditions except that no seed shall be sown on frozen and crusted soil. All seeded areas shall be mulched.

(b) Ground having a slope steeper than 3:1 shall not be prepared for seeding; seed, lime and fertilizer shall be applied as specified in paragraph 4.06.2.(b).

(c) Ground having a slope not steeper than 3:1, shall be plowed to a depth not less than four inches for shoulders and embankments, not less than six inches for front and back slopes of cuts and for level areas, and not less than six inches for waste areas having unstable materials. After having been plowed, areas shall be disced and harrowed, to the depth of plowing in a manner which will pulverize the soil. Surface of the disced and harrowed area shall present a smooth, uniform, loose appearance; large clods, rock, stumps, roots larger than 1/2 inch in diameter, and debris shall be removed. If topsoil is to be applied to the area, such preparation by plowing, discing, and harrowing, is to be done prior to the application of the topsoil.

(d) With soil material reasonably uniform, apply lime, fertilizer, and nitrogen as follows:

Lime	-	Apply at rate of 2 tons per acre, unless otherwise noted.
Fertilizer	-	(10-10-10) @ 18-23 lbs./1000 sq. ft.
Nitrogen	-	Topdress with 30-50 pounds of nitrogen 30-60 days after planting only when needed to increase plant growth and cover.

(e) When hydraulic seeder is to be used, soil preparation is not required. When conventional seeding is to be done, no preparation is required if the soil material is loose and has not been sealed by rainfall. On smooth undisturbed cut slopes, the surface will require pitting, trenching or scarifying to provide a place for seed to lodge and germinate.

4.06.2 SEEDING

(a) LEVEL AREAS AND SLOPES NOT STEEPER THAN 3:1

(1) Seed shall be sown within 24 hours after ground preparation has been completed, and with either mechanical seed drills or rotary hand seeders; seeds of approximately the same size may be mixed and sown together. If seeds are sown with rotary hand seeders, seeded areas shall be lightly raked. Seeded areas shall be rolled and sprinkled before applying mulch.

(2) Mulch shall be applied to rolled and sprinkled areas by either hand-spreading or mechanical methods. Applied mulch

shall be neither thinner than 3/4 inch nor thicker than 1-1/2 inches (approximately 1-1/2 to 2 tons per acre).

(3) All mulched areas (not hydroseeded) shall be tacked at the rate of 150-200 gallons of tack per ton of mulch.

(4) Lime may be spread by any means that will deliver an even distribution of lime over the area to be seeded. No spotting or heavy deposits will be allowed. The lime shall be applied at the rate of 2 tons per acre unless otherwise noted by the Project Specifications.

(5) Fertilizer shall be applied to limed areas. Fertilizer (10-10-10) shall be applied at the rate of 18-23 lbs./1,000 sq. feet.

(b) SLOPES STEEPER THAN 3:1

(1) This work shall be accomplished by hydroseeding and liming. Hydroseeding shall consist of mixing fertilizer, seed, and wood cellulose fiber mulch with water and applying the mixture as a slurry. Rate of application shall ensure that the fertilizer (10-10-10) will be applied at a rate of 18-23 lbs./1,000 sq. feet, that the seed will be applied at the rate specified in paragraph 4.06.2.(c) and that the applied mulch will be neither thinner than 3/4 inch nor thicker than 1-1/2 inches (approximately 1-1/2 to 2 tons per acre). Slurry shall be spread uniformly over the area and within one hour after having been mixed, and shall be agitated while being applied.

(2) Liming shall consist of mixing lime with water and applying the mixture as a slurry. Rate of application shall ensure that the lime will be applied at the rate of two (2) tons per acre. Slurry shall be spread uniformly over the area immediately after hydroseeding has been accomplished.

(c) APPLICATION

(1) Apply seed uniformly by broadcasting with a cyclone seeder, close drilling or cultipacker seeder. Normal depths for covering seed range from 1/4" for rye grass to 1 inch for small grain. Firm the soil after planting with a cultipacker or suitable equipment except where seed is applied with a hydraulic applicator.

(2) When a hydraulic seeder is used, the seed and fertilizer are mixed in a slurry and applied in one operation. The seed

must not remain in the slurry with fertilizer for more than one hour.

(d) SEEDING SCHEDULE

Seed shall be applied and utilized at the correct seasonal time and in the proper geographical area as follows:

PERMANENT SEEDINGS

Plants and Mixtures	Planting Rates Per Acre	Planting Dates	Notes
		1. Coastal Plain 2. Piedmont 3. Mountains	
1. Pensacola Bahiagrass	40-50 lbs.	1. Mar. 15 - June 15 2. April - May	Adapted south of line from Shelby, Greensboro, Elizabeth City, N.C.
2. Common Bermudagrass (hulled)	8-12 lbs.	1. April - July 2. Apr. 15 - June 30 3. May - June 15	Bermuda stands traffic does not tolerate shade. In mountains keep under 2,000' elevation on well-drained sunny sites. Refer to specifications for SODDING AND
3. Common Bermudagrass (unhulled)	15-20 lbs.	1. Jan. - March 2. Jan. - March 3. Dec. - April	SPRIGGING.
4. Crownvetch	15-20 lbs.	2. Aug. 20 - Sept. 20 Feb. 20 - Apr. 15 3. Mar. 15 - April	Best in mountains, and upper Piedmont. Requires a pH of 6+ and maintenance of lime, P&K every 3-4 years. Slow to establish with seed. Good plant on slopes that will not be mowed. Refer to specifications for VINES,
SHRUBS, and TREES.			
5. Crownvetch and Tall Fescue	10-20 lbs. 20-30 lbs.	2. Aug. 20 - Sept. Feb. 20 - Apr. 3. Mar. 15 - Apr.	Avoid wet sites - Mow only to control brush. Fescue used to increase land cover during establishment of Crownvetch.
6. Sericea Lespedeza (scarified) and Weeping Lovegrass	40-50 lbs. 4-5 lbs.	1. March - June 2. March 15 - June 3. April - May	Lovegrass provides quick protective cover
7. Sericea Lespedeza (scarified) and Common Bermudagrass	40-50 lbs. 6-8 lbs.	1. March - June 2. March 15 - June 3. April - May	Bermuda provides quick cover, spreads, and heals in open areas. Bermuda grass usually disappears where Sericea establishes a canopy.
8. Sericea Lespedeza (scarified) and Tall fescue	40-50 lbs. 25-30 lbs.	1. March - April 2. March - April 3. April - May	Scarified Sericea may be spring seeded on fescue that was seeded the previous fall.
9. Sericea Lespedeza (unscarified) and Tall Fescue	50-60 lbs. 25-30 lbs.	1. Dec. - Feb. 2. Nov. - Feb. 3. Nov. - March	If Sericea seed unavailable at planting time, it may be over-seeded on Fescue later in the winter.
10. Sericea Lespedeza (unhulled-unscarified) Tall Fescue Milled or Sudan	60-70 lbs. 20-30 lbs. 15-20 lbs.	1. Sept. - Jan. 2. Aug. - Jan. 3. July - Feb.	Include summer annuals in early seedings only. If Sudan growth exceeds 10 inches, mow.

PERMANENT SEEDINGS

Plants and Mixtures	Planting Rates Per Acre	Planting Dates 1. Coastal Plain 2. Piedmont 3. Mountains	Notes
11. Sericea Lespedeza (unhulled-unscarified)	60-70 lbs.	1. Sept. - Dec.	
Common Bermuda (unhulled)	10 lbs.	2. Aug. - Jan. 3. July - Feb.	
Rye	25 lbs.		
12. Tall Fescue	40-60 lbs.	1. Sept. - Nov. Feb. - March 2. Aug. 15 - Oct. 15 Feb. 15 - May 3. July 15 - Sept. March - May quality turf.	Not well suited to infertile, sandy, droughty, soils. Required good maintenance. Seeding date in mountains varies with elevation and aspect. Good shade tolerance. Double seeding rate for lawn
13. Tall Fescue and White Clover	30-50 lbs. 3-4 lbs.	1. Sept. - Nov. Feb. - March 2. Aug. 15 - Oct. Feb. 15 - Apr. 15 3. July 15 - Sept. March & April	Can be used where regular mowing is desired and high level of maintenance will be provided. Double seeding rate for lawn quality turf.
14. Tall fescue and Red Fescue	30-40 lbs. 20-30 lbs.	2. Aug. 20 - Oct. 10 Feb. 15 - Apr. 15 3. July 15 - Sept. March & April	Red Fescue in this mixture has a tendency to fill in voids. It is shade tolerant.
15. Tall Fescue and Bluegrass	30-40 lbs. 20-30 lbs.	2. Aug. 15 - Oct. Feb. 15 - Apr. 15 3. July 15 - Sept. March-April	Limited to fertile, well-drained soils in northern Piedmont and Mountains. Shade tolerant.
16. Tall Fescue and Browntop Millet or Sorghum - Sudan Hybrids	60 lbs. 35 lbs. 30 lbs.	1. Aug. - Sept. 2. July 15 - Aug. 3. July - Aug. 15	Keep annuals cut back to 10-12 inches.
17. Tall Fescue and Rye	70 lbs. 25 lbs.	1. Dec. - Jan. 2. Nov. - Jan. 3. Oct. - Feb.	Use only when necessary to complete a job. Mulching will be necessary to provide erosion control. Keep annuals cut back to 10 to 12 inches.
18. Reed Canarygrass	15-20 lbs.	2. Aug. 20 - Sept. Feb. 15 - April 3. March - July velocity.	Excellent on berms, stream banks and poorly drained sites. Do not use on small streams with low velocity.

PERMANENT SEEDINGS

Plants and Mixtures	Planting Rates Per Acre	Planting Dates	Notes
		1. Coastal Plain 2. Piedmont 3. Mountains	
19. Weeping Lovegrass	4-5 lbs.	1. March - June 2. April - June 3. May - June	Gives quick summer cover - well adapted to droughty sites - best in mixtures with Sericea Lespedeza. Tends to become clumpy with age.

4.06.3 N. C. DEPARTMENT OF TRANSPORTATION (DOT) - PERMANENT SEEDING

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**:

75 lbs. Ky 31 Fescue
50 lbs. Pensacola Bahiagrass
50 lbs. Korean Lespedeza
1,000 lbs. 5-10-10 Fertilizer
4,000 lbs. Agricultural Limestone

NOTE: Only tested and certified seed shall be used. Seed certification shall be provided to the District Engineer prior to use.

- (c) Seeded area shall be cultipacked to firm seedbed and cover seed.
- (d) Grain straw shall be applied over seeded areas as a mulch. No bare ground shall 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. See 4.06.2(a)(2) for rates.

- (e) Mulched area shall be tacked with asphalt sufficient to hold straw in place. See 4.06.2(a)(3) for rates.
- (f) Ditch treatment shall be used in areas where steep grades (more than 10%) could cause ditch erosion. Use of jute mesh, excelsior matting, or fiberglass roving is acceptable. Ditch treatment should be installed before mulching operation.

4.07 MATERIALS

4.07.1 TOPSOIL

(a) Topsoil shall be fertile, friable, loamy soil having neither less than two percent nor more than 30 percent organic matter as determined by loss on ignition of samples which have been oven-dried to a constant weight at 212 degrees F. Soil shall be free from subsoil, heavy and stiff clay, coarse sand, stones larger than two inches in their largest dimension, toxic amounts of acidic and alkaline substances, roots, brush, sticks, coarse litter, and other substances which would interfere with mixing, planting, and maintenance.

(b) Topsoil shall be taken from reasonably well-drained, arable land which has not supported tobacco growth during the previous three years, and which is not supporting the growth of Johnson grass or Kudzu. Topsoil shall be taken from and transported through areas which are free from infestations of fire ants, white fringed beetles, and Japanese beetles.

(c) Topsoil shall not be taken below the depth of fertility, except that in no instance shall topsoil be stripped below a depth of 12 inches. Topsoil shall not be stripped when it is in frozen, muddy, or non-friable condition.

4.07.2 SEED

(a) Seed shall satisfy the requirements of the North Carolina Department of Agriculture. No seed will be accepted having a date of test more than six months prior to the date of sowing.

(b) Seed which has become wet, moldy, and otherwise damaged will not be acceptable.

4.07.3 NITROGEN

Nitrogen shall be either in granular or liquid form and shall be of commercial grade. Nitrogen shall be furnished in new, clean, sealed, and labeled containers; labels shall clearly show manufacturer's name, brand name, and the weight and guaranteed analysis of contents.

4.07.4 LIME

Lime shall be agricultural type. Total carbonates shall be not less than 85 percent, by weight. Not less than 90 percent shall pass a No. 10 Sieve, and not less than 25 percent shall pass a No. 100 Sieve.

4.07.5 FERTILIZER

Fertilizer shall be uncaked granular type, and either 10:10:10, 4:12:12, 6:12:12, or 5:10:15. Fertilizer shall satisfy the requirements of the North Carolina Department of Agriculture.

4.07.6 MULCH

(a) AREAS NOT STEEPER THAN 3:1

Mulch shall be either threshed rye, oat, or wheat straw or Bermuda grass hay, and shall have a moisture content of not more than 12 percent. Mulch shall be free from noxious weed seeds, soil, sawdust, mildew, leaves, and substances toxic to vegetation. Material for holding mulch in place shall be asphalt or other approved binding material.

(b) AREAS STEEPER THAN 3:1

Mulch shall be wood cellulose fiber, shall contain no germination and growth-inhibiting factors, shall be green to allow visual metering in its application, and shall have the property to be evenly dispersed and suspended when agitated in water. When mulch is sprayed uniformly on the surface of the soil, the fibers shall form an absorbent cover, allowing percolation of water to the underlying soil. Mulch shall be packaged in moisture-resistant bags which have the net weight of the package plainly shown. Properties of mulch shall be as follows:

Properties	Nominal Values in Percent
Moisture Content	9.0 + 3.0
Organic Matter (Oven Dried Basis)	99.2 + 0.8
Ash Content	0.8 + 0.2
pH	4.8 + 0.5
Water Holding Capacity (Grams of Water/100 Grams Fiber)	1150 Minimum

4.07.7 Jute Net

(a) Jute net shall be heavy, uniform cloth woven of single jute yarn, which if 36 to 48 inches wide, shall weigh an average of 1.2 pounds per linear yard. The jute net shall be Erosionet, Holdgro, Weedchek, Curlex or approved equal.

4.07.8 Geotextile Fabric for Roadways

(a) Geotextile fabric underlining the access roads shall be a high modulus woven fabric with the following minimum properties:

- | | |
|---------------------------------------|-------------|
| 1) Weight 6.0 oz/yd ² | ASTM D-3776 |
| 2) Grab Strength 340 lbs. | ASTM D-4632 |
| 3) Grab Elongation 30% | ASTM D-4632 |
| 4) Trapezoidal Tear
Strength | ASTM D-4533 |
| 5) Puncture Strength
170 lbs. | ASTM D-4833 |
| 6) Permittivity 0.2 sec ⁻¹ | ASTM D-4491 |

4.08 MEASUREMENT FOR PAYMENT AND COMPENSATION

4.08.1 GENERAL

If any or all of the work to be performed under this contract is on a unit price basis, the actual number of units of each unit price item of work actually performed may be more or less than the number stated in Bidding Schedule of the Proposal, or included in the Contract, but no variation in the Contract unit price will be made on that account. Payment will be made only for the actual number of units incorporated in the work, or for the actual number of units of work performed, and at the Contract unit price for each such unit with measurement for payment

made as defined in the following paragraphs. Measurement for payment of work done on a unit price basis will be as follows:

4.08.2 CLEARING AND GRUBBING

Unless otherwise specified in the Project Specifications or the Contract Drawings, the payment for Clearing and Grubbing shall be as specified in Section 1, Clearing and Grubbing, of these General Specifications.

4.08.3 GRADING

(a) When provided for by a Unit Price Proposal, excavation shall be paid for at the Contract Unit price per cubic yard, which price shall be full compensation for the excavation and formation and compaction of embankments, furnishing water for moisture control, disposal of surplus materials, preparation and completion of subgrades, shoulders, ditches, channels, ramps, dikes, and other appurtenances and incidentals necessary to complete the work and all haul within the specified "Free Haul Limit".

(b) Embankment shall not be a pay item unless specifically called for in the Project Specifications. The cost of embankments shall be included in the cost of excavation, except that required amount, over that which is available from excavation, which will be paid for at the Contract unit price per cubic yard of borrow.

(c) When not provided with a Unit Price Proposal, the Contractor shall merge the cost of all excavation and embankment work with the Lump Sum Base Bid Item.

(d) The quantity of excavation to be paid for will be the actual number of cubic yards of materials, measured in their original position and computed by the average end area method, which have been acceptable excavated in accordance with Contract Specifications and Drawings. Final cross sections will be taken after the excavation has been completed except that the plan typical sections will be used for the final cross sections where, in the opinion of the Engineer, the work has been constructed in reasonably close conformity to the plan typical section.

4.08.4 UNDERCUT EXCAVATION

(a) Undercut excavation shall be as defined by Section 4.03.1(b) of this Specification. When provided for by a Unit Price Proposal,

undercut excavation shall be paid for at the Contract Unit price per cubic yard, which price shall be full compensation for the excavating and hauling of this material; for the disposal of the excavated material; for furnishing any disposal areas that may be necessary; for the backfilling and compacting of suitable material to replace undercut excavation; and for the furnishing of all labor, equipment, tools and incidentals necessary to complete the work.

(b) Undercut excavation will be measured on a box cut section to widths and depths as directed by the Engineer.

(c) When not provided with a Unit Price Proposal, the Contractor shall merge the cost of all undercut excavation work with the Lump Sum Base Bid item or the Unit Price Item for Excavation.

4.08.5 ROCK EXCAVATION

Rock excavation, granular backfill and select backfill shall be unclassified unless provided as a Unit Price Item in the Proposal. When the Proposal is not Unit Price, the cost of all rock excavated and removal shall be merged with the Lump Sum Base Bid Item.

When rock excavation is not unclassified, rock excavation shall be as defined by Section 4.03.3 of this Specification. Rock excavation shall then be paid for at a unit price rate provided by the Unit Price Proposal.

4.08.6 FINE GRADING

This item shall not be paid for as a separate pay item, but shall be included in the cost of grading.

4.08.7 EROSION CONTROL

Erosion control shall be unclassified unless specific erosion control items are provided for by the Proposal. When bid as Unit Price Items, erosion control shall be paid for at the Contract Unit price per item utilized in erosion control per the Proposal.

4.08.8 TEMPORARY SILT FENCE

When provided for by the proper item in a Unit Price Proposal, the quantity of temporary silt fence to be paid for under this item shall be the actual number of linear feet of fence installed in place and accepted. Such price and payment will be full compensation for the work as described in the above paragraphs, including but not limited to

furnishing all materials, tools, equipment and all incidentals necessary to complete the work. When a Unit Price Proposal for this item is not available, all costs for placing, maintaining and removing all temporary silt fences and deposited silt materials shall become part of the Lump Sum Base Bid.

4.08.9 SILT ACCUMULATIONS

(a) When provided for by the proper item in a Unit Price Proposal, the removal and disposal of silt accumulations shall be paid for at the Contract Unit Price per cubic yard of "Drainage Ditch Excavation".

(b) When a Unit Price Proposal for this item is not available, all cost for the removal and disposal of silt accumulations shall become part of and be considered to be incidental to the work covered by "Temporary Silt Fence."

4.08.10 GRASSING

(a) This item shall be paid for at the contract unit price per square yard. The Contract unit price shall be full compensation for ground preparation, furnishing and planting seeds, plant establishment and any incidental items necessary to obtain an acceptable ground cover

(b) All measurement of permanent seeding will be made horizontally.

4.08.11 TESTS

(a) Tests for compaction of cohesive and noncohesive soils, which shall be conducted by a testing laboratory approved by the Engineer, shall not be paid as a separate item; but shall be merged into either the lump sum or unit price items, as applicable.

(b) All cost of these tests shall be paid by the Contractor.

4.09 MEASUREMENT FOR PAYMENT AND COMPENSATION

4.09.1 GENERAL

If any or all of the work to be performed under this Contract is on a unit price basis, the actual number of units of each price item of work actually performed may be more or less than the number stated in the Bidding Schedule of the Proposal, or included in the Contract, but no variation in the Contract unit price will be made on that account. Payment will be

made only for the actual number of units incorporated in the work, or for the actual number of units of work performed, and at the Contract unit price for each such unit with measurement for payment made as defined in the following paragraphs.

GENERAL SPECIFICATIONS
5.0 FENCING

THIS SECTION NOT USED

GENERAL SPECIFICATIONS
6.0 BURIED PRESSURE PIPELINES

6.01 GENERAL

6.01.1 SCOPE OF WORK

(a) All labor, material, equipment, tools and services required for the furnishing, installation and testing of all buried pressure pipelines and appurtenances required on this Contract shall be furnished and installed in compliance with the following General Specifications, the Project Specifications, and the Contract Drawings.

(b) This General Specification, designated as Section 6.0 Buried Pressure Pipelines, covers the description of materials generally utilized in buried pressure pipeline construction and the installation of such materials. The Project Specifications and the Contract Drawings designate the specific work, the materials, location, grades, details and construction methods to be employed on the furnishing and installation of all Buried Pressure Pipelines and appurtenances on this Contract. The inclusion of items within this specification does not necessarily constitute their use on this Project. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

(c) Pipelines and appurtenances constructed under this Contract, under provisions of Section 6.0 Buried Pressure Pipelines, shall include the pipe, fittings, valves and appurtenances included in the pipeline systems which are not exposed within basins and vaults.

6.01.2 SHOP DRAWINGS

(a) Attention is directed to the provisions in the General Conditions of the Contract requiring the submission to the Engineer of descriptive details and of shop and setting drawings. On Buried Pressure Pipeline installation, such submission shall include the following, even though items proposed to be furnished conform to the exact description stated in the General or Project Specifications.

- (1) Full details of all pipe, specials, fittings, joints and assembly thereof.
- (2) Joint materials and details.
- (3) Reinforcing steel bending and setting drawings.

- (4) Catalog cuts and descriptions of valves, hydrants, service appurtenances, and all casting.
- (5) In addition, for all pipelines 16 inches in diameter and larger, a location profile referenced to the Contract Drawings showing the size, length and location of each pipe and fitting, and the details of all anchorage proposed.
- (6) In addition on all concrete pressure pipelines:
 - Gauge of pipe cylinder.
 - Diameter and spacing of circumferential wire.
 - Area of steel per lineal foot of pipe wall.
 - Tension under which wire is to be wound.
 - Unit stresses to be induced in wire and core.

6.01.3 STANDARDS

(a) Where materials and methods are indicated in the following Specifications as being in conformance with a standard specification, it shall refer in all cases to the latest edition of the specification and shall include all interim revisions. Listing of a standard specification without further reference indicates that the particular material or method shall conform with such listed specification. Where manufacturer(s) or trade names appear, it is only to represent a level of quality expected and in no way is to be construed to preselect the Contractor's supplier or equipment.

6.02 CONSTRUCTION MATERIALS

6.02.1 GENERAL

(a) All materials and equipment shall be furnished by an established and reputable manufacturer or supplier. All materials and equipment shall be new and shall be of first class ingredients and construction designed and guaranteed to perform the service required and shall conform to the following standard specifications or shall be the product of the listed manufacturer or similar and equal thereto as approved by the Engineer.

6.02.2 CAST AND DUCTILE IRON PIPE

- (a) PIPE AND FITTINGS
 - (1) BELL & SPIGOT PIPE AND MECHANICAL JOINT PIPE
ASA A21.6, A21.8, or A21.11 or AWWA C106, C108 or C111.

- (2) SINGLE GASKET JOINT PIPE (PUSH-ON JOINT)
ANSI 21.11 or AWWA C111. Bells shall be modified to accommodate a single gasket type jointing material. Modified bells shall be supplied on pipe only and not on fittings.
- (3) CAST IRON PIPE
ASA A21.1, ASA A21.6, or ASA A21.8 completely coated with coal tar pitch varnish; Federal WW-P-421.
- (4) DUCTILE IRON PIPE
ASA A21.51 or AWWA C151 Class 50 unless otherwise noted by the Project Specifications or Contract Drawings.
- (5) BELL & SPIGOT FITTINGS AND MECHANICAL JOINT FITTINGS
ASA A21.10 and/or A21.10 with A21.11 Joints or AWWA C110 and C111. All fittings shall be Standard Cast Iron fittings.
- (6) TAPPING SLEEVES
All tapping sleeves used on current centrifugally cast pipe shall have mechanical joints conforming to 6.02.2(a)(4). All tapping sleeves used on pit cast pipe shall be leaded Bell & Spigot joints conforming to ASA A21.8.
- (7) FLANGED PIPE
ASA A21.6 or A21.8 or AWWA C106 or C108. Flanges shall be faced and drilled to ASA Class 150 unless designated otherwise in the Project Specifications.
- (8) FLANGED FITTINGS
ASA A21.10 or AWWA C110. Flanges shall be faced and drilled to ASA Class 150 unless designated otherwise in the Project Specifications.
- (9) THICKNESS CLASS FOR BURIED CAST IRON PIPE AND FITTINGS -- ASA Specifications -- Laying Condition B as listed in Table 8.3 and/or 6.3 unless noted otherwise in Project Specifications or indicated on the Contract Drawings.
- (10) THICKNESS CLASS FOR BURIED DUCTILE IRON PIPE AND FITTINGS -- ASA Specifications -- Laying condition type 3 as listed in Table 51.1 for the depth of

trench stated in the Project Specifications or indicated on the Contract Drawings. All backfill shall be tamped to an elevation 12" above the top of the pipe.

- (11) Cast and Ductile iron pipe may be supplied in 18 foot or 20 foot laying lengths with all joints being the same length.

(b) COATINGS

- (1) The exterior of all pipe and fittings and the interior of all wall castings shall receive a Coal Tar coating as per Federal Specification WW-P 421C.
- (2) Cement Mortar Lining of interior of all pipe and fittings conforming to ASA A21.4. All cement lining shall receive a seal coat of bituminous material.

(c) JOINTS

(1) BELL AND SPIGOT

a. Packing material shall be either of the rubber or fibre type specifically designed for cast iron bell and spigot type joints. On pipelines designated to carry potable water supplies, extreme care shall be exercised to prevent contamination of packing material.

b. Rubber jointing units shall be either round or wedge shape fabricated of best quality of rubber.

c. Fibre type jointing material shall be submitted for approval by the Contractor.

d. Rubber jointing units for Single Gasket type joints shall consist of a single molded rubber gasket of the type designated as "Bell-Tite," "Tyton," "Fastite" or approved equal.

e. Jointing materials supplied for installation over the joint gaskets shall be lead or a commercial compound specifically manufactured for such purpose of a type approved by the Engineer. Lead shall be the best quality virgin pig lead conforming to ASTM B29.

- (2) Mechanical joints shall conform to ASA A21.11 or AWWA C111.

- (3) Flanged joints shall conform to A21.10 or AWWA C110.
 - a. Gaskets for flanged joints shall be fabricated of one sixteenth (1/16) inch thick cloth inserted best quality rubber, accurately cut to cover the full width of the flanges.
 - b. Bolts shall be fabricated of the best quality genuine wrought iron or steel cadmium plated with cold pressured hexagon nuts and square heads.

6.02.3 STEEL PIPE

(a) PIPE AND FITTINGS

Less than 30 inches in diameter AWWA C202. In diameters 30 inches and larger, AWWA C201. Fitting dimensions AWWA C208.

(b) COATINGS

(1) Coal Tar Enamel - Interior and exterior priming and coating with coal tar enamel and exterior bonding with cement asbestos felt wrapper -- AWWA C203 together with Section A1.2 and A3.1 of its Appendix.

(2) Cement Mortar Lining - AWWA C205.

(c) JOINTS

(1) Couplings - Couplings shall be of the Dresser or Victaulic rubber gasket bolted type.

(2) Field Welded - AWWA C206.

(3) Flanged - AWWA C207 with ring type flanges and full face rubber gaskets.

6.02.4 CONCRETE PIPE

(a) PIPE AND FITTINGS

(1) Prestressed Reinforced Concrete Cylinder Pipe AWWA C301.

- (2) Reinforced Concrete Cylinder Pipe (not Prestressed) AWWA C300.
- (3) Reinforced Concrete Pipe - AWWA 302 or ASTM C361.
- (b) LINING - All pipe and fittings shall receive a bituminous seal coat as per ASA 21.4.
- (c) JOINTS
 - (1) Steel Joint Ring and Rubber Gasket Pipe and fittings AWWA C300, C301, C302.
 - (2) Collar and Rubber Gasket - Pipe (not fittings) furnished with rubber gaskets in compliance with AWWA C302 shall be joined by a collar manufactured of non- corrosive material.

6.02.5 STANDARD P.V.C. PRESSURE PIPE

All standard P.V.C. pressure pipe shall conform to ASTM D2241 for pressure rating of 160 psi or 200 psi as stated in the Project Specifications. All rubber ring gaskets shall conform to ASTM D1869 and ASTM F477. Fittings for 3" and 4" P.V.C. pipe shall be gasketed P.V.C. fittings. Fittings for larger P.V.C. pipe shall be standard Cast Iron Push-On joint fittings with special transition Single Rubber Gaskets.

6.02.6 THICKWALL P.V.C. PRESSURE PIPE

All thickwall P.V.C. pressure pipe shall conform to AWWA C900 for Class 100, Class 150 or Class 200 as stated in the Project Specifications. All fittings shall be standard Cast Iron fittings with Push-On joint and Single Rubber Gaskets.

6.02.7 FIBERGLASS REINFORCED PIPE

All Fiberglass Reinforced Pipe shall be a composite pipe consisting of a P.V.C. interior core around which layers of roving fiberglass are wound and epoxy bonded in accordance with ASTM D2996. The pipe shall be constructed in 20 foot sections, shall be Class 150 or Class 200 as stated in the Project Specifications and shall have passed the ASTM D1599 test for burst pressure. The pipe joint shall be of an integral bell with a spigot end capable of accepting cast iron or ductile iron pipe creating a water tight joint with a rubber ring gasket.

6.02.8 SERVICE PIPES AND APPURTENANCES

(a) PIPE

(1) Copper Pipe - Service pipe shall be copper water tube, Type K, soft temper, for underground service, conforming to ASTM B-88 and B251. The pipe shall be marked with the manufacturer's name or trademark and a mark indicative of the type of pipe. The outside diameter of the pipe and minimum weight per foot of the pipe shall not be less than that listed in ASTM B251, Table 11.

(2) Plastic Pipe - Plastic service pipe shall be High Molecular Weight Polyethylene tubing approved by NSF for potable drinking water use. Tubing shall be S.D.R.-9 Copper Tube Size rated at 160 psi maximum allowable pressure at 73.4°F meeting or exceeding PE- 3406 and PS-24-69 standards.

(b) STOPS AND FITTINGS - All corporation stops and curb stops shall be fabricated of brass and shall be provided with outlets suitable for copper connections or wiped lead connections. Curb stops shall be of the roundway type. Fittings for lead services shall be of brass suitable for wiped joints. Fittings for copper pipe shall be copper and of the compression type. Stream line fittings of the soldered joint type may be used, if so designated in the Project Specifications. The type of threads for all corporation stops and curb stops shall be as specified in the Project Specifications.

(c) SERVICE BOXES - Service boxes shall be of the best quality iron, of the spiral type, with the base of ample size to completely house the services stop, and of such construction that it shall be capable of extension from a minimum of three (3) feet, to a maximum of four (4) feet, six (6) inches in length. Boxes shall be two and one-half (2-1/2) inches in diameter for stops one and one quarter (1-1/4) inches and smaller, and shall be three (3) inches in diameter for stops over one and one quarter (1-1/4) inches. Boxes shall be furnished with a cast iron cover labeled "City Water".

6.02.9 VALVES, HYDRANTS AND APPURTENANCES

(a) VALVES

(1) Unless otherwise required by the Project Specification or the Contract Drawings, all buried valves shall be gate valves. Valves other than gate valves, whether buried or not, shall be as

specified by Section 11 - Inside Process Piping located either in the General Specifications or the Project Specifications.

(2) Gate valves shall be non-rising stem valves with a 2 inch square operating nut, designed to take full pressure on either face furnished in full compliance with AWWA C501. All valves shall open by turning to the left unless otherwise specified.

(3) All valves shall be of ample strength to withstand and operate satisfactorily under the working pressures and shall be subject to the test pressures both expressed in pounds per square inch given in the following table. The class of valve to be used on each service shall be as defined in the Project Specifications.

<u>Class of Valve</u>	<u>Cold Water Pressure In Pounds Working</u>	<u>Per Square Inch Test</u>
A	150	300
B	50	100
C	25	50

(4) After the valves have been set, they shall be tested for satisfactory operation with the pipelines by the Contractor.

(5) Ends of valves shall comply with the requirements for cast iron pipe mechanical joint ends as specified in Paragraph 6.02.2 (a) above. Bolt holes on flanged end valves shall straddle the vertical centerline unless otherwise indicated on the Contract Drawings.

(6) Gate valves to be installed in a horizontal position in a horizontal line which are designed for working pressures lower than 150 pounds, in sizes 20 inches and larger, shall be equipped with bronze rollers running on bronze or integral cast iron tracks in the body; those which are designed for 150 pound working pressure, in sizes 16 inches and larger, shall be equipped with bronze rollers and bronze tracks secured to the body. Gate valves smaller than 16 inches shall have double cast iron disk, bronze mounted seat rings, parallel seat O-ring seals with bronze stem and stem nuts. All buried valves shall be Mechanical Joint. All valves shall be iron body bronze mounted gate valves with 2" square operating nuts.

(7) When so indicated in the Project Specifications, manually operated gate valves 16 inches and larger shall be equipped with a by-pass and by-pass valve. By-pass valve shall be of the same type as the main valve, shall be equipped with handwheel and shall

have the stem in a vertical position unless otherwise indicated on the Contract Drawings. Unless otherwise specified, all by-pass valves shall have a 2 inch square operating nut. Sizes shall be as follows:

<u>Main Valve Size</u> <u>Inches Diameter</u>	<u>By-Pass Valve Size</u> <u>Inches Diameter</u>
16 to 20	3
24 and 30	4
36 and 42	6
48 and larger	8

Such valves in sizes 16 inch to 20 inch shall be spur gear operated for installation in a horizontal line with stem vertical, and bevel gear operated for installation in a horizontal pipeline with stem horizontal on all valves larger than 20 inch. All bevel and spur geared valves shall be enclosed in a grease filled case.

(b) VALVE BOXES

(1) Valve boxes shall be supplied for all buried valves unless they are to be housed in valve basins. Valve boxes shall be made of good quality cast iron and shall be of the sectional type. The lower section shall be a minimum of five and one quarter (5-1/4) inches in diameter, enlarged to fit around the bonnet of the valve, if a two section box is used, or to fit a circular or oval base section if three section box is used. The upper section shall be arranged to screw down over the adjoining lower section and shall be full diameter throughout. Two (2) piece valve boxes shall be used on all valves up to those four (4) feet deep. Valves deeper than four (4) feet shall utilize SDR-41 on thicker PVC barrel extensions between the cast iron box sections. Valve boxes shall be provided with cast iron lids or covers. Lids or covers shall be marked "Water". The over-all length of valve boxes shall be sufficient to permit the top to be set flush with the established ground surface grade. City standard valve boxes shall be used any time such standard exists.

(c) HYDRANTS

Fire hydrants shall comply with all requirements of ANSI/AWWA C502-85 (latest revision), plus further design requirements listed herein.

Hydrants shall have a minimum valve opening of 4 ½". They shall be "dry top", "traffic model". Furnished two (2) each 2 ½" hose nozzles and one (1) each 4 ½" steamer nozzle with caps and chains. Nozzle threads shall be National Standard.

Furnish a pentagonal operating nut measuring 1 ½" from point to flat. Hydrants shall OPEN by turning the operating nut to the left (counter clockwise). Hydrants shall be suitable for setting in a 3'-6" trench unless deeper settings are required and indicated in the Bid Form. Provide a 6" mechanical joint base with MJ accessories. Hydrants shall be painted red.

Hydrants shall incorporate the following design features:

A WEATHER SHIELD shall be provided between the operating nut and the hydrant cover. Additionally, a weather cap shall be affixed which conceals the hold-down nut. It shall be embossed with an arrow indicating the opening direction.

A TRAVEL STOP NUT shall be provided in the "head" of the hydrant to eliminate further compressive loading of the hydrant rod after the hydrant has reached its full open position. Travel stop devices in the "base" or main valve area are not acceptable.

A DRY TOP LUBRICATION CHAMBER with triple "o-ring" seals shall be provided for protection and lubrication of the rod and operating nut threads. Hydrants shall be provided with an anti-friction thrust washer.

A TRAFFIC FLANGE (two piece) shall be provided at the groundline.

A BREAKABLE ROD COUPLING (one piece) shall be provided at the groundline connection of the upper and lower rods. Provide pin and cotter key fastening for easy removal of the coupling.

A BRONZE DRAIN RING shall be provided with integral, external drain ports. The drain ring shall be secured between the lower barrel and base flanges. The valve assembly shall be secured to the drain ring by bronze to bronze threading. The drain ring and valve assembly shall provide a totally bronze drain system. The drain system shall have a minimum of two (2) internal and two (2) external ports as a part of the all bronze drain system. Drain ports in the base and partially bronze lined drain systems are not acceptable.

Drain closure shall be by conventional double facings of an approved material other than leather. Hydrant valve top shall be bronze.

All flanges shall be integrally cast or "screwed-on". Snap or retainer ring (loose flange) design is not acceptable.

Hydrants shall be capable of being extended (raised) at the groundline in 6" increments. "Stacking" of extensions will not be permitted.

Hydrant design shall permit seat removal by use of a SHORT BODY "T" wrench which shall engage the upper hydrant rod. Designs requiring disassembly at the groundline are not acceptable.

Hydrant manufacturer shall have existing authorized stocking distributors currently serving the area of this project.

Hydrants shall be Model MARK-73-1 by American Darling Valve or Model 461 Centurian by Mueller Company unless otherwise specified by the Project Specifications.

All hydrants shall be furnished by one (1) manufacturer of the same type.

6.02.10 MATERIAL TESTING

(a) Attention is directed to the provisions in the General Conditions of Contract requiring the inspection and testing of materials to be incorporated in work included under this Contract, by a Testing Laboratory employed and paid by the Contractor, where required.

(b) All materials to be incorporated in the Construction of Buried Pressure Pipelines required under this Contract shall be subject to inspection and testing. Specimens up to 0.5 percent of the total number of each size of pipe furnished shall be tested, except that in no case shall less than two (2) specimens be tested. The laboratory making such tests shall furnish to the Engineer three (3) certified copies of the tests. No pipe shall be laid before these test reports are approved by the Engineer.

(c) Under the following items, pertinent tests required are:

(1) Reinforced Concrete Cylinder Pipe

a. Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, visual inspection at the site for conformance with AWWA C300 or C301.

b. Where the total quantity required on this Contract, including all pipe sizes, is more than 1,000 feet, tests shall be by independent laboratory per AWWA C300 or C301.

c. One pipe out of each 300 pieces completed shall be selected at random and subjected to a hydrostatic test of 150% of the design for the class of pipe specified. If the pipe fails in this test, the entire 300 lengths may be rejected.

(2) Reinforcing

Certified mill tests for conformance with ASTM A15 and A305.

(3) Cast Iron Pipe and Fittings and Ductile Iron Pipe

a. Where the total quantity on this Contract, including all pipe sizes, is less than 200 tons; each piece shall bear the manufacturer's serial number and shall be certified by the manufacturer for conformance with ASA A21.1, A21.6, A21.8, AWWA C110 or AWWA C111.

b. Where the total quantity on this Contract, including all pipe sizes, is more than 200 tons; each shipment shall be certified by the manufacturer as per (3)a above. In addition, the Contractor shall test by an independent laboratory per ASA A21.1, A21.6, A21.8, AWWA C110 or AWWA C111.

(4) Steel Pipe

Tests to be performed shall include those specified in AWWA C201 or AWWA C202.

(5) Standard P.V.C. Pressure Pipe

Tests to be performed shall include those specified in ASTM D2241.

(6) Thickwall P.V.C. Pressure Pipe

Tests to be performed shall include those specified in AWWA C900.

(7) Fiberglass Reinforced Pipe

Tests to be performed shall include those specified in ASTM D 1599.

6.03 CONSTRUCTION METHODS

6.03.1 TUNNELING

(a) Excavation in tunnels made beneath existing structures, across railroad rights-of-way, existing pavements and sidewalks for the installation of pipe or conduits, shall be of sufficient size, height and width to permit the installation of the pipe, to permit proper bracing of the tunnel section, and to permit ample room for the prosecution of the work and safety of the workmen.

(b) All tunnels shall be lined with full circle metal liner plates of sufficient strength to meet the loading conditions. Loading for highway and pavement tunnels shall be based upon continuous load carrying structures for the height of cover under H-20 loading; and loading for railroad tunnels shall be based upon continuous load carrying structures for the height of cover under Cooper E-70 loading. In no case shall liner plates for H-20 loading have a section modulus less than 0.0736 in. and for Cooper E-70 loading less than 0.0918 in. Liner plates for railroad tunnels shall be galvanized and bituminous coated.

(c) All work performed beneath existing structures, across railroad rights-of-way, and under pavements shall be performed in accordance with the requirements of the parties or agencies having jurisdiction over these locations. The Contractor shall contact the parties or agencies prior to starting work and shall meet all requirements of the parties or agencies in regard to methods of construction and the safety precautions to be taken in performing the tunnel work. All costs involved in meeting these requirements shall be paid for by the Contractor and no additional compensation will be allowed.

(d) At the Contractor's option, with the written approval of the Engineer, and with consent of the parties or agencies having jurisdiction; corrugated metal pipe, reinforced concrete pipe or steel pipe may be jacked

or bored in place as a casing pipe in lieu of a liner plate tunnel under the following conditions:

(1) That the Contractor be responsible for all approvals from the parties or agencies having jurisdiction, that the Contractor furnish complete details of the methods to be employed for approval and that the work shall be performed under the following conditions:

(2) Corrugated metal pipe shall be fabricated from corrugated galvanized sheets, number eight (8) gauge U.S.S., or as specified in the Project Specifications or Contract Drawings with base metal made by the open hearth process. Rivets shall be made of the same material as the base metal, thoroughly galvanized. The base metal sheets shall be galvanized on both sides by the hot dip process, at the rate of not less than two (2) ounces per square foot of metal, or one (1) ounce on each side. Corrugated pipe shall be specially fabricated for a jacking installation, with sections fabricated for field riveting. The pipe shall be furnished in lengths to suit the Contractor; however, the sections should be as long as is possible for the Contractor to conveniently handle and install, shall be bituminous coated inside and outside for railroad crossings. Reinforced concrete pipe shall be of the tongue and groove type, conforming to ASTM Designation C76, unless otherwise shown on the Contract Drawings and/or designated in the Project Specifications.

(3) A suitable approach trench shall be opened long enough to accommodate the length of pipe units to be placed, and wide enough to provide sufficient working room. Guide timbers or rails for keeping the pipe on line and grade shall be installed in the bottom of the trench, and heavy timber backstop supports installed at the rear of the trench to take the thrust of the jacks. A timber bearing or "pushing frame" shall be built and furnished to fit or match the end of the pipe to be jacked, so that the pressure of the jacks will be evenly distributed over the end of the pipe. Two (2) hydraulic jacks of sufficient power shall be used to apply pushing or jacking pressure. Excavation shall be carried on from inside the pipe, eight (8) to twelve (12) inches ahead of the lead pipe. Excavation at the top and sides shall be approximately one (1) inch greater than the outside periphery of the pipe. Bottom excavation shall be accurately cut to line and grade. Adjoining sections of corrugated iron pipe shall be made with cement mortar and jute from the inside. Adjoining sections of steel pipe shall be welded. Pipe shall be jacked on successive shifts until completed, this to

guard against the "freezing of the line" due to settlement and compaction of surrounding soil.

6.03.2 BORING

(a) Lines installed under highways or railroads shall be performed by boring where permitted and/or indicated by the Contract Drawings. Where boring is required, the Contractor shall be paid the unit price bid in the proposal for each linear foot of pipe, so placed, of the type bid upon in the proposal.

In placing pipe in bored tunnels, any annular space exceeding one-quarter inch in width between pipe and tunnel shall be grouted. The cost of grouting shall be an integral part of the price submitted in the proposal for the type and size of pipe required by the installation.

The Engineer may require "Boring or Tunneling" under objects or pavings not indicated on the plans, but required in the best interest of the Owner; in which case the payment for each linear foot required will be made at the unit price given in the proposal or at the unit price as established by Article 4.11 of the General Conditions.

The Contractor shall install casings in accordance with the following requirements:

(1) General

The Contractor shall be required to notify the Department of Transportation or the appropriate Railroad Association of the contemplated construction and shall verify or secure the necessary permits for performing the work.

(2) Carrier Pipe

Carrier line pipe and joints under highways and railroads shall be mechanical joint ductile iron pipe as per Section 6.02.2(a)(3) of this specification unless noted otherwise.

(3) Casing Pipe

The casing pipe shall be spiral welded or smooth wall steel pipe unless noted otherwise by the Project Specifications. All casing pipe shall have a minimum yield strength of 35,000 psi. All casing pipe and joints shall be of leakproof construction, capable of withstanding the intended loads. The inside diameter of the casing pipe

shall be at least four (4) inches greater than the largest outside diameter of the carrier pipe's joints or couplings. In all cases, the casing pipe shall be large enough to allow the carrier pipe to be removed. The required minimum wall thickness for casing pipes used under highways shall be as follows:

<u>Pipe Sizes (O.D.)</u>	<u>Wall Thickness</u>
12-3/4"	0.188
16"	0.250
18"	0.250
20"	0.250
24"	0.250
30"	0.312
36"	0.375
48"	0.432

The required minimum wall thickness for casing pipes used under railroads shall be as follows:

<u>Pipe Sizes (O.D.)</u>	<u>Wall Thickness</u>
Under 14"	0.188
14"	0.219
16"	0.219
18"	0.250
20"	0.281
22"	0.312
24"	0.344
26"	0.375
28"	0.406
30"	0.406
32"	0.438
34"	0.469
36"	0.469
38"	0.500
40"	0.500
42"	0.500

If casing pipe used under railroads is installed without an exterior protective coating, increase the wall thickness on the appropriate size 0.063 inches. The protective coating shall be at least a single coal - tar primer coat, followed by a single application of hot coal - tar enamel 3/32 inches thick plus a bonded 15 pound asbestos felt wrap.

(4) Installation

All work on borings shall be under the supervision of the appropriate Department of Transportation District Engineer or his authorized representative, who shall be notified at least 5 days before actual work of installation is begun.

Pipelines shall be installed under highways or railroads by boring or jacking, if practicable.

The casing pipe shall be installed by dry boring and jacking. As the dry boring operation progresses, each new section of the encasement pipe shall be butt welded to the section previously jacked into place. The boring auger shall not be of a greater diameter than the O.D. of the encasement (plus protective coating where applicable).

Voids are to be filled with a 1:3 Portland cement grout at sufficient pressure to insure that no settlement will occur. In the event that an obstruction is encountered during the dry boring operation, the auger is to be withdrawn, the excess pipe cut off and capped, and the void completely filled with 1:3 Portland cement grout at a minimum of 25 psi prior to moving to another boring site.

All boring operations shall be conducted at all times in such a manner so as not to create a hazard nor to impede the normal flow of traffic.

Where the ends of the casing pipe are below grade, the Contractor shall brick up the casing ends leaving a 4" Schedule 40 PVC drain pipe in the low end of the casing exiting into approximately 8 cu. feet of No. 57 or 67 stone. Where the ends of the casing are at or above ground surface and above high water level, they may be left open, provided drainage is afforded in such a manner that leakage will be carried away from any railroad, highway or structure. The carrier pipe shall be installed with one (1) centering spider at each joint. Bitumastic coat each spider prior to installation.

See items 6.03.1(d)(1), (2) and (3) for additional information pertaining to the jacking procedure.

6.03.3 PIPELINE INSTALLATION

(a) GENERAL

(1) The installation of pipe and fittings shall be done in accordance with latest revision of AWWA C600 and C605, with care being taken to provide uniform bearing for the pipe.

(2) The Engineer shall provide on the Contract Drawings a horizontal layout for the proposed pipeline construction along with a minimum of one (1) bench mark every 4,000 feet of line length. The Contractor shall be responsible for verifying the accuracy of any and all bench marks prior to use. No claim for extra work will be allowed for alleged inaccuracy of any bench mark

(3) It shall be the Contractor's responsibility to protect the original line and bench marks set by the Engineer. Should this information become destroyed or damaged, the cost of the replacement will be borne by the Contractor.

(4) Proper tools and appliances for the safe and convenient handling and laying of pipes and fittings shall be used. Great care shall be taken on coated items to prevent the coating from being damaged, particularly on the inside of pipes and fittings. All pieces shall be carefully examined for defects, and no piece shall be laid which is known to be defective. If any defective piece is discovered after having been laid, it shall be removed and replaced with a sound piece by the Contractor at his own expense. The interior pipe and fittings shall be thoroughly cleaned before laying and shall be kept clean until the completed work is ready for acceptance by the Owner.

(5) All pipelines and appurtenances, when laid, shall conform accurately to the lines and grades or depth of cover below established grade, as designated on the Contract Drawings or in the Project Specifications. If no cover or grade is so designated, the minimum cover to the top of pipe shall be three (3) feet. Control grades will be established by the Engineer, but shall be transferred to the pipeline by the Contractor. All pipe shall be laid in a straight line. If shown on the Contract Drawings or if approved by the Engineer, pipe joint deflection will be permitted at joints. The maximum joint deflection shall be in accordance with the pipe manufacturer's recommendations. Pipe shall be cut as required to locate fittings, valves and appurtenances at positions indicated on the Contract Drawings.

(6) Pipe and fittings shall be laid on good foundation, and where required, secured against settlement in a manner approved by the Engineer. All pipe shall be laid in a cut, flat bottom trench

with fill material hand tamped to 12" above the top of the pipe in 6" lifts, unless noted otherwise by the Project Specifications or the Contract Drawings. Thereafter, lifts not exceeding two (2) feet will be permitted in good soil. Mechanical compaction of this two (2) foot lift shall insure firm and unyielding soil prior to the placement of additional lifts. Upon encountering rock or areas with high groundwater, granular material equal to N. C. Department of Transportation standard size 67 shall be utilized as bedding material for a depth not less than six (6) inches, unless required otherwise by the Engineer, the Project Specifications or the Contract Drawings. All other laying conditions remain the same as stated herein and in Section 8.0 Pipeline - Trench Excavation and Backfill. All large clods of dirt, sticks, stones, etc., shall be removed from the ditch bottom prior to placement of any pipe or backfill. At joints, enough depth and width shall be provided around the pipe to permit the joints to be made in a proper manner. All pipes shall have a solid bearing throughout their entire length. When laid in tunnels or encasements, the pipe shall be blocked in such a manner as to take the weight off bells of couplings. At the end of each day's work, or when work is suspended temporarily, the pipe ends shall be tightly plugged.

(7) Whenever pipelines designated to carry potable water supplies cross or are laid less than ten (10) feet horizontally from existing or proposed drain or sewer lines, special precautions shall be taken as follows:

(a) Horizontal Separation

Should conditions prevail which prevent a lateral separation of 10 feet, the pipeline may be laid closer than 10 feet to a storm or sanitary sewer, provided the main is laid in a separate trench and at such an elevation that the bottom of the pipeline is at least 18 inches above the top sewer.

If it is impossible to obtain a horizontal separation of at least 10 feet and a vertical separation of at least 18 inches, as stipulated above, or if the water line crosses below the sewer line, the water and sewer lines shall be constructed or reconstructed of mechanical joint, cast iron pipe, or concrete pressure pipe, for a distance of 10 feet minimum, either side of the crossing, and be pressure tested to assure water tightness.

(b) Vertical Separation

Whenever the pipeline crosses house sewers, storm drains, or sanitary sewers, the pipeline shall be laid at such an elevation that the bottom of the line is at least 18 inches above the top of the drain or sewer. This minimum vertical separation shall be maintained for that portion of the pipeline located within 10 feet, horizontally, of any sewer or drain crossed, said 10 feet to be measured normal to the pipeline centerline to the drain or sewer.

Under conditions that the minimum vertical separation set forth in (a) cannot be maintained, or it is necessary for the pipeline to pass under a sanitary sewer main or a storm drain, the pipeline shall be laid with mechanical joint, cast iron pipe, and the pipe shall extend on each side of the crossing until the distance from the pipeline to the sewer or drain line measured normal to the pipeline centerline is at least 10 feet.

In making such crossings, a full length of pipe shall be centered over the sewer to be crossed so that joints will be equidistant from the sewer and as remote therefrom as possible. Where a pipeline must cross under a sanitary sewer main, the vertical separation of 18 inches between the bottom of the sewer and the top of the water main shall be maintained. The sewer shall be supported to prevent its settling as directed by the Engineer.

(8) Anchorage - Unless otherwise stated in the Project Specifications or Contract Drawings, all buried pipe six (6) inches in diameter and larger shall be anchored at each fitting causing a change in direction. Two lengths of adjoining pipe on each side of the elbow shall be anchored together by some suitable means, approved by the Engineer on pipe 16 inches in diameter and larger. Thrust blocks as specified in the Project Specifications or shown on the Contract Drawings shall also be installed to anchor the elbow.

(b) **CAST IRON PIPE OR DUCTILE IRON PIPE INSTALLATION**

(1) **Bell and Spigot Joints**

a. The installation of ductile iron pipe and fittings for water mains shall be in accordance with the appropriate

sections and subsections of the latest revision of AWWA C600.

b. In joining pipe, fittings, valves and appurtenances, the spigot shall be properly seated in the bell of the next adjacent piece and adjusted so as to give a uniform space for the jointing, which shall be made with rubber or fibre gasket and lead or compound, as designated in the Project Specifications. The packing shall be long enough to completely encircle the pipe and shall be thoroughly driven into the bell so as to leave a space of at least two and one-half (2-1/2) inches in depth to be fitted with lead or compound.

c. Each joint must be made in one pour. In making lead joints, the melting pot shall be kept near the joint to be poured and dross shall not be allowed to accumulate in the melting pot. Lead joints shall be thoroughly caulked by competent mechanics, and in such a manner as shall secure tight joints without overstraining the iron of the bells. Compound joints shall be made in strict conformance with the manufacturer's recommendations and directions.

(2) Flanged Joints

a. After placing gasket, bolts shall be inserted in all holes in the flanges and tightened. On flanged joints to be backfilled, a coating of tar shall be mopped on exposed portions of bolts and nuts.

(3) Mechanical Joints

a. Prior to making up the joint, the inside of the socket, the outside of the plain end of the pipe and the rubber gasket shall be washed thoroughly with soapy water, using a sponge or rag to remove all sand, grit and foreign matter.

b. The gland shall be placed over the plain end of the pipe and shall be followed by the rubber gasket. The lip of the gland and the thin edge of the gasket shall face the plain end of the pipe or the socket. The plain end of the pipe shall then be entered into the socket and the gasket shall be pushed "home" with the fingers. The gland shall next be moved into contact with the gasket. The bolts shall then be

inserted, and the nuts applied and pulled up by hand to refusal. The nuts shall then be tightened with a limit torque ratchet wrench, alternating the tightening from top to bottom and from one side to the other, until all nuts are drawn tight. If the joint is to be deflected, it shall be made up in a straight line and then deflected prior to the tightening of the nuts with the ratchet wrench. The size of the ratchet wrench and applied torque shall be in accordance with ASA Specification A21.11.

(4) Single Gasket, Rubber Seal Joint

a. Prior to making up the joint, the inside of the bell, the entire gasket and the spigot end of the joining pipe shall be thoroughly cleaned with soapy water, using a sponge or rag to remove all foreign matter.

b. The rubber molded gasket shall then be placed in correct position in the bell; and the gasket and surface of the spigot end of the joining pipe shall be lubricated in accordance with manufacturer's recommendations. The spigot shall then be centered into the bell until it engages the gasket and force applied to make the joint. Any deflection shall be taken after the joint assembly has been completed. Force to make the assembly can be supplied by means of a pinch bar applied to the bell end of the joining pipe in sizes of 3 inches to 12 inches. Other mechanical means, such as a chain and ratchet, shall be used to assemble sizes larger than 12 inches.

(c) CONCRETE PIPE INSTALLATION

(1) Concrete pipe and fittings shall be laid at the locations and to the grade and alignment as shown on the Contract Drawings. Changes in direction of the pipeline shall be made by the use of pipe joints or by the use of bevel end pipe. Changes in grade shall be made similarly using preconstructed bends where specifically designated on the Contract Drawings. Pipe sections and fittings shall be thoroughly cleaned on the inside before laying.

(2) All pipe and fittings shall be jointed by means of a steel ring and rubber gasket joint. The rubber ring gasket shall be of the roll-on-type and shall be placed so as to form a watertight joint between the bell and spigot of the concrete pipe in full compliance with the manufacturer's recommendations.

(3) The rubber gasket on the spigot end of the pipe and the bell of the receiving pipe shall be thoroughly lubricated with an approved vegetable soap before the pipes are jointed together. Machinery and equipment for laying the pipe shall be such as to assure that all pipes are completely and properly shoved home.

(4) Joint recesses on the outside of the pipe shall be protected from dirt and foreign material, and enclosed with a reinforced heavy paper or cloth diaper of adequate width. After the pipes are home and in place, the outside joint recess shall be filled with a cement grout, poured into place against the paper or cloth diaper. Grout shall consist of one (1) part of Portland cement and two (2) parts fine sand. Care shall be exercised in pouring the grout to assure that the recess around the entire circumference of the joint is completely filled.

(5) The recess of joints on the inside of all pipe 24" in diameter and larger, shall be pointed up from the inside of the pipe with cement mortar, using one part cement and one and one-half parts of sand. The inside recess shall be filled completely and the mortar troweled smooth and flush with the walls of the adjacent pipes.

(6) When specifically designated in the Project Specifications, a collar and rubber gasket type of joint shall be installed on straight pipe only. Such joint shall be made in accordance with the manufacturer's instructions.

(d) STEEL PIPE INSTALLATION

(1) Steel pipe shall be transported and handled in a manner to prevent damage to the lining or coating of the pipe. Prior to the lowering in of the pipe, each length of the pipe will be inspected by the Engineer and approved lengths properly identified. Damaged pipe shall be repaired or removed from the site as directed by the Engineer.

(2) During necessary shifting operations, pipe shall be carried, not dragged, into position. Where pinch bars are used for lining up, the bars shall be used only on the bare ends of the pipe. Where tongs are used for turning pipe, they shall be used only at bare ends.

(3) Removal or loosening of the Kraft paper during handling of the pipe shall be minimized and general care shall be taken to

avoid unnecessary abrasion of the pipe protection. If any abrasions occur, the coating and wrapping shall be cut back to the point of firmness. The Kraft paper shall be peeled back from the edges of the damaged area and the surface of the pipe cleaned and reprimed. One coat of hot enamel shall be applied with a dauber to a piece of felt of adequate size, and while the enamel is still hot, the enameled side of the piece of felt shall be applied to the repaired area, "gloving" it down smooth. The entire repaired surface shall be covered with an outer coat of hot enamel applied with a dauber. If the lining has become damaged at the ends of the pipe, the damaged areas shall be filled in smoothly, using a soft paint brush to "lay on" the replacing hot enamel.

(4) Only belt slings or well padded hooks or tongs shall be used for lowering pipe into ditch, and the use of chains or wire rope will not be permitted. Wood poles with broad flat faces shall be used for removing skids. Pipe or steel bars shall not be used for this purpose. If belt slings are used for lowering in pipe, care must be used so that when the sling is withdrawn from under the lowered pipe, the wrapping will not be torn.

(5) Jointing

a. The bare end of the pipe at each side of the joint shall be protected after assembling as follows:

The Kraft paper shall be torn back a few inches.

The exposed narrow ring of pipe surface shall be reprimed.

When the primer is dry, a coat of the same bituminous coating material used on the exterior of the pipe at the mill shall be applied by pouring and/or daubing hot, to the approximate thickness of the mill applied protection.

b. On coupled joints, the coupling assembly shall be carefully cleaned and reprimed before installation. Couplings shall be assembled on the job in a manner to insure tight flexible joints under all reasonable conditions, including pipe movements caused by expansion or contraction, slight settling of the ground, or minor variations in the trench gradient. After coupling has been assembled on the pipe and when the primer is dry, a heavy coat of hot enamel or the same materials as used on the pipe, shall be poured over the completed coupling

assembly. During the application of hot coating to pipe ends and couplings, a catch pan shall be placed beneath the joint to collect hot coating which would otherwise be wasted.

c. On welded joints, the welds shall be made in accordance with AWWA Specification C206 and the entire joint shall be covered with a coating of hot enamel as described under paragraph b - Coupled Joints.

d. Flanged Joints - Flanged joints shall be made in accordance with AWWA Specification C207, and the entire joint shall be covered with a coating of hot enamel as described under paragraph b - Coupled Joints.

(e) **STANDARD AND THICKWALL PVC PRESSURE PIPE**

(1) Installation of this pipe shall proceed in accordance with the instructions for laying Single Gasket, Rubber Seal Joint Cast and Ductile Iron pipe on page 21 of this specification section.

(2) Whenever it is necessary to cut a pipe, a rip saw or cross saw and a miter box shall be used to insure a true cut. All sawed pipe ends shall be thoroughly cleaned and deburred of all spalling plastic and beveled prior to assembly.

6.03.4 SERVICE PIPE INSTALLATION

Each water service pipe shall be connected to the water main through a brass corporation stop. The water main shall be tapped and the corporation stops inserted under pressure. The main shall be tapped at an angle of forty-five degrees, with the vertical, and the stop must be turned so that the T-handle will be on top.

6.03.5 STRUCTURES AND APPURTENANCES

(a) **GENERAL** - All special structures and valve basins shall be installed to the details shown on the Contract Drawings. Valve basins and structure sidewalls shall be constructed of monolithic concrete, concrete block or brick as designated by the General Specifications Section 9.

(b) **CONCRETE WORK** - Concrete and reinforcing steel shall be installed to the details shown on the Contract Drawings. Concrete shall be

proportioned, mixed and placed in compliance with PCA Specification for Plain and Reinforced Concrete. Concrete for structures shall be Class "B" and concrete for encasement cradles and thrust blocks shall be Class "C" as required by the General Specifications Section 9.

(c) **THRUST BLOCKS** - All buried pressure pipelines shall be backed up and anchored with poured concrete at all bends and at all changes of direction so that there will be no movement of the pipe in the joints due to internal or external pressures. Concrete shall be Class "C". The concrete shall completely fill the space between the bends or fittings and the wall of the trench from 6 inches below the fitting or pipe to 12 inches above the fitting or pipe, and so placed that there will be no interference with the making or remaking of joints regardless of the type of joint used. No hydrostatic test shall be allowed until seven (7) days have passed from the time the thrust blocks were poured, unless permitted by the Engineer.

(d) **APPURTENANCES**

(1) **Valves** - Valves shall be installed in locations designated on the Contract Drawings. On all buried valves, a cast iron screw down 5-1/4 inch valve box shall be set truly vertical and so supported until sufficient backfill has been placed to insure the vertical alignment of the box.

(2) **Hydrants** - Hydrants shall be installed at locations designated on the Contract Drawings, with the frost ring nearly at the level of finished grade. Each hydrant shall be set on a Class "C" concrete 2 foot square, 6 inch deep concrete slab with not less than three-fourths of a cubic yard of gravel or crushed stone furnished and placed at the base to provide drainage for the hydrant drip. Each hydrant shall be restrained with two (2), 3/4 inch bitumastic coated tie rods unless noted otherwise by the Project Specifications or the Contract Drawings. Tie rods shall extend from the hydrant through the valve and into the tee and shall be placed so as to permit removal of the hydrant.

6.04 COMPLETION OF CONTRACT

6.04.1 TESTING

(a) All water mains shall be tested prior to final approval. The pressure and leakage test shall be performed in the manner set forth in the latest revision of AWWA Standard C600. The pressure test shall be witnessed by the Owner's representative.

- (b) When a stretch of pipe and appurtenances have been completed and before it is covered, the Contractor shall furnish proper appliances and facilities for testing and draining the same, without injury to the work, or surrounding territory. If otherwise noted in the Project Specifications or if agreed to in writing by the Engineer, the Contractor shall be allowed to test sections of line that had previously been laid, and covered because of safety considerations, in lieu of testing the pipe as previously stated. He shall test by filling the pipe with clean water furnished by the Contractor at his expense. The Contractor shall not be allowed to test sections longer than the line valve spacing or 3500 feet, whichever is less. Air shall not be used for pressure testing, unless otherwise stated in the Project Specifications. All pressure pipe systems which are installed under this contract shall be subjected to a hydrostatic pressure test of 150 psi for not less than 2 hours during which time the leakage loss shall not exceed the number of gallons per hour for each section tested, as determined by the following formula:

$$L = \frac{SDP^{0.5}}{148,000}$$

- L = Allowable leakage, in gallons per hour
 S = Length of line under test, in feet
 D = Nominal diameter of the pipe, in inches
 P = Average test pressure, in psi

The test shall be made only under the supervision of the Engineer. The Contractor shall provide all equipment and perform all work required for the purposes. In case any section under test shows leakage in excess of the allowable amount, the Contractor shall make such repairs to the line as are required to bring the loss within the stipulated limits. The Engineer shall be allowed to select certain sections of line that may be advantageous to the Owner in order to meet his schedules. The Contractor shall meet ANSI/AWWA C600 for ductile iron pipe and UNI-BELL UNI-B-3 for PVC pipe.

(c) MISCELLANEOUS

- (1) Any defects, cracks or leakage that may develop, or that may be discovered either in the joints or in the body of the castings or pipe walls, shall be promptly made good by the Contractor, at his own expense, either by replacement of defective items or by repairs as approved by the Engineer. Backfilling around joints shall not be made until the leakage tests have been completed, except as previously noted, and if any leaks are discovered, the

installation shall be repaired and leaks eliminated to meet the requirements stated above.

(2) Depending on traffic conditions, public hazard, or other reasons, the Engineers may direct when tests of completed sections of mains shall be made and he may order such tests to be made in relatively short sections in order that hazardous sections may be backfilled promptly.

(3) Water service pipe and fittings shall be subjected to hydrostatic pressure of one hundred and fifty (150) pounds per square inch after the service is laid, and before any backfilling is done. Each service shall be required to sustain this pressure for a period of ten (10) minutes without leakage, before being acceptable.

6.04.2 STERILIZATION

(a) GENERAL

(1) All pipe, fittings and tanks connected to and forming a part of a potable water supply shall be sterilized in a manner acceptable to the Engineer. The following method, or other acceptable to the State Department of Health and the Engineer, shall be used.

(2) Generally, sampling taps shall be provided on the water main every five hundred (500) feet, in order to afford representative water testing and sample collection. When long transmission mains are constructed, without side connections, the distance between each tap may, at the discretion of the Engineer, be increased. In all instances, however, sampling taps shall be provided to collect a source sample and enough representative water samples for laboratory examination. All work, expenses and materials associated with this testing shall be borne by the Contractor.

(b) PRELIMINARY FLUSHING

Each valved section of the completed main shall be flushed prior to sterilization as thoroughly as possible with water pressure and outlets available, unless provided for differently by the Project Specifications or agreed to in writing by the Engineer. If no hydrant is provided at the end of the main section, a tap shall be installed at the main section extremity, large enough to develop a velocity in the main of at least 2.5 fps. The flushing operation

shall be done after the pressure test has been made. Each valved section of the newly laid pipe shall be flushed separately.

(c) DISINFECTING

(1) Before being placed in service, all new mains and existing piping disturbed in any manner by the work shall be disinfected. Draining the water from existing piping or even lowering the water pressure more than one-half will constitute disturbances of the piping.

(2) The disinfection of water mains, valves, tanks and other appurtenances incorporated into the main construction shall be accomplished by a chlorine-bearing compound of known chlorine content, prepared in solution form. The recommended chlorine-bearing compound shall be high test calcium hypochlorite (65-70 percent available chlorine). In the preparation of this solution, the powder shall first be made into a paste and then gradually thinned with water to approximately one percent chlorine solution (10,000 parts per million). This will require about 7.50 gallons of water to each one pound of powder. Solution shall be prepared in a wooden barrel and the solids permitted to settle out. The clear supernatant shall be applied to the main through a rubber hose by gravity, siphonage, injection or by suitable pump feeder.

(3) The point of chlorine application shall be at the beginning of the water main construction and/or any valve section thereof, through a corporation cock installed close to and on the downstream side of the regulating gate valve controlling the flow of water into the main. The rate of chlorine application shall be in such proportion to the rate of water flow entering the main that the chlorine dose applied shall produce at least fifty (50) parts per million (420 pounds per million gallons) chlorine concentration in the water within the main.

(4) During the disinfecting operation, valves, hydrants, and other mechanical devices controlling the flow of water shall be operated to permit full effectiveness of the chlorine. Valves shall be manipulated so that the strong solution within the main being sterilized will not flow back into the supply line nor flow into mains already in service. A chlorine concentration test shall be made, in turn, at each of the hydrants and/or taps provided for that purpose.

(d) RETENTION PERIOD

After the disinfecting operation has been completed and upon test, proved satisfactory, the heavily chlorinated water (50 ppm of chlorine) shall be retained in the main long enough to destroy all non-spore forming bacteria. This period shall be at least twenty-four (24) hours. At the completion of the retention period, the chlorine concentration of the water within the main shall be at least ten (10) parts per million.

(e) FINAL FLUSHING AND TESTS

(1) After the required period of retention has elapsed, the heavily chlorinated water shall be flushed out completely to waste by the Contractor until the replacement water throughout the length of the main shall, upon test, be proven comparable in quality to the water supply source. The Contractor may release chlorinated water and/or flush water only in the manner, location and rate as approved by the Engineer. Such approval shall be on a site by site basis.

(2) When the water in the treated main has been proven comparable to that of the source, water samples shall be collected at each of the sampling taps and submitted to a laboratory on two (2) separate days. Under no circumstances shall such samples be collected from hydrants or unsterilized hose connections. Should the results of the bacteriological examination prove satisfactory, the main shall be placed in service. Should the initial disinfecting fail to result in approval, the disinfecting procedure shall be repeated until satisfactory results are obtained.

(3) Bacteriological analyses shall be run by the Contractor. Samples must be picked up by the Contractor and run by a commercial or other state approved laboratory, approved by the Engineer, employed and paid by the Contractor, with the cost of such tests merged in the price for contract items.

6.05 MEASUREMENT FOR PAYMENT AND COMPENSATION

6.05.1 GENERAL

If any or all of the work to be performed under this Contract is on a unit price basis, the actual number of units of each price item of work actually performed may be more or less than the number stated in the Bidding Schedule of the Proposal, or included in the Contract, but no variation in

the Contract unit price will be made on that account. Payment will be made only for the actual number of units incorporated in the work, or for the actual number of units of work performed, and at the Contract unit price for each such unit with measurement for payment made as defined in the following paragraphs. Measurement for payment of work done on a unit price basis will be as follows. On lump sum contracts and lump sum items, no measurements for separate payment for buried pressure pipelines will be made.

6.05.2 PRESSURE PIPELINE

Measurement for pressure pipelines and service, whether cast iron, concrete, or other materials, will be made along the centerline of the pipe whether curved or straight, measured in place, and will include the laying length of valves, fittings and specials.

6.05.3 FITTINGS AND SPECIALS

Unless otherwise specifically provided in the Project Specifications, the cost of furnishing and placing specials and fittings shown on the Contract Drawings and/or called for in the Project Specifications shall be paid for on a poundage basis at the Contract unit price.

6.05.4 VALVES

Valves will be paid for at the contract unit price (which shall include the furnishing and installation of a cast iron valve box on buried valves) for each item installed.

6.05.5 HYDRANTS

Hydrants will be paid for at the Contract unit price for each item installed. No extra payment will be made for the concrete slab, base stone or for the gravel required for drip drainage.

6.05.6 SERVICES

Services will be paid for on the basis of the length of pipe installed and the number of shut-offs, etc., that are installed.

6.05.7 NO. 67 STONE BEDDING MATERIAL

No. 67 stone ordered placed under pipelines or used as backfill will be measured on the basis of the actual number of cubic yards ordered, furnished and placed.

GENERAL SPECIFICATIONS
7.0 GRAVITY SEWERS, CONDUITS, AND DRAINS

7.01 GENERAL

7.01.1 SCOPE OF WORK

(a) All labor, materials, equipment, tools and services required for the furnishing, installation and testing of all gravity sewers, conduits, and drains required on this Contract shall be furnished and installed in compliance with the following General Specification, the Project Specifications and the Contract Drawings.

(b) This General Specification designated as Section 7.0 covers the description of materials generally utilized in sewer and drain construction and the installation of such materials. The Project Specifications and the Contract Drawings will designate the specific work, the materials, the lines, grades and details and the construction methods to be employed on the furnishing and installation of all Sewers, Conduits, and Drains on this Contract. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

7.01.2 SHOP DRAWINGS

(a) Attention is directed to the provisions in the General Conditions of the Contract requiring the submission to the Engineer of descriptive details and of shop and setting drawings. On Sewer and Drain installations, such submission shall include the following even though items proposed to be furnished conform to the exact description stated in the General or Project Specifications:

- (1) Full details of pipe, fittings, specials, joints and the assembly thereof.
- (2) Joint materials and details.
- (3) Reinforcing steel bending and setting drawings.

7.01.3 STANDARDS

(a) Where materials and methods are indicated in the following Specifications as being in conformance with a standard specification, it shall refer in all cases to the latest edition of the specification and shall include all interim revisions. Listing of a standard specification without

further reference indicates that the particular material or method shall conform with such listed specification.

7.02 CONSTRUCTION MATERIALS

7.02.1 GENERAL

All materials and equipment shall be furnished by an established and reputable manufacturer or supplier. All materials and equipment shall be new and shall be of first class ingredients and construction, designed and guaranteed to perform the service required and shall conform with the following Standard Specifications or shall be the product of the listed manufacturers or similar and equal thereto as approved by the Engineer.

7.02.2 CLAY PIPE

- (a) CLAY DRAIN TILE - ASTM C4.
- (b) STANDARD STRENGTH, EXTRA STRENGTH AND PERFORATED CLAY SEWER PIPE - ASTM C700.

7.02.3 CONCRETE PIPE

- (a) CONCRETE DRAIN TILE - ASTM C412.
- (b) CONCRETE SEWER PIPE - ASTM C14 and Concrete with minimum cement content of 6.5 sacks per cubic yard of concrete. All pipe specified to be ASTM C-14 pipe shall be bid as Class 2, "B" wall pipe with O-ring rubber gasket joints unless otherwise noted by the Project Specifications. Joints may be either with or without shoulders on the tongue. Joints shall meet ASTM C-443.
- (c) REINFORCED CONCRETE CULVERT, STORM DRAIN AND SEWER PIPE - ASTM C76 with circular reinforcement, wall thickness B, or as designated in Project Specifications or Drawings, and concrete with minimum cement content of 6.5 sacks per cubic yard of concrete. The class of pipe shall be as required by the Project Specifications and/or Contract Documents. All pipe specified to be ASTM C-76 pipe shall be bid as Class 3, "B" wall pipe with O-ring rubber gasket joints unless otherwise noted by the Project Specifications. Joints shall have opposing shoulders designed to meet ASTM C-443 and suitable for pipe meeting ASTM C-361 and AWWA C-302.

- (d) PERFORATED CONCRETE PIPE - ASTM C444.
- (e) REINFORCED CONCRETE LOW HEAD PRESSURE PIPE - ASTM C361 with circular reinforcement and concrete with minimum cement content of 6.5 sacks per cubic yard of concrete.
- (f) REINFORCED CONCRETE CYLINDER PIPE - AWWA C300 or C301.
- (g) REINFORCED CONCRETE SUBAQUEOUS CYLINDER PIPE - AWWA C300 or C301. Steel lugs for draw bolts shall be located on the springline at the ends of each pipe. Draw bolts with units shall be supplied to pull the pipe together subaqueously.
- (h) FLARED END SECTIONS (FES) - FES shall be used on all free-discharging concrete storm drain pipes unless specifically noted otherwise by the Project Specifications. All flared end sections (FES) shall be of the same material as the pipeline.

7.02.4 CAST IRON PIPE

- (a) CAST IRON PIPE - ASA A21.1, ASA A21.6, or ASA A21.8 completely coated with coal tar pitch varnish; Federal WW-P-421.
- (b) CAST IRON PIPE FITTINGS - AWWA C110 completely coated with coal tar pitch varnish. Wall castings and wall sleeves shall be provided with intermediate wall collars and shall be coated on inside only.
- (c) CAST IRON SOIL PIPE - ASTM A74. This pipe shall only be installed in locations specifically noted on the Contract Drawings.

7.02.5 DUCTILE IRON PIPE

All ductile iron pipe shall conform to AWWA C151, class 50 unless otherwise noted in the Project Specifications and/or the Contract Drawings. All joints shall be of the Push-On type, unless otherwise noted in the Project Specifications and/or Contract Drawings.

7.02.6 P.V.C. GRAVITY SEWER PIPE

All P.V.C. Gravity Sewer Pipe shall conform to ASTM D 3034.

7.02.7 FIBERGLASS REINFORCED PIPE

All fiberglass reinforced pipe shall be a composite pipe consisting of a P.V.C. interior core around which layers of roving fiberglass are wound and epoxy bonded in accordance with ASTM D2996. The pipe shall be constructed in 20 foot sections, shall be 150 psi pressure rated and shall pass the ASTM D1599 test for burst pressure. The pipe joint shall be of an integral bell with a spigot end capable of accepting cast iron or ductile iron pipe creating a water tight joint with a rubber ring gasket.

7.02.8 CORRUGATED METAL PIPE

All corrugated metal pipe shall be furnished in accordance with the requirements of the Project Specifications, the Contract Drawings, and Federal Specification WW-P-405B.

Corrugated metal pipe used for storm drain shall be mitered on all free-discharging ends unless specifically noted otherwise by the Project Specifications.

7.02.9 CORRUGATED POLYETHYLENE PIPE

All corrugated polyethylene pipe shall be furnished in accordance with ASTM F405 and F667, and AASHTO M252 and M294.

7.02.10 JOINTING MATERIALS

(a) CEMENT MORTAR shall be composed of one (1) part Portland cement and two (2) parts clean torpedo sand. Where pipe is to be laid in wet sand, the Contractor shall use one-third (1/3) natural cement and two-thirds (2/3) Portland cement in lieu of 100% Portland cement in preparing the joint mortar or add an approved waterproofing agent to the mortar.

(b) RUBBER GASKETS - ASTM C443. Shape and design satisfactory to the Engineer.

(c) MECHANICAL JOINTS - ASA A21.11.

(d) GASKET TYPE JOINTS FOR BELL AND SPIGOT CAST IRON PIPE shall be similar and equal to American "Fastite," U.S. "Tyton," Clow "Bell-Tite" or approved equal.

(e) FACTORY FABRICATED RESILIENT MATERIAL JOINTS FOR CLAY PIPE - ASTM C425.

(f) CORRUGATED METAL PIPE JOINTS shall be as specified by Section 7.03.3(c)(9) unless otherwise noted by the Project Specification.

(g) All joints used on Fiberglass Reinforced Pipe shall be Mechanical Joints conforming to ASA A21.11 unless otherwise noted in the Project Specifications or Contract Drawings.

7.02.11 MATERIAL TESTING

(a) Attention is directed to the provisions in the General Conditions of the Contract requiring the inspection and testing of materials to be incorporated in work included under this Contract, by a Testing Laboratory employed and paid by the Contractor, unless otherwise noted by the Project Specifications.

(b) All materials to be incorporated in the Construction required under this Contract shall be subject to inspection and testing. Specimens up to 0.5 percent of the total number of each size of pipe furnished shall be tested, except that in no case shall less than two (2) specimens be tested. The laboratory making such tests shall furnish to the Engineer three (3) certified copies of the tests. No pipe shall be laid before these reports are approved by the Engineer.

(c) Under the following items, the pertinent tests required are:

(1) Clay Pipe - Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, visual inspection at the site for conformance with ASTM C4 and C700. Where the total quantity required on this Contract including all pipe sizes is more than 1,000 feet, tests shall be by an independent laboratory per ASTM C301 for conformance with ASTM C700. Drain tile shall be tested per ASTM C4.

(2) Concrete Pipe - Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, visual inspection at site for conformance with ASTM C14, C412, and C444. Where the total quantity required on this Contract, including all pipe sizes, is more than 1,000 feet, tests shall be by an independent laboratory per ASTM C14, C412, and C444.

(3) Reinforced Concrete Pipe - Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, visual inspection at the site for conformance with ASTM C76. Where the total quantity required on this Contract, including all pipe sizes, is more than 1,000 feet, tests shall be by an

independent laboratory per ASTM C76, Section 9.0. In sizes 30 inches and larger, strength and amount of reinforcing may be determined by crushing tests on concrete cores taken from the pipe in accordance with ASTM C497.

(4) Reinforced Concrete Cylinder Pipe - Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, visual inspection at the site for conformance with AWWA C300 or C301. Where the total quantity required on this Contract, including all pipe sizes, is more than 1,000 feet, tests shall be by independent laboratory per AWWA C300 or C301.

(5) Reinforced Concrete Low-Head Pressure Pipe - Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, preliminary hydrostatic joint tests, concrete cylinder tests and visual inspection at the site for conformance with ASTM C361. Where the total quantity required on this Contract including all pipe sizes, is more than 1,000 feet, preliminary hydrostatic joint tests, followed by hydrostatic tests on 0.5 percent of the number of each size required and concrete cylinder tests by an independent laboratory per ASTM C361.

(6) Corrugated Metal Pipe - All corrugated metal pipe furnished shall be tested in accordance with the requirements set forth in Section 4, "Quality Assurance Provisions", of Federal Specification WW-P-405B. All pipe sampling shall be as stated in Federal Specification MIL-STD-105. A certification from the manufacturer will be accepted when filled out on the form enclosed as part of these Contract Documents.

(7) Corrugated Polyethylene Pipe - All corrugated polyethylene pipe furnished shall be tested in accordance with the test procedures described in AASTO M252 and 294, and ASTM 405 and 667. The supplier shall include a certification form indicating the passage of the tests as performed by the manufacturer on all projects where the total project amount is 1,000 feet or more.

(8) Reinforcing - Certified mill tests for conformance with ASTM A15 and A305.

(9) Cast Iron Pipe and Ductile Iron Pipe Fittings - Where the total quantity required on this Contract, including all pipe sizes, is less than 200 tons, each piece shall bear the manufacturer's serial number and shall be certified by the manufacturer for conformance.

(10) P.V.C. Gravity Sewer Pipe - Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, visual inspection at the site for conformance with ASTM D3034 shall apply. Where the total quantity required on this Contract, including all pipe sizes, is more than 1,000 feet, test shall be made by an independent laboratory as per ASTM D3034. The sampling frequency shall not be less than one (1) sample per lot.

(11) Fiberglass Reinforced Pipe - Where the total quantity required on this Contract, including all pipe sizes, is less than 1,000 feet, visual inspection at the site for conformance with ASTM D2996 shall apply. Where the total quantity required on this Contract, including all pipe sizes, is more than 1,000 feet, tests shall be by an independent laboratory as per ASTM D2992 and D2996. The sampling frequency shall not be less than one (1) sample per lot.

7.03 CONSTRUCTION METHODS

7.03.1 TUNNELING

(a) Excavation in tunnels made beneath existing structures, across railroad rights-of-way, existing pavements and sidewalks for the installation of pipe or conduits, shall be of sufficient size, height and width to permit the installation of the pipe, to permit proper bracing of the tunnel section, and to permit ample room for the prosecution of the work and safety of the workmen.

(b) All tunnels shall be lined with full circle metal liner plates of sufficient strength to meet the loading conditions. Loading for highway and pavement tunnels shall be based upon continuous load carrying structures for the height of cover under H-20 loading; and loading for railroad tunnels shall be based upon continuous load carrying structures for the height of cover under Cooper E-70 loading. In no case shall liner plates for H-20 loading have a section modulus less than 0.0736 in. and for Cooper E-70 loading less than 0.0918 in. Linear plates for railroad tunnels shall be galvanized and bituminous coated.

(c) All work performed beneath existing structures, across railroad rights-of-way, and under pavements shall be performed in accordance with the requirements of the parties or agencies having jurisdiction over these locations. The Contractor shall contact the parties or agencies prior to starting work and shall meet all requirements of the parties or agencies in regard to methods of construction and the safety precautions to be taken in

performing the tunnel work. All costs involved in meeting these requirements shall be paid for by the Contractor and no additional compensation will be allowed.

(d) At the Contractor's option, with the written approval of the Engineer, and with consent of the parties or agencies having jurisdiction; corrugated metal pipe, reinforced concrete pipe or steel pipe may be jacked or bored in place as a casing pipe in lieu of a liner plate tunnel under the following conditions:

(1) That the Contractor be responsible for all approvals from the parties or agencies having jurisdiction, that the Contractor furnish complete details of the methods to be employed for approval and that the work shall be performed under the following conditions:

(2) Corrugated metal pipe shall be fabricated from corrugated galvanized sheets, number eight (8) gauge U.S.S., or as specified in the Project Specifications or Contract Drawings with base metal made by the open hearth process. Rivets shall be made of the same material as the base metal, thoroughly galvanized. The base metal sheets shall be galvanized on both sides by the hot dip process, at the rate of not less than two (2) ounces per square foot of metal, or one (1) ounce on each side. Corrugated pipe shall be specially fabricated for a jacking installation, with sections fabricated for field riveting. The pipe shall be furnished in lengths to suit the Contractor; however, the sections should be as long as is possible for the Contractor to conveniently handle and install, and shall be bituminous coated inside and outside for railroad crossings. Reinforced concrete pipe shall be of the tongue and groove type, conforming to ASTM Designation C76, unless otherwise shown on the Contract Drawings and/or designated in the Project Specifications.

(3) A suitable approach trench shall be opened long enough to accommodate the length of pipe units to be placed, and wide enough to provide sufficient working room. Guide timbers or rails for keeping the pipe on line and grade shall be installed in the bottom of the trench, and heavy timber backstop supports installed at the rear of the trench to take the thrust of the jacks. A timber bearing or "pushing frame" shall be built and furnished to fit or match the end of the pipe to be jacked, so that the pressure of the jacks will be evenly distributed over the end of the pipe. Two (2) hydraulic jacks of sufficient power shall be used to apply pushing or jacking pressure. Excavation shall be carried on from inside the

pipe, eight (8) to twelve (12) inches ahead of the lead pipe. Excavation at the top and sides shall be approximately one (1) inch greater than the outside periphery of the pipe. Bottom excavation shall be accurately cut to line and grade. Adjoining sections of corrugated iron pipe shall be made with cement mortar and jute from the inside. Adjoining sections of steel pipe shall be welded. Pipe shall be jacked on successive shifts until completed, this to guard against the "freezing of the line" due to settlement and compaction of surrounding soil.

7.03.2 BORING

(a) Lines installed under highways or railroads shall be performed by boring where permitted and/or indicated by the Contract Drawings. Where boring is required, the Contractor will be paid the unit price bid in the proposal for each linear foot of pipe, so placed, of the type bid upon in the proposal.

In placing pipe in bored tunnels, any annular space exceeding one-quarter inch in width between pipe and tunnel shall be grouted. The cost of grouting shall be an integral part of the price submitted in the proposal for the type and size of pipe required by the installation.

The Engineer may require "Boring or Tunneling" under objects or pavings not indicated on the plans, but required in the best interest of the Owner; in which case the payment for each linear foot required will be made at the unit price given in the proposal or at the unit price as established by Article 4.11 of the General Conditions.

The Contractor shall install casings in accordance with the following requirements:

(1) General

The Contractor shall be required to notify the Department of Transportation or the appropriate Railroad Association of the contemplated construction and shall verify or secure the necessary permits for performing the work.

(2) Carrier Pipe

Carrier line pipe and joints under Highways and Railroads shall be ductile iron pipe as per Section 7.02.5 of this specification unless noted otherwise.

(3) Casing Pipe

The casing pipe shall be spiral welded or smooth wall steel pipe unless noted otherwise by the Project Specifications. All casing pipe shall have a minimum yield strength of 35,000 psi. All casing pipe and joints shall be of leakproof construction, capable of withstanding the intended loads. The inside diameter of the casing pipe shall be at least four (4) inches greater than the largest outside diameter of the carrier pipe's joints or couplings. In all cases, the casing pipe shall be large enough to allow the carrier pipe to be removed. The required minimum wall thickness for casing pipes used under highways shall be as follows:

<u>Pipe Sizes (O.D.)</u>	<u>Wall Thickness</u>
12 3/4"	0.188
16"	0.250
18"	0.250
20"	0.250
24"	0.250
30"	0.312
36"	0.375
48"	0.432

The required minimum wall thickness for casing pipes used under railroads shall be as follows:

<u>Pipe Sizes (O.D.)</u>	<u>Wall Thickness</u>
Under 14"	0.188
14"	0.219
16"	0.219
18"	0.250
20"	0.281
22"	0.312
24"	0.344
26"	0.375
28"	0.406
30"	0.406
32"	0.438
34"	0.469
<u>Pipe Sizes (O.D.)</u>	<u>Wall Thickness</u>
36"	0.469
38"	0.500
40"	0.500
42"	0.500

If casing pipe used under railroads is installed without an exterior protective coating, increase the wall thickness on the appropriate size 0.063 inches. The protective coating shall be at least a single coal - tar primer coat, followed by a single application of hot coal - tar enamel 3/32 inches thick plus a bonded 15 pound felt wrap.

(4) Installation

All work on borings shall be under the supervision of the appropriate District Engineer or his authorized representative, who shall be notified at least 5 days before actual work of installation is begun.

Pipelines shall be installed under Highways or Railroads by boring or jacking, if practicable.

The casing pipe shall be installed by dry boring and jacking. As the dry boring operation progresses, each new section of the encasement pipe shall be butt welded to the section previously jacked into place. The boring auger shall not be of a greater diameter than the O.D. of the encasement (plus protective coating where applicable).

Voids are to be filled with a 1:3 Portland cement grout at sufficient pressure to insure that no settlement will occur. In the event that an obstruction is encountered during the dry boring operation, the auger is to be withdrawn, the excess pipe cut off and capped, and the void completely filled with 1:3 Portland cement grout at a minimum of 25 psi prior to moving to another boring site.

All boring operations shall be conducted at all times in such a manner so as not to create a hazard nor to impede the normal flow of traffic.

Where the ends of the casing pipe are below grade, they shall be bricked up with a four inch (4") Schedule 40 PVC drain at the low end. The drain shall have 8 cu. feet of No. 67 or 57 stone covering its outlet. Where the ends of the casing are at or above ground surface and above high water level, they may be left open, provided drainage is afforded in such a manner that leakage will be carried away from any railroad, highway or structure. See items 7.03.1(d)(1), (2) and (3) for additional information pertaining to the jacking procedure.

7.03.3 PIPELINE INSTALLATION

(a) GENERAL

(1) The Engineer shall provide on the Contract Drawings a horizontal layout for the proposed pipeline construction along with a minimum of one (1) bench mark every 5,000 feet of line length. The Contractor shall be responsible for verifying the accuracy of any and all bench marks prior to use. No claim for extra work will be allowed for alleged inaccuracy of any bench mark. Should the Contractor require additional bench marks for the installation, said marks are at his cost.

(2) It shall be the Contractor's responsibility to protect the original line and bench marks set by the Engineer. Should this information become destroyed or damaged, the cost of the replacement will be borne by the Contractor.

(3) All Clay Pipe, Concrete Pipe, Cast Iron Pipe, Ductile Iron Pipe, and Corrugated Metal Pipe shall be laid in conformance with the ASTM standard for installing vitrified clay pipe, ASTM C12. This specification shall be strictly conformed with unless otherwise noted by the Project Specifications. The bedding type shall be Class C unless otherwise noted. This bedding requires the use of granular materials equivalent to the NC Department of Transportation gradation size No. 67, or approved equal, unless otherwise noted by the Project Specifications or required by the ENGINEER on site because of local conditions.

All extruded A.B.S. Truss Pipe, P.V.C. Pipe and Fiberglass Reinforced Pipe shall be laid in conformance with the ASTM standard for installing flexible thermoplastic pipe ASTM D2321. This specification shall be strictly conformed with unless otherwise noted by the Project Specifications or required by the ENGINEER on site because of local conditions. The pipe shall be bedded to the ASTM C12 specification for Class C bedding unless otherwise noted. See Section 8.0 Pipeline - Trench Excavation and Backfill of the General Specifications for additional information.

(4) The junction of two or more sewers shall be made in strict conformance with the Contract Drawings. The cost of all connections shall be included in the contract price for the new sewers unless otherwise specifically provided in the Contract.

(5) New sewer connections with old existing sewers shall be made within a manhole. Where an old manhole exists at the point of connection of new and old sewers, it shall be repointed and any loose bricks or blocks in the walls of the old existing manhole shall be relaid. The cost of such work shall be included in the Contract price for new main sewer unless other payments are specifically provided for in the Project Specifications.

(6) Where no old manhole exists at the point of connection, a new manhole shall be constructed of the size and type shown on the Contract Drawings. Payment for such additional manholes will be made at the unit price in the Contract for new manholes, which price shall include all work necessary to make the connection.

(7) Connections of new sewers to existing sewers, when encountered in construction and not shown on the Contract Drawings, shall be made where ordered by the Engineer. Such connection shall be made within a manhole, except for house sewer and drain connections. When such sewer connections are made within an existing manhole, any added work involved will be paid for in accordance with the procedure outlined in the General Conditions of the Contract. If the Engineer orders such connections to be made in a new manhole, such new manhole will be paid for at the prices established in the Contract, which price shall include all work necessary to make the connection.

(8) When connections are made with sewers carrying sewage or water, special care must be taken that no part of the work is built under water. A flume or dam must be installed and pumping maintained, if necessary, to keep the new work in the dry until completed and concrete or mortar has set up.

(9) Junctions for future sewer connections, where indicated on the Contract Drawings, shall be bricked off at the ends or otherwise sealed off in a manner satisfactory to the Engineer; the cost to be merged in the Contract price for manholes or sewers.

(10) No pipe shall be laid upon a foundation in which frost exists; nor at any time when the Engineer shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation. The pipe shall be fitted together and matched so that there shall be no shoulder or unevenness along the inside bottom half of the pipe, and so that alignment and slope are correct. No pipe shall be laid until the preceding length has been completely aligned and secured. Joints shall not be completed

until sufficient pipe has been laid in advance to insure against injuring the finished joints. When jointed in the trench, the pipe shall form a true and smooth line of sewer. Pipe shall not be trimmed except for closures, and pipe not making a good fit shall be removed. Where slight defects occur and the use of the pipe is approved by the Engineer, defects shall be placed in the top of the sewer. Temporary bulkheads shall be placed in all open ends of sewer lines whenever pipe laying is stopped for more than 8 hours. When sections of line between manholes have been completed, an inspection shall be conducted and all deficiencies corrected. This inspection does not constitute acceptance.

(b) PIPE LAYING

(1) Each pipe shall be laid on an even, firm bed, so that no uneven strain will come to any part of the pipe. Particular care shall be exercised to prevent the pipes bearing on the sockets. Bell holes for bell and spigot pipe shall be dug at each point as hereinbefore specified. Each pipe shall be laid in conformity with the line and grades given by the Engineer, and in the presence of the inspector. The bell-end of the pipe shall be laid upgrade. Subgrade preparation shall be such that each pipe spigot will be entered in the receiving pipe bell in such a manner that the joint packing can be freely inserted at all points of the joint circumference, special care being taken to provide adequate joint space at the bottom of the joint without raising the pipe off of the trench bottom for packing insertion. No portion of the weight of the spigot end of the pipe shall be transmitted to the receiving pipe bell through the joint packing.

Before each piece of pipe is lowered into the trench, it shall be thoroughly inspected to insure its being clean. Each piece of pipe shall be lowered separately. No piece of pipe or fitting which is known to be defective, shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

(2) The interior of the sewer shall, as the work progresses, be cleaned of all dirt, jointing material and superfluous materials of every description. On small pipe sewers, where cleaning after laying may be difficult, a swab or drag shall be kept inside the pipeline and pulled forward past each joint immediately after its

completion. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent floatation of pipe by run-off into trench.

(3) All pipe shall be completely shoved home. On pipe of the tongue and groove type, 30" in diameter and larger, pressure must be applied to the center of each pipe as it is laid by a winch and cable or other mechanical means properly set and operated to insure that the spigot is all the way home in the socket, and that the sewer joint is of uniform size throughout the circumference of the pipe.

(4) Laying holes in pipe, if used, shall be tapered and shall be plugged before backfilling with a tapered concrete plug set in mortar or mastic.

(5) Pipes laid in tunnel or casing pipe shall be supported on suitable blocks cut or grouted into position to place the invert of the sewer or drain at the slope and to the elevations indicated on the Contract Drawings.

(6) On pipes laid in tunnel or casing pipe, the space between the casing pipe and tunnel lining shall be either backfilled with fine low void sand thoroughly rammed or flushed into place, backfilled with Class "C" concrete or left unbackfilled as designated in the Project Specifications. If left unbackfilled, each end shall be suitably bulkheaded to protect against entrance of foreign material.

(7) All Gravity Flow Pipeline shall be installed using a laser for control of vertical and horizontal alignment. The Contractor shall follow accepted practices in the utilization of the laser. A certified laser operator shall be present on the job at all times. Care shall be exercised to assure that the alignment control range of the instrument is not exceeded; but in no case, shall the range exceed 500 feet. Care shall be taken to prevent vibration of or direct sunlight on the instrument. Where present, a blower shall be provided to purge glue vapors from the pipe. An air velocity meter shall be provided so that the velocity of air in the pipe will not be great enough to cause the light beam to be distorted. The Contractor shall coordinate the work to minimize the number of take downs and set ups at each point. Periodic checks of the laser shall be made to assure that alignment is maintained.

(8) During the installation process, any non-ferrous pipe that is closer than 36" to the ground surface or closer than 12" to crossing storm drain shall be installed by the Contractor as ductile iron pipe, unless specifically changed in writing by the Engineer.

(c) PIPE JOINTS

(1) General - In all jointing operations the trench must be dewatered when joints are made and kept dewatered until sufficient time has elapsed to assure efficient hardening of the jointing material. Bell and spigot, or tongue and groove ends of the pipe shall first be wiped clean before actual jointing operations are started. The type of joint to be installed in each location of the several following types specified shall be as specifically designated in the Project Specifications.

(2) Cement Mortar and Jute Joints - Joints between consecutive pipes made with jute and Portland Cement Mortar shall be constructed as follows:

a. On bell and spigot pipe, or variations thereof, plastic mortar shall be spread in the bottom one-third of the bell of the pipe previously laid. A closely twisted gasket of jute of proper thickness and of sufficient length to span around the pipe and lap at the top shall then be squeezed into the mortar. The spigot of the next pipe shall be entered and shoved home. After the pipe has been thoroughly bedded to line and grade, the jute gasket shall be caulked into the annular space with a suitable caulking tool in such manner as to seal the joint against leakage. The remainder of the space shall be completely filled with plastic mortar beveled off with the outside of the pipe. The joint in pipes 30" or larger in diameter shall also be pointed and smoothed from the inside after the pipe has been laid.

b. On tongue and groove type pipe, the jute shall be firmly attached to the middle of the tongue of each pipe in one continuous length with a compatible cement having adhesive properties similar and equal to EC104 rubber cement as provided by the Minnesota Mining and Manufacturing Company. Plastic mortar shall be placed on the edges of the upper half of the tongue of the pipe to be laid and the lower half of the socket of the pipe previously laid; the pipe then aligned, forced home and graded. Sufficient mortar shall be placed on each pipe so that the

space between the two pipes shall tend to become filled by the sliding action of the socket when the pipe is forced into place. All beveled surfaces of the adjacent tongue and voids in both the inside and the outside shall be completely filled with mortar. The inside shall be troweled smooth for pipes 30" in diameter and larger. The finished joint shall not be greater than one (1) inch in width.

(3) Bituminous and Jute Joints, Mastic Type - Joints between consecutive pipes made with jute and a bituminous joining compound shall be constructed as follows. Jute and bituminous joining compound shall be applied in the same manner as that specified for cement mortar and jute joints.

(4) Bituminous and Jute Joints, Poured Type - Joints between consecutive bell and spigot pipe made with jute and a bituminous joining compound, poured in place, shall be constructed as follows: The bell and spigot of pipes to be joined together shall first be painted with a bituminous prime coat to insure adherence of the poured filler to the sides of the pipe. With pipe at grade and butted, the jute shall be caulked into position in such a manner as to leave a uniform space all around. The joint shall be made in one pour using a joint runner.

(5) Rubber Gasket and Bituminous Joints - Joints between consecutive bell and spigot or tongue and groove pipe made with a rubber gasket and compatible bituminous compound of a type recommended by the gasket manufacturer shall be constructed as follows: The gasket shall be fitted over the tongue or spigot of each pipe, the space behind the gasket filled with the bituminous compound on tongue and groove joints, and the pipe entered into the bell or groove and shoved home. The remainder of the joint space shall be filled with bituminous compound in the same manner as that specified for mortar and jute joints.

(6) Cast Iron Pipe and Ductile Iron Pipe Joints.

a. General - Before any joints are made or the spigot of pipes placed in the bells, the spigots, bells, gaskets and glands shall be thoroughly cleaned and all foreign materials removed from their surfaces.

b. In joining bell and spigot pipe and fittings, the spigot of each pipe shall be properly seated in the bell of the next adjacent piece and adjusted so as to give a uniform

space for the joint, which shall be made with braided hemp or jute, fiber packing, or rubber gasket, and with lead as designated in Project Specifications. The packing shall be long enough to completely encircle the pipe, and shall be thoroughly driven into the bell so as to leave a space of at least 2 1/2 inches in depth to be filled with lead. Each joint must be made in one pour. In making lead joints, the melting pot shall be kept near the joint to be poured, and dross shall not be allowed to accumulate in the melting pot. Lead joints shall be thoroughly caulked by competent mechanics and in such a manner as shall secure tight joints without overstraining the iron of the bells.

c. In joining mechanical joint pipe and fittings, the gland, followed by the gasket, shall be placed over the plain end of the pipe, the gasket and socket brushed with soapy water and the pipe inserted into the bell. The gasket shall then be pushed into position so that it is evenly seated in the bell and the gland moved into position against the face of the gasket. The bolts shall be inserted and made finger tight. The bolts shall then be tightened up with a ratchet wrench to complete the joint.

d. In joining gasket type pipe and fittings, the gasket shall be seated evenly around the inside of the bell in the groove or recess provided and the inside of the gasket lubricated with lubricant furnished by the joint manufacturer. The spigot of the next pipe shall be aligned with the bell and started into the bell until it contacts the gasket. The joint shall then be completed by forcing the spigot past the gasket until it makes contact with the base of the socket. Pressure to force the spigot home shall be applied by means of a bar, a special lever or a mechanical jack-type assembly tool.

(7) Factory-Fabricated Resilient Material Joints for Clay Pipe - In joining clay pipe with factory-fabricated resilient material joints, the bell and the spigot of the pipes shall be thoroughly cleaned, the joint material assembled on the spigot if it is made up of more than one part, the joint material or both bell and spigot coated with lubricant or adhesive, furnished by the joint manufacturer, the spigot entered into the bell and the pipe forced home by means of a bar or mechanical pipe puller.

(8) Rubber Gasket Joints for Reinforced Concrete Low Head and Cylinder Pressure Pipe - In joining pipes of these types, the ends of the pipes shall be thoroughly cleaned and the gasket furnished with the pipe placed in the groove or recess on the spigot, the gasket coated with a compatible bitumastic compound of a type recommended by the gasket manufacturer, the spigot entered into the bell and pipe forced home by means of a bar or mechanical winch. The remainder of the joint shall be filled with bituminous compound in the same manner as that specified for mortar and jute joints.

(9) Corrugated Metal Pipe Joints - Unless allowed by the Project Specifications, only gasketed standard and two-piece bands and the o-ring gasketed hugger-type connection will be allowed. The ends of the pipes shall be cleaned thoroughly to accept the gasket. All gaskets shall be lubricated with a lubricant furnished by the pipe manufacturer to ease assembly and promote uniform tightening of the connection to the torque specified by the pipe manufacturer. Upon tightening the connector bands, if the friction offered by pipe coatings, gaskets, etc., preclude proper pull-up of the gasket, the contractor shall utilize wooden levers to aid the compression of the bottom two-thirds of the band.

(10) Corrugated Polyethylene Pipe Joints - In joining this pipe, all surfaces shall be cleaned of foreign debris and lubricated for assembly. All joints shall be water-tight rubber gasketed PVC Series 35 coupler joints. All joints are assembled by push-on techniques.

(11) Truss Pipe, Solid Wall Laterals and Accessories - In joining this pipe, the surfaces to be solvent welded shall be thoroughly cleaned of all foreign material. Primer shall be utilized and generously applied to all joining surfaces followed immediately with the application of cement. The joint shall then be made to prevent set-up of cement. In making joints of this type, the pipe shall receive a 1/4 arc rotation while seating the spigot end into the bell. After the joint is made, every effort shall be taken not to disturb the pipe.

(12) P.V.C. Sewer Pipe - P.V.C. Sewer Pipe shall be jointed as per Section 7.03.3(c)(6)d above. The Contractor is cautioned that all cut ends are to be beveled prior to assembly.

(13) Fiberglass Pipe - Fiberglass Pipe shall be jointed in the same manner as the P.V.C. Sewer Pipe above.

7.03.4 CONNECTIONS FOR SERVICE PIPES

(a) GENERAL

- (1) Service Connections for house sewer and/or drain connection openings shall be provided in the main sewers as shown on the Contract Drawings or as designated in the Project Specifications. The exact location shall be as directed by the Engineer during construction.
- (2) Service connections shall not be extended onto private property, *unless* specifically provided for by the proposal and/or the Project Specifications. If services connections are call to be extended to the individual houses, as in a CDBG Block Grant project, then the full cost associated with the connection of these individual services (water or sewer) to the plumbing in the individual houses is the responsibility of the Bidding Contractor.
- (3) Unless otherwise shown on the Contract Drawings or so designated in the Project Specifications, all sewer connection openings on bell and spigot pipe shall be wye or tee branches, with the outlet being four (4) inches in internal diameter. All sewer connection openings on concrete pipe of the tongue and groove type shall be cast in place with the shape, size and dimension of the opening corresponding to the bell end of a standard sewer pipe four (4) inches in internal diameter. Wye or tee branches shall be located at the points designated by the Engineer. Wye branches shall be so installed that the lower lip of the branch is not more than 2 inches below the outside top of the pipe. Tees may be installed with the branch vertical or rotated, depending on specific site situations. After installation, wye or tee branches shall not be covered with backfill until determination and record has been made by the Engineer of the location of each with reference to the nearest manhole downstream therefrom, and the direction in which the wye faces.
- (4) All connection openings shall be closed with a vitrified tile or concrete disk or stopper securely held in place with the same joint material as that specified for main sewer, unless otherwise noted on the Contract Drawings.

(b) CONSTRUCTION

(1) All excavation shall be carried out in compliance with the specifications.

(2) Service connection made to the sewer prior to backfilling shall not be installed in the pipe trench as vertical risers except as approved in writing by the Engineer, but shall be laid on a slope not exceeding 2 feet vertical to 1 foot horizontal, and not less than 1/8 inch per foot, cut back into the trench bank in such a manner that the service connection pipe shall have a solid bearing on undisturbed earth as stipulated for pipe sewers. The service pipe shall make such a horizontal angle with the sewer line that a proper connection with the wye or tee branch of slant is obtained without trimming the pipe and with no danger of jute or jointing material being forced into the sewer. The first length of pipe shall not make a total angle with the branch or slant greater than four inches in two feet, and the wye branch or slant shall be installed in such a manner as to fit the alignment of the branch service line as closely as possible. Where vertical risers are specified or ordered by the Engineer, riser pipes shall be supported to prevent an excessive load being applied to the main sewer pipe, and encased in Class "C" concrete with a minimum thickness of 6 inches, as shown on the plans, specified or ordered by the Engineer.

(3) Wye and Tee branches for bell and spigot pipe, with less than 8 feet from the surface of the ground to the center of the branch, shall be laid horizontally with a slight fall across the branch. Connection openings on concrete pipe of the tongue and groove type shall be laid with the opening in the upper quarter of the pipe.

(4) When the distance from the center of the connection openings is more than 8 feet from the ground surfaces, the connection openings shall be raised by means of riser pipes to a point less than 8 feet from the ground surface. Pipe risers for single connections shall be laid at an angle of from 45 Degrees to 60 Degrees with the horizontal depending on the side slope of the sewer trench, and shall be laid in undisturbed soil. Pipe risers for double connections shall be installed vertically with a double "T" branch at the top with the branches placed crosswise of the main sewer. All openings shall be plugged with clay or concrete disks or stoppers. Riser pipes and joints shall be of the same type as specified for the main sewer.

(5) When sidewalks are available opposite the sewer being constructed, the Contractor shall notch the street side of the walk directly opposite each opening left in the sewer for connection to building drains. Where walks are not available for such marking, the Contractor shall place a hardwood stake on the property line directly opposite each opening left in the sewer. The hardwood stake shall be topped with a brass marker labeled "Sewer". If the Contract Drawings so stipulate, the sewer connections shall be extended to the R/W or as noted, plugged and provided with a clean out. In this case, the requirements for measured locations, notching sidewalks, stakes, etc. shall be omitted. Also, the Contractor shall locate and keep a record of all opening locations by measurement to the nearest downstream manhole. Such record shall be delivered to the Engineer monthly during progress of the work.

7.04 COMPLETION OF CONTRACT

7.04.1 TESTS

(a) GENERAL

It is the intent of these specifications to secure pipelines with a minimum amount of leakage. All pipe shall undergo tests as herein described. Unless otherwise noted by the Project Specifications, no testing will be performed on piping used to transport storm water.

All air used shall pass through a single control panel. Individual air hoses shall be used from control panel to pneumatic plugs; from control panel to sealed line for introducing low pressure air; and from sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe tested. The plugs shall resist internal test pressures without requiring external bracing or blocking. Plugs shall be tested prior to installing in the pipe run. A joint of pipe shall be sealed at both ends with the plugs to be used in the sewer test. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall then be pressurized to 9 psig. The plugs shall withstand this pressure without bracing or movement. If air testing is employed, the manholes shall be tested by exfiltration. The tested line segment shall be plugged and pressurized to 4.0 psi greater

than the groundwater back pressure but not to exceed 10 psi. The line shall be allowed to stabilize for two minutes after pressurization. After the pressure has stabilized, the air pressure shall be decreased slowly to 3.5 psi (or a value greater than groundwater back pressure) and the timing shall commence. The time for the pressure to drop 1 psi from 3.5 psi shall be recorded. The minimum acceptable time durations are shown on Table II. If the elapsed time to drop 1 psi is less than that shown on Table II, then the air loss shall be considered excessive and the section of pipe has failed the test.

(b) DEFLECTION TEST FOR PVC GRAVITY PIPE

All PVC pipe with a pressure rating of 200 psi or greater may be excluded from the deflection test (manufacturer shall certify that the rating is in excess of 200 psi). Deflection test shall be a test on the completed installation and be performed no sooner than 30 days after final full backfill has been placed. The Contractor shall test the pipe for deflection by means of a GO-NO-GO mandrel to assure that a deflection of 5 percent has not been exceeded. The mandrel, one for each size pipe, shall be a nine arm mandrel, with proving ring, sized at 5 percent less than the ASTM dimension in accordance with Table I on the next page.

Table I
Mandrel Specifications

Nominal Diameter (inches)	L (inches)	PVC-SDR 35 ASTM D3034 D (inches)
8	8	7.50
10	10	9.33
12	12	11.16
15	15	13.60
18	18	16.60

L = Mandrel Arm Length
D = I.D. of Proving Ring

The mandrel shall be pulled through the sewer line manually. The Contractor shall test a minimum of 30% of each size line laid line

with the mandrel. The Engineer shall select the line to be tested with mandrels. Should any of the tested lines fail this test, they shall be corrected until passing the test, at the Contractor's expense. Additionally, for each section of line failing the mandrel test, the Engineer shall select one extra replacement line section to be mandrel tested until all sections selected have passed the test.

(c) INFILTRATION TESTS

(1) To check the amount of infiltration, the Contractor, at no added compensation over the contract price for the sewers, shall furnish, install and maintain a V-notch sharp crested weir in a wooden frame tightly secured at the low end of each sewer lateral and at locations on the main sewers as directed by the Engineer. Maximum allowable infiltration shall be 100 gallons per mile per inch of diameter of sewer per 24-hour day at any time. The joints shall be tight and visible leakage in the joints or pipe barrel or leakage in excess of that specified above shall be repaired at the Contractor's expense by any means found to be necessary, and with the Engineer's consent.

(2) When infiltration is demonstrated to be within the allowable limits, the Contractor shall remove such weirs

(d) TESTING OF MANHOLES

(1) EXFILTRATION TESTING

Inflatable stoppers shall be used to plug all lines into and out of the manhole being tested. The stoppers shall be positioned in the lines far enough from the manhole to insure testing of those portions of the lines not air tested. The manhole shall then be filled with water to the top of the ring assembly. A 12-hour pre-soak shall be allowed. Leakage shall not exceed 1/2 gallon per hour. Test duration shall be 2 hours.

(2) VACUUM TESTING

Vacuum testing of manhole construction will be allowed on all precast concrete manholes. Manholes shall be tested after assembly and prior to backfilling and all stubouts, manhole boots and pipe plugs shall be secured to prevent movement during the test.

A measure vacuum of ten inches of mercury shall be established in the manhole as measured from the manhole ring assembly down to and including the invert. The time for the vacuum to drop to nine inches of mercury shall be recorded. This time is the leakage rate and the maximum of allowable rate shall be as follows:

Minimum Elapsed Time for 1 Inch of Hg Pressure Change

<u>Manhole Depth</u>	<u>4 Ft. Diameter</u>	<u>5 Ft Diameter</u>	<u>6 Ft. Diameter</u>
10 ft. or less	60 seconds	75 seconds	90 seconds
> 10 ft. or <15 ft.	75 seconds	90 seconds	105 seconds
> 15 ft. or >25 ft.	90 seconds	105 seconds	120 seconds

TABLE II

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015

Part 1A

Specification Time for
Length (L) Shown (min:sec)

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Minimum Time (ft.)	Time for Longer Length (sec)	100 feet	150 feet	200 feet	250 feet
4	3:46	597	.380 L	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12

Part 1BSpecification Time for
Length (L) Shown (min:sec)

Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)	300 feet	350 feet	400 feet	450 feet
4	3:46	597	.380 L	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	52:21	61:00	69:49	78:31
24	22:40	99	13.674 L	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	153:50	179:29	205:07	230:46

7.04.2 RESPONSIBILITY

(a) GENERAL

(1) Sewers must be built so as to remain true to line and grade. The inclining grade of the bottom of the sewer after completion shall be such that after flooding, the flood water will drain off so that no remaining puddle of water will be deeper than one-half (1/2) of an inch on pipe thirty-six (36) inches internal diameter or smaller, and three-quarters (3/4) of an inch on pipe larger than thirty-six (36) inches internal diameter. Any section of pipe that does not comply with specifications at any time previous to final acceptance of the work shall be replaced or relaid at the Contractor's expense.

(2) The Contractor will be held strictly responsible that all parts of the work shall bear the load of the backfill. If cracks one-hundredth (1/100) of an inch develop in the pipe within one year from the date of final acceptance of the work, the Contractor will be required to replace, at his expense, all such cracked pipe. To this end, the Contractor is advised to purchase pipe under a guarantee from the manufacturer, guaranteeing proper service of

sewer pipe under conditions established by the Contract Drawings, Contract Specifications, and local conditions at the site of the work.

7.05 MEASUREMENT FOR PAYMENT AND COMPENSATION

7.05.1 GENERAL

If any or all of the work to be performed under this Contract is on a unit price basis, the actual number of units of each unit price item or work performed may be more or less than the number stated in the Bidding Schedule of the Proposal, or included in the Contract, but no variation in the Contract unit price will be made on that account. Payment will be made only for the actual number of units incorporated in the work, or for the actual number of units of work performed, and at the contract unit price for each such unit with measurement for payment made as defined in the following paragraphs. Measurement for payment of work done on a unit price basis will be as follows:

7.05.2 FITTINGS AND SPECIALS

Unless otherwise specifically provided by the Proposal, the cost of furnishing and placing specials and fittings shown on the Contract Drawings and/or called for in the Project Specifications shall be merged in the unit prices for the pipelines, and will not be paid for separately.

7.05.3 GRAVITY SEWERS, CONDUITS, CULVERTS, AND DRAINS

(a) Measurement of gravity sewer lines, conduits, culverts and drains will be made along the centerline of the line, whether curved or straight, measured in place. The payment for gravity pipelines and related items that are presented in unit price schedules and requested on a depth of cut basis shall be the depth of cut obtained by subtracting the perpendicular distance along the centerline of the structure or pipeline's flow line or invert from the natural ground surface or top of structure.

(b) Linear measurements on sewers of thirty-six (36) inches or less internal diameter will be made straight through the manholes. On sewers larger than thirty-six (36) inches internal diameter, measurement will start and terminate at the inside face of manholes.

(c) Measurement on catch basin sewer connection leads will be made from the centerline of basins to the centerline of the manholes or sewers. Measurement of sewer leads between inlet boxes and catch basins will be made from the inside wall of the inlet box to the centerline of the catch basin. Half traps and running traps will be included in the above measurement and will not be paid for separately.

7.05.4 CAST IRON PIPE AND FITTINGS FOR RAISING OR LOWERING WATER MAINS

Measurement for payment will be made only for raising or lowering those water mains which lie within the area to be occupied by the sewer, conduit or structure.

7.05.5 RELOCATION OF WATER SERVICE PIPES

Measurement for payment will be made only for relocating those water service pipes which lie within the area to be occupied by the sewer, conduit or structure.

GENERAL SPECIFICATIONS
8.0 PIPELINE - TRENCH EXCAVATION AND BACKFILL

8.01 GENERAL

(a) All labor, material, equipment, tools and services required for the installation of all gravity sewers, conduits, drains, pressure pipelines, valves, special structures, etc. required on this Contract shall be furnished and installed in compliance with the following General Specifications, the Project Specifications and with the Contract Drawings.

(b) This General Specification designated as Section 8.0 Pipeline - Trench Excavation and Backfill covers the approved techniques to be utilized in the construction of this work. The Project Specifications and the Contract Drawings designate the specific work, the location, grades, details and construction methods to be employed on the installation of all buried pipes and accessories used on this project. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

8.02 CONSTRUCTION METHODS

8.02.1 EXCAVATION

(a) GENERAL

(1) Excavation shall include the loosening, loading, removing, transporting and disposing of all materials, wet or dry, necessary to be removed to construct all work in Section 8.01 above included in this Contract to the lines, grades, and locations shown on the Contract Drawings. The Contractor must assume the risk of meeting and the Contract price shall include the cost of removal of quicksand, hardpan, boulders, clay, rubbish, unforeseen obstacles, underground conduits, gas pipe, drain tile, trees, roots, timber or masonry structures, railroad tracks, pavements, and sidewalks, and the delay or damage occasioned by the same, whether these obstacles are shown on the Contract Drawings or not.

(2) No claim for an amount of money beyond the Contract price of the work will be entertained or allowed on account of the character of the ground in which the trenches or other excavation is made unless rock as defined hereinafter is encountered and removed. Additional compensation at the Contract price will be authorized for all such rock removed; the quantities for payment being determined on the basis established in Section 8.03 following.

(3) The locations of sewers, pressure pipelines, structures, etc. as shown on the Contract Drawings, have been selected to provide the service intended. The Owner reserves the right to make minor variations in the location of these items during construction to meet any changed conditions discovered during the construction, and no extra payment will be allowed the Contractor for such shifts in alignment.

(4) The location of existing piping and underground utilities, such as gas mains, water mains, electric duct lines, telephone conduits, etc., as shown on the Contract Drawings, have been determined from the records of the parent Utility Companies and drawings of the existing facilities. However, the Owner does not assume responsibility for the possibility that during construction, utilities other than those shown may be encountered, or that actual location of those shown may be different from the locations designated on the Contract Drawings.

(5) At the locations wherein detailed positions of these facilities become necessary to the new construction, the Contractor shall, at his own expense, furnish all labor and tools to either verify and substantiate the record drawing location, or definitely establish the position of the facilities.

(6) Unless otherwise specified in the Project Specifications, all concrete and asphalt surfaced pavements shall be sawed before removal and/or repair.

(7) Necessary arrangements shall be made by the Contractor with all persons, firms, corporations owning or using any poles, pipes, tracks, or conduits, etc., affected by the construction on this Project, to maintain and protect such facilities during construction with the cost of any such protection paid by the Contractor and included in the Contract price. All off- right of way encroachments are totally the responsibility of the Contractor. The Contractor shall provide the Owner and Engineer with written proof that such encroachments are made with the full knowledge and consent of the property owners involved. In the event that any existing gas pipes, water pipes, conduits, sewers, tile drains or poles are blocked or interfered with by the excavation required on this Project, the Contractor shall maintain them in continuous operation, and restore them to the same condition as they were prior to the start of construction of this Project, all at no additional compensation.

(8) Excavated material shall not be placed on grass plots unless there is no other suitable place to put it. Excavated material shall be placed on pavements or sidewalks only on the explicit approval of the Engineer.

(9) Sidewalks and pavements must in no case be blocked or obstructed by excavated material, except on the authorization of the Engineer, and then only when adequate provisions have been made for a satisfactory temporary passage of pedestrians and vehicles. Adequate bridging and planked crossings must be provided and maintained across all open trenches for pedestrians and vehicles. Barriers, lights, flares, and watchmen shall be provided and maintained by the Contractor at all trenches, excavations, and embankments at no additional compensation, as provided in the General Conditions of the Contract.

(10) The Contract price shall include the furnishing and installation of all temporary sheeting, shoring, timbering and bracing required to maintain the excavation in a condition to furnish safe working conditions and to permit the safe and efficient installation of all items of contract work. The Contractor shall further, at his own expense, shore up, or otherwise protect all fences, buildings, walls, walks, curbs, or other property adjacent to any excavation which might be disturbed during the progress of the work. The Contractor will be held liable for any damage, which may result, to neighboring property from excavation or construction operations.

(11) Lumber used for sheeting may consist of any species, which will satisfactorily stand driving. It shall be sawn, or hewn, with square corners, and shall be free from worm holes, loose knots, wind shakes, decayed or unsound portions, or other defects which might impair its strength or tightness. Minimum thickness shall be 2-inch nominal. Lumber for bracing shall be No. 2 common yard lumber of timber in less than six (6) inch sizes, and common structural grade on timbers six (6) inches and over in width.

(12) The sheeting and bracing shall be removed as the work progresses in such a manner as to prevent the caving in of the sides of the excavations, or any damage to the masonry. While being drawn, all vacancies left by the sheeting and bracing shall be carefully filled with fine sand and rammed by special tools, or puddled as directed by the Engineer.

(13) Sheeting, shoring, timbering, and bracing for open trenches and excavations may be ordered left in place by the Owner or the Engineer when such is necessary for the protection of the work, the public, or the adjacent property. Any sheeting so ordered left in place will be paid for at a rate named in the Contract, or in the manner established in the General Conditions of the Contract, said price to cover the furnishing, cutting, placing, and bracing.

(14) The Contract price in this Contract shall include the cost of all temporary supports and braces that may be necessary to secure a safe prosecution of the work until the permanent structure is complete; such temporary supports must in all cases be removed by the Contractor at his own expense after or concurrently with the completion of the permanent structure.

(15) The Contractor shall do all ditching, pumping, well pointing, and bailing, build all drains, and do all other work necessary to keep the excavation clear of ground water, sewage or storm water during the progress of the work, and until finished work is safe from injury. Where the excavation is wet sand, and suitable construction conditions cannot be obtained by other methods, the Contractor shall install and operate, at no additional compensation, a pumping system connected with well points, so as to drain the same effectually. No masonry or pipe shall be laid in water, and water shall not be allowed to rise over masonry until concrete or mortar has set at least 24 hours. All water pumped or drained from the work shall be disposed of in a manner satisfactory to the Engineer without damage to adjacent property or to other work under construction. Necessary precautions shall be taken to protect all construction against flooding.

(16) Whenever the excavation is carried beyond the lines and grades shown on the Contract Drawings, or given by the Engineer, the Contractor shall, at his own expense, refill all such excavated space with such material and in such a manner as may be directed. Beneath and around concrete structures, space excavated without authority shall be thoroughly compacted when refilling; or, if deemed necessary by the Engineer, shall be refilled with concrete at the Contractor's expense.

(17) If the materials encountered on any excavation are not suitable for structural foundations; or, if necessary to go an additional depth or width from that designated on the Contract Drawings to provide proper bearing for pipe or masonry, or to construct pile or plank foundations, the Contractor shall make such

additional excavations outside the regular limits of the work as may be directed by the Engineer. The cost of such additional excavation when authorized by the Engineer shall be paid as Extra Clay Excavation.

(18) Excavated material shall be deposited so as to interfere as little as possible with the execution of the whole work or its several parts, and in such a manner that for each purpose the most suitable material may be placed in its final position but not in a manner to interfere with the satisfactory carrying out of the work. Such material as cannot be placed in its final position in fills and embankments shall be removed to a temporary spoil bank, from which it shall later be taken and placed in embankments or fills.

(19) Unsuitable and surplus excavated material not incorporated in the improvement shall be disposed of by the Contractor, at his own expense, unless otherwise designated in the Project Specification or, on the Contract Drawings.

(20) If private land is used by the Contractor as a spoil site, or for equipment storage, the Contractor shall obtain written permission from the Owner or Agent of the land agreeing to its use for this purpose, and provide the project Owner with a certified copy of such agreement.

(21) Where trenches are constructed in or across roadway ditches or other watercourses, the fill material shall be protected from surface erosion.

(22) All material deposited in roadway ditches or other water courses crossed by the line of the trench or near a structure shall be removed immediately after backfilling is completed and the section grades and contours of such ditches or water courses restored to their original condition, in order that surface drainage will be obstructed no longer than necessary.

(23) Construction procedures during backfilling of trenches shall proceed in such a manner that water will not be diverted from its previous course.

(24) Whenever the excavation results in both unsuitable material and good material, the Contractor shall make every effort to keep this separate. The Engineer shall direct the replacement of the better material upon refilling the ditch.

(25) Subgrades under all proposed structures, roadways and parking areas, and all water, sewer and storm drain trenches under roadways and parking lots shall be compacted in accordance with method "C" of ASTM D698, Standard Proctor Compaction Test, to 100 percent of maximum dry density in pounds per cubic foot in the top 36" of the ground surface. Testing to verify compaction shall be carried out by the Contractor as part of this Contract without additional compensation. Testing under structures, roadways and parking lots shall be at the rate of one (1) test per 10,000 sf or not less than two (2) tests per area, whichever is more. Testing of water, sewer or storm drain line trenches under roadways and parking lots shall be performed at the rate of one (1) test per 500 linear feet or not less than two (2) tests per trench, whichever is more. Trench testing for lines not under parking lots or roadways shall not be required, unless trench settling is, in the opinion of the Engineer, routine. If in the opinion of the Engineer, trench settling is routine, the Contractor shall test not less than three (3) locations selected by the Engineer at the expense of the Contractor with no additional compensation. These locations shall be tested at a depth of 36" from the ground surface. Locations not meeting the general requirements of compaction to 90% of Method "C", ASTM D698 shall be excavated, re-compacted and re-tested until the minimum compaction requirement of 90% is met. Once testing begins due to routinely settled trenches, the Contractor shall be responsible for all testing, excavation, re-compacting and re-testing of all settled trenches until such time, in the opinion of the Engineer and the tests performed, the settled trenches are adequately compacted.

(26) All testing shall be performed by an independent soils laboratory to verify that the stated compaction has been achieved. All tests and re-tests, until stated compaction is achieved, shall be paid for by the Contractor and shall be included in the appropriate unit price or lump sum line items' price for the work proposed by this Contract. Separate line items for testing are not a part of this Contract.

(b) TRENCH EXCAVATION

(1) GENERAL - The ground shall be excavated in open trenches, of sufficient width and depth to provide ample room within the limits of the excavation, or lines of sheeting and bracing, for the proper construction of the sewer or drain and its appurtenances as shown on the Contract Drawings and for

removing any material which the Engineer may deem unsuitable for foundation.

The excavation of the trench shall not advance more than 200 feet ahead of the completed masonry and pipe work, except where, in the opinion of the Engineer, it is necessary to drain wet ground.

When trench excavation is carried ahead of contemplated masonry and pipe work, the elevation of the bottom of the trench shall be continually checked to the satisfaction of the Engineer. Excavation made below that necessary for the proper installation of the sewers, masonry, and appurtenances shall be refilled only with properly graded crushed rock, thoroughly compacted, all at the Contractor's expense. Where it is necessary on pipeline construction to install sheet piling, the maximum allowable trench width herein specified shall be measured between the inside faces of the sheeting.

All excavation for pipes and fittings shall result in trench of sufficient depth to provide the depth of cover below established grade, as shown on the Contract Drawings, and/or as specified in the Project Specifications. If depth of cover is not shown on the Contract Drawings or so specified, the minimum cover to the top of pipe shall be three (3) feet. Grades will be established by the Engineer's Contract Drawings, but shall be transferred to the ditch by the Contractor.

In clay excavation, except Buried Pressure Pipelines whose trenching is covered in part by Section 6, the bottom of the trench shall be excavated to a minimum depth of six (6) inches, unless otherwise noted in the Project Specifications, below the bottom of the pipe barrel and this space refilled with N.C. Department of Transportation Standard Aggregate Size 67, or other non-compressible fine low void material satisfactory to the Engineer as bedding. This bedding shall be slightly rounded to provide as much bearing area as possible for the lower quarter of the pipe. Clay shall be interpreted to mean all soils other than rock, and/or gravel. The cost of the additional excavation and refill shall be merged in the unit bid and contract price for the pipe sewer, unless provisions are made in the Proposal for a Unit Price on "TRENCH BEDDING MATERIAL." In this case, the refill costs are bid as unit prices. In sand and gravel excavation, the bottom of the excavation shall be slightly rounded to provide as much bearing area as possible for the lower quarter of the pipe.

On all installations on which the strength of the pipe will not withstand the weight of the backfill and any super-imposed load indicated on the Contract Drawings, resulting from excessive width of trench at the top of the pipe, and the width of trench as excavated, measured at the top of the pipe to be installed, exceeds the maximum allowable width herein specified; the Contractor either shall furnish and install a concrete cradle to the section shown on the Contract Drawings, with the specifications hereinafter stated, or shall furnish and place between the pipe and the bottom and the sides of the trench up to a level 12" above the top of the pipe with No. 67 stone or other non-compressible fine, low-void material satisfactory to the Engineer, at no additional compensation over the Contract Unit Price for the additional stone or concrete. The provision of this paragraph shall apply unless specifically accepted in the Project Specifications.

(2) GRAVITY PIPELINES - When sewer or cast iron pipe of the bell and spigot type is to be installed in the trench, bell holes of sufficient depth shall be dug across the bottom of the trench to accommodate the bell and to permit adequate caulking.

Where pipe sewers are built, the width of the trench at the top of the pipes shall not exceed the internal diameter of the sewer plus two (2) feet thru 24" I.D. pipe. Pipe larger than 24" I.D. shall be laid in a trench width equal to the pipe internal diameter plus three (3) feet. The Engineer may permit a greater width when it is necessary to sheet the trench or when special equipment is used. There shall be at least four (4) inches of clear space on each side of the pipe to permit placing of backfill around pipe.

The Contractor shall note that when gravity pipelines, manholes, catch basins and related items are presented in Unit Price schedules and when the pricing for these items are requested on a depth of cut basis, the depth of cut shall always refer to the perpendicular distance along the centerline of the structure or pipe from the flow line or invert, to the natural ground surface.

(3) PRESSURE PIPELINES - On all pipelines where pipe joint units extend beyond the diameter of the pipe barrel, bell holes shall be provided across the trench at each joint and lug location. Bell holes shall be deep enough and wide enough to accommodate the flare of the pipe being installed, and to permit ample room to construct the joint.

The maximum trench width at the top of the pipes shall not exceed the internal diameter of the pipe plus two (2) feet thru 24" I.D. pipe. Pipe larger than 24" I.D. shall be laid in a trench width equal to the pipe internal diameter plus three (3) feet. Where required, the Engineer may permit wider excavation to allow for sheeting or as special conditions dictate.

Excavation for service pipe installation shall be carried out in compliance with the following specifications. The ground shall be excavated in open trenches, except where specifically required in the Project Specifications to be placed in tunnels or borings, and to a depth necessary to secure three (3) feet of cover. No water service ditch shall be dug nearer than eighteen (18) inches to a parallel trench. In firm and unyielding soil, water service pipes may be laid in a shelf cut in the side of a house drain trench. When this procedure is followed, the top of the sewer pipe (house drain) must be a minimum of eighteen (18) inches below the grade of the water service pipe. The house drain trench shall be first backfilled up to the height of the shelf. The backfill shall be thoroughly compacted by placing in six (6) inch layers and tamping. The water service pipe shall be placed on the shelf at least twelve (12) inches from the side of the house drain trench.

(c) STRUCTURE EXCAVATION

Excavation for manholes, catch basins, inlets, valves and special structures shall be made to the depth and dimensions necessary for the proper installations of all structures shown on the Contract Drawings. Care shall be taken that the foundation area of the structure is not excavated below grade except when rock is encountered. Where masonry is built directly against the sides or bottom of the excavations, the final trimming shall be done just before the masonry is placed.

The Contractor shall note that when gravity pipelines, manholes, catch basins and related items are presented in Unit Price schedules and when the pricing for these items are requested on a depth of cut basis, the depth of cut shall always refer to the perpendicular distance along the centerline of the structure or pipe to the natural ground surface.

(d) ROCK EXCAVATION

- (1) Wherever the word "Rock" appears, it shall be interpreted to mean any material encountered of a uniform hardness of three (3) in the scale of mineral hardness and/or any material which cannot be removed from its original position with a 300 hp

(minimum), 70,000 lb. working weight (minimum) dozer with a rock ripping attachment, power excavator in good condition without continuous drilling and blasting. The Contractor will be responsible for proving, by demonstration and photographic evidence that slate, shale, sandstone, or other hard material encountered cannot be removed with heavy equipment without continuous drilling and blasting. Other materials shall not be classed as rock, although it may be more economical to remove it by blasting. Boulders will not be classified as rock unless larger than 1/2 cubic yard.

(2) Should rock be encountered in the excavation, it shall be removed by blasting or otherwise. Where blasts are made, the excavation shall be carefully covered with suitable brush, timber or matting to prevent danger to life and property. The Contractor shall secure all permits required by law for blasting operations and any additional hazard insurance required; the cost of such permits and insurance to be borne by the Contractor. No loaded holes shall be left unattended or overnight without approval from the Engineer.

(3) Materials classified as "Rock" in these Specifications, if encountered, shall be excavated to not less than three (3) inches below the grade of the bottom of structures and six (6) inches below the bottom of pipes, or conduit to be installed, unless specifically shown on the Contract Drawings to be removed to a greater depth. After such rock is removed, the excavation shall be backfilled with N.C. Department of Transportation Stone #67 or other non-compressible fine low void material satisfactory to the Engineer, and consolidated to place the top surface at the grade established on the Contract Drawings for the bottom of the structure, pipe or conduit. Bearing surface for pipes shall be slightly rounded to provide as much bearing area as possible for the lower quarter of the pipe. The cost of furnishing, placing and consolidating of such fill material shall be entered as the unit price for "TRENCH BACKFILL MATERIAL," except in proposals where this item does not appear. In these cases this cost shall be merged in the unit price bid for rock excavation.

In Proposals that do not have a rock clause, the cost for rock excavation and material backfill shall be considered to be unclassified and shall be merged with the unit price for pipe, or the lump sum bid for the project.

8.02.2 FOUNDATIONS, STRENGTHENING

(a) GENERAL

- (1) Whenever the ground is sufficiently firm and unyielding, and specially allowed by the Engineer, the masonry shall be laid directly on the bottom of the excavation and pipes or conduits shall be laid as specified under (b) Trench Excavation.
 - (2) When so designated on the Contract Drawings, or ordered by the Engineer, excavated areas shall be strengthened for foundation purposes by furnishing and placing crushed rock or gravel backfill, concrete cradle or encasement, timber cradles, timber piling or a combination of these materials.
 - (3) After the excavation is opened and to grade, it will be examined by the Engineer who will determine whether or not it is a satisfactory foundation for masonry or pipes, or if it is necessary to stabilize the base, install concrete or timber cradle, concrete encasement or drive piling. Any masonry or pipe installed in an excavation that has not been examined by the Engineer, is so installed at the Contractor's own risk. Where deemed necessary by the Engineer, a soil load test shall be made to determine the safe bearing capacity of the ground. The cost of this test shall be considered an extra and will be paid in the manner allowed by Section 4.11, "Change of Contract Price", in the General Conditions.
 - (4) When backfill or cradle is to be placed on any material which will run or move when wet, sheeting must be employed during construction to keep adequate side supports on each side of sewer trench so that weight of cradle and/or sewer will not tend to cause bottom material to run to each side of the excavation. In extremely fluid materials, at the direction of the Owner, wood sheeting shall be used and left in place. In this case, the backfill or cradle shall extend the entire width between sheeting. If deemed necessary by the Engineer, the pipe shall be rigidly anchored or weighted to prevent flotation when the concrete is placed.
- (b) Crushed rock or gravel backfill shall be placed to the depth shown on the Contract Drawings, or as ordered by the Engineer, but in no case shall the depth be less than six (6) inches. If the backfill is greater than six (6) inches in depth, the balance of the material must have sufficient amounts of graded stone or coarse sand to fill all voids between rock fragments. The top of the backfill under pipes shall be slightly rounded to

provide as much bearing as possible for the lower quarter of the pipe. At the direction of the Engineer, the Contractor may be required to backfill the entire trench to a depth of twelve (12) inches above the pipe with sand or gravel. This special backfill will be utilized in wet and/or unstable areas as determined by the Engineer. This material will be paid for as described in section 8.03.7.

(c) Concrete cradle or encasement shall be furnished and placed including reinforcing steel, if required, to the details shown on the Contract Drawings or as ordered by the Engineer.

(d) Timber cradles shall be fabricated and placed to the details shown on the Contract Drawings, or ordered by the Engineer. Lumber for planking, timbering, or bracing shall be No. 2 common yard lumber, for timber in sizes less than six (6) inch nominal, and common structural grade for timbers over six (6) inches nominal. All cradle lumber and planking shall be sawn or hewn with square corners, and shall be free from worm holes, loose knots, wind shakes, decayed or unsound portions, or other defects which might impair its strength or tightness. All lumber and timber shall be subject to inspection by the Engineer before it is incorporated in the finished work.

(e) Pile foundations shall be furnished and placed to the details shown on the Contract Drawings or ordered by the Engineer.

(1) Equipment and methods used for driving piling shall be satisfactory to the Engineer. A protecting cap shall be used in driving; and the hammer shall be of suitable size and type. Combination water and air jets may be used to make the driving easier when so approved by the Engineer. The Contractor is hereby advised to purchase piling so designated or ordered only after a test pile (or piles) has been placed. When piling is required, the Contractor, when ordered by the Engineer, shall furnish and place test piles in a location designated by the Engineer. The bearing value of driven piles will be computed on the basis of the Engineering News Record Formula. For piling shown on the Contract Drawings, the Project Specifications designate the bearing values to which the piling shall be driven. For piling not shown on the Contract Drawings, piling shall be supplied and driven to the bearing value designated by the Engineer. When so ordered by the Engineer, the Contractor shall furnish and place framework and loading for an actual test load on the pile. Piling shall be driven plumb in all directions payment unless otherwise shown or ordered and to a minimum of 12 feet. Excavation performed, when authorized, in order to facilitate the driving of piling shall be

backfilled and compacted, and no payment will be made therefor. Driving of piles will not be permitted within 500 feet of concrete being placed, or less than 24 hours old, nor within 200 feet of concrete less than 7 days old. All piles, including test piles, shall be paid for according to 8.03.3 and/or 8.03.4.

8.02.3 BACKFILL

(a) Unless otherwise directed, all trenches and excavation shall be backfilled as soon as joints have been made. No pipelines having bituminous or concrete joints, shall be backfilled until the joints have acquired a suitable degree of hardness. No pressure pipelines shall be backfilled around the joints until the leakage tests have been made and leaks that are discovered are repaired to the satisfaction of the Engineer. No gravity pipelines shall be backfilled above the top of the pipe until the sewer elevations, gradient, alignment, and pipe joints have been checked, inspected and approved by the Engineer. All backfilling operations shall be carried out evenly on both sides of the pipe. Care shall be taken that no rock, frozen material or other hard substances are placed in contact with the pipe. All gravity pipelines shall be held in place by cable and winch or other suitable method satisfactory to the Engineer during backfill operations so that there will be no movement in the pipe joints. Excavations for manholes, catch basins, inlets and other structures shall be backfilled as soon as they have developed sufficient strength to resist backfilling loads and forces.

(b) The pipe shall then be covered by hand to a depth of 12 inches above the top of the pipe with clean, dry earth. The material shall be placed in layers not exceeding six (6) inches in depth, and each layer thoroughly tamped and compacted by hand, with at least one man tamping for each man depositing material in the trench. Material for backfilling the space between the pipe and the bottom and sides of the trench, and for covering to the depth noted above, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

(c) The remainder of the trench (except those constructed within pavement or sidewalk limits) shall be backfilled by using the material originally excavated from the ditch to a height slightly above the original elevation of the ground. This backfill commencing 12" above the installed pipe shall be placed in lifts not exceeding two (2) feet. Mechanical compaction of this two (2) foot lift shall be sufficient to insure firm and unyielding soil prior to the placement of additional lifts. Backfilling shall not be left unfinished more than 300 feet behind the masonry or pipe work. No heavy rock shall be dropped into the trench nor placed within three (3)

feet of the pipe. In depositing rock in the trench, care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

(d) Trenches constructed within the limits of any existing pavement or sidewalk shall be backfilled to the underside of the pavement or sidewalk with No. 67 stone thoroughly compacted, unless otherwise directed by the Engineer. The cost of this special backfill will be paid for at the Contract unit price for gravel backfill unless the material excavated is suitable for backfilling, in the opinion of the Engineer, in which case no special backfill will be paid for. On that part of the sewer that is constructed under unpaved areas in the streets, alleys, driveways, parking areas or other ornamental grounds, the backfill shall be thoroughly compacted after which all depressions formed shall be filled to a point slightly above the original elevation of the top of the ditch.

(e) Pipelines shall in all cases be covered with earth to a depth of not less than three (3) feet above the top of the pipe or as shown on the Contract Drawings; and where the trenches do not furnish sufficient backfill material, the Contractor shall supply such material as is required at no added compensation. If additional filling beyond three (3) feet is required to be placed over a pipeline for its protection, the Contractor shall furnish and spread earth, cinders or clean ashes, free from animal or vegetable matter, in such a manner and in sufficient quantity so that after it is thoroughly compacted the embankment will be of the uniform grade and cross-section and of the dimensions shown on the Contract Drawings, at no added compensation. Such filling shall have a width extending at least two (2) feet outside of the pipeline on both sides and shall be so constructed that natural drainage courses are not blocked.

(f) Excavation for manholes, catch basins, inlets and structures shall be backfilled in the same manner as the adjoining pipelines to which they are connected or a part thereof.

(g) All surplus excavated material which is not used in backfilling shall be loaded and disposed of by the Contractor at his own expense, unless otherwise noted.

(h) The Contractor shall remedy any settlement of the backfill below the original ground surface for a period of one year after final completion and acceptance upon receipt of written notice from the Owner.

(i) Testing requirements are covered by items 25 and 26, page 6 of this Section 8.0.

8.03 MEASUREMENT FOR PAYMENT AND COMPENSATION

8.03.1 GENERAL

If any or all of the work to be performed under this Contract is on a unit price basis, the actual number of units of each unit price item of work actually performed may be more or less than the number stated in the Bidding Schedule of the Proposal, or included in the Contract, but no variation in the Contract unit price will be made on that account. Payment will be made only for the actual number of units of work performed, and at the Contract unit price for each such unit with measurement for payment made as defined in the following paragraphs. Measurement for payment of work done on a unit price basis will be as follows:

8.03.2 ROCK EXCAVATION

Rock excavation shall be unclassified unless a specific item unit price item for rock is shown in the Proposal.

When rock is not un-classified, rock excavation for structural work will be measured to a plane three (3) inches below the bottom of the structural foundation, and for a distance of one (1) foot outside the horizontal limiting dimensions of the foundation. When rock is not un-classified, rock measurements for pipe or conduit will be a plane six (6) inches below the bottom of the outside of the pipe, and a width equal to the trench width allowed by the specification. No allowance will be made for rock excavation in excess of the limits above described.

8.03.3 PRESTRESSED CONCRETE PILES

Prestressed concrete piles will be measured for the actual piling lengths furnished and installed. No cutting off tops shall be allowed. The Contractor shall merge in the unit price bid for concrete piling, the extra cost of furnishing and placing one (1) test pile.

8.03.4 TIMBER PILING

Timber piling will be measured for the actual piling lengths furnished and installed. Cut off tops will not be included in footage measured for payment. The Contractor shall merge in the unit price bid for piling, the extra cost of furnishing and placing one (1) test pile.

8.03.5 TIMBER SHEETING, BRACING AND CRADLES

Timber sheeting, bracing and cradles will be measured in Foot Board Measure based on the nominal size of the plank or timber furnished multiplied by the lineal feet left in place. The cost of cutting, mortising, spiking or bolting shall be included in the price bid per thousand board feet measure of timber furnished and placed.

8.03.6 CONCRETE CRADLE AND ENCASEMENT

Concrete cradle and encasement will be measured in cubic yards, based on the lineal feet of cradle or encasement furnished and placed on each pipe size, multiplied by the cubic yards per lineal foot for each pipe size indicated on the encasement cross-sections included in the Contract Drawings. The unit bid and the Contract price for cradle or encasement shall include the cost of removing and disposing of the added excavation required accommodating those materials.

8.03.7 GRAVEL TRENCH BEDDING MATERIAL

No. 67 gravel trench bedding ordered placed under pipelines and/or structures will be measured on the basis of the actual number of cubic yards ordered furnished and placed.

8.03.8 UNSUITABLE SOIL EXCAVATION

Extra soil excavation will be measured on the basis of the actual number of cubic yards of unsuitable material ordered removed by the Engineer.

8.03.9 PAVEMENT REPLACEMENT

Pavement replacement measured for the replacing of pavement disturbed during construction of sewers or pressure pipelines will be based on the width of the trench plus six (6) inches for each side on which the pavement is cut. Payment for pavement replacement over manholes and structures will be made only for an area twelve (12) inches beyond the horizontal limiting dimensions of the base. Any pavement disturbed beyond the above-described limits must be replaced at the Contractor's expense.

8.03.10 SIDEWALK AND DRIVEWAY REPLACEMENT

Sidewalk and driveway replacement measured for replacing items necessary to be disturbed during construction of sewers or pressure pipelines will be based on the actual number of square feet of sidewalk and/or driveway replaced.

8.03.11 CURB AND GUTTER REPLACEMENT

Concrete curb and gutter replaced will be paid for on the basis of the actual number of lineal feet of curb and gutter necessary to be disturbed and replaced.

8.03.12 TESTING

Testing shall be performed by an independent soils laboratory to verify that stated compaction has been achieved. All tests and re-tests, until stated compaction is achieved, shall be paid for by the Contractor and shall be included in the appropriate unit price or lump sum line items' price for the work proposed by this Contract. Separate line items for testing are not a part of this Contract.

GENERAL SPECIFICATIONS
9.0 CONCRETE AND REINFORCING

9.01 GENERAL

9.01.1 SCOPE OF WORK

(a) All labor, material, equipment, tools and services required for the furnishing and installation of all concrete, both precast and cast in place, reinforcing steel and appurtenances for structures and structural frames required on the Contract shall be furnished and installed in compliance with the following General Specifications, with the Project Specifications, and with the Contract Drawings.

(b) This General Specification, designated as Concrete and Reinforcing, covers the description of materials generally utilized in precast, cast in place reinforced concrete construction and the installation of such materials. The Project Specifications and the Contract Drawings designate the specific work, its locations and the construction methods to be used on all Concrete and Reinforcing Steel installations under this Section. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

9.01.2 SHOP DRAWINGS

(a) Attention is directed to the provisions in the General Conditions of the Contract requiring submission to the Engineer of descriptive details and of shop and setting drawings. On Concrete and Reinforcing Steel installations such submission shall include the following, even though items proposed to be furnished conform to the exact description stated in the General or Project Specifications.

(1) Bar lists, bending details and setting drawings for all reinforcing.

(2) Manufacturers descriptive details on:

- a. Admixtures.
- b. Joint Materials.
- c. Reinforcing Steel support chairs.
- d. Form Ties.
- e. Forms if fabricated off the site.
- f. Reinforcing Mesh.
- g. Vapor barriers.

9.01.3 MATERIAL TESTS

(a) Attention is directed to provisions in the General Conditions of the Contract for inspection and testing of materials to be incorporated in the work to be constructed under this Contract. Inspection and tests of materials to be incorporated in concrete construction furnished and placed under this Section shall include the following:

- (1) Tests of Materials.
- (2) Advance Design of Concrete Mixes.
- (3) Tests of Concrete as Placed.

(b) The specific tests to be performed are designated in Paragraph 9.02.12 of this General Specification (following).

9.01.4 STANDARDS

Where materials and methods are indicated in the following specifications as being in conformance with a standard specification, it shall refer in all cases to the latest edition of the specification and shall include all interim revisions. Listing of a standard specification without further reference indicates that the particular material or method shall conform with such listed specification.

9.01.5 REFERENCE SPECIFICATIONS

(a) The following reference specifications shall govern the work covered by this Section, unless otherwise noted or detailed:

American Concrete Institute

ACI-301	Specifications for Structural Concrete for Buildings
ACI-304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI-305	Recommended Practice for Hot Weather Concreting
ACI-306	Recommended Practice for Cold Weather Concreting
ACI-308	Recommended Practice for Curing Concrete
ACI-315	Manual of Standard Practice for Detailing Reinforced Concrete Structures
ACI-318	Building Code Requirements for Reinforced Concrete

ACI-347	Recommended Practice for Concrete Formwork
ACI-614	Recommended Practice for Measuring, Mixing and Placing Concrete

Concrete Reinforcing Steel Institute

CRSI	Recommended Practice for Placing Reinforcing Bars.
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ASTM Standards

A 82	Specification for Cold-Drawn Steel Wire for Concrete Reinforcement
A 185	Specification for Welded Steel Wire Fabric for Concrete Reinforcement
A 496	Specification for Deformed Steel Wire for Concrete Reinforcement
A 497	Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement
A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 33	Specification for Concrete Aggregates
C 39	Test for Compressive Strength of Cylindrical Concrete Specimens
C 150	Specification for Portland Cement
C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete

9.02 CONSTRUCTION MATERIALS

9.02.1 GENERAL

All materials and fabricated items shall be furnished by an established and reputable manufacturer or supplier. All materials and fabricated items shall be new and shall be of first-class ingredients and construction and guaranteed to perform the service required and shall conform to the following standard specifications or shall be the product of the listed manufacturer or similar and equal thereto.

Unless otherwise provided herein, or noted on the drawings, all structural concrete used in the project shall be Class "A" concrete having a minimum compressive strength of not less than 3,750 pounds per square inch at 28 days and all plain concrete shall be Class "C" having a minimum compressive strength of not less than 3,000 pounds per square inch at 28 days.

9.02.2 CONCRETE MATERIALS

(a) PORTLAND CEMENT

1. Portland cement shall conform to Specifications for Portland Cement ASTM C-150 and shall be Type I.
2. When high early strength concrete is called for, use Type III.

(b) CONCRETE AGGREGATES

1. Concrete aggregates shall conform to Specifications for Concrete Aggregates (ASTM C33). Aggregates failing to meet these requirements but producing concrete of the required quality as shown by special test or actual service may be used where authorized by the Engineer. (See Table 1, Grading of Fine and Coarse Aggregate for Concrete).
2. The maximum size of the aggregate shall be not larger than 1/5 of the narrowest dimension between sides of the forms within which the concrete is to be cast nor larger than 3/4 of the minimum clear spacing between reinforcing bars, or between reinforcing bars and forms. For unreinforced slabs, the maximum size of aggregate shall be not larger than 1/3 of the slab thickness.

(c) ADMIXTURES:

1. Except as noted on the Contract Drawings, all structural and plain concrete to be used on this project shall contain an approved air-entraining agent conforming to "Specifications for Air-Entraining Admixtures for Concrete (ASTM C-260)." The admixture shall be used and dispensed according to recommendations of the manufacturer.
2. Except as noted on the Contract Drawings, all structural and plain concrete to be used on this project shall contain an approved water reducing admixture. The water reducing admixture shall be composed essentially of water soluble reacting products of an amine and an organic acid, and shall not contain lignosulfonic acid, its derivatives or calcium chloride. The admixture shall be supplied in liquid, ready-to-use form and shall be used and dispensed according to the recommendations of the manufacturer.

3. Other admixtures, if approved by the Engineer, shall conform to appropriate ASTM Standards.

(d) MIXING WATER

Preferably, water used in mixing concrete shall be fresh, clean and potable. Nonpotable water may be used if mortar cubes made with the water in question have 7 and 28 days strengths equal to those of companion specimens in which potable water was used.

9.02.3 CONCRETE QUALITY

(a) ALLOWABLE STRESSES:

The allowable stresses for the design of the structures are based on the specified 28 day compressive strength of the concrete, or on the specified compressive strength at the earlier age on which the concrete may be expected to receive its full load. The strength of concrete, at 28 days, for which all parts of the structures were designed, unless shown otherwise on the Contract Drawings is 3,750 psi.

(b) WATER-CEMENT RATIO:

The proportioning of materials shall be based on requirements for a plastic and workable mix. When no preliminary tests of the materials to be used are made, the water-cement ratio shall not exceed, nor shall the cement content be less than that given in Table 2 for the class of concrete specified. The water in the aggregate must be included in the quantity specified and subtracted from the amount added to the mixture. It shall be measured by methods satisfactory to the Engineer which will give results within one (1) pound for each one hundred (100) pounds of aggregate. Moisture determination shall be made on representative samples at least once each day and at such times as the appearance of the aggregate of the mixed concrete indicates a change in moisture content.

The addition of water to plant mix concrete is discouraged. At any time when additional water is to be added to plant mix concrete, the Contractor shall supply the Engineer with documentation to prove that the **total** amount of all water in the mix is not exceeding the plant mix design or in the event of no specific plant mix design, not exceeding the allocations as provided herein. If on-site additions of water are requested, all necessary materials to

substantiate the maximum amount of field added water shall be made available to the Engineer prior to any concrete pour. ACI-304 R-89 refers.

9.02.4 REINFORCING

- (a) BARS - Intermediate grade, deformed - ASTM A615, grade 60.
- (b) WELDED FABRIC AND COLD DRAWN WIRE - ASTM A82, A185, A496 and A497.

9.02.5 JOINTING MATERIALS

- (a) WATER STOPS - Ribbed or corrugated and manufactured from virgin polyvinylchloride material.
 - (1) In construction joints - "Durajoint" type 7 as manufactured by W. R. Grace and Co. , A. C. Horn Co., Toch Bros. Corp, or approved equal.
 - (2) In expansion joints - "Durajoint" type 7C as manufactured by W. R. Grace Co., A. C. Horn Co., Toch Bros. Corp, or approved equal.
- (b) EXPANSION JOINTS MATERIAL - Resilient premolded self-expanding cork.
- (c) Exposed edges of joint material and joint filler shall be capped with a gray polysulfide joint sealer "Hornflex" as manufactured by W. R. Grace and Co., or "Thiotok" as manufactured by Toch Bros. Corp., A. C. Horn Co. or approved equals.
- (d) FOR PRECAST CONCRETE ITEMS - The joints between sections shall be of the tongue and groove design sealed with a vulcanized butyl rubber elastomeric compound which meets Federal Specification No. SS-S-00210 and which has a temperature service range of -65 degrees F to +200 degrees F. Unless otherwise specified joints will be grouted.

9.02.6 DUSTPROOFING HARDENER:

- (a) For all interior concrete floor surfaces to be let permanently exposed to view, apply a two coat treatment of "Clearbond" manufactured by Guardian Chemical Company, "Lapidolith" manufactured by A. C. Horn Co., Toch Bros. Corp. or approved equal. Remove all foreign

materials, including mortar, paint, etc., to prevent any foreign materials from showing through the finished surface.

(b) One coat shall be applied upon completion of curing of the slab and one coat applied after final painting and other finishes are complete. The final result shall be a transparent appearance which, when subjected to an abrasion test made with a stiff wire brush, shall not dust, but shall polish without showing abrasion.

9.02.7 CONCRETE CURING PAPER:

Where curing paper is selected for final curing of flatwork, Sisalkraft "Orange Label", Ludlow Papers, Inc., "Scuf-Champ", "Glas-Kraft", Grade A, or equivalent concrete curing paper conforming to ASTM C171, Type I, shall be used.

9.02.8 MEMBRANE FORMING CURING COMPOUND:

Liquid membrane forming curing compounds shall be wax free resin type capable of retaining 95% of the moisture for the specified curing period and shall conform to ASTM C-309, Type I, and shall contain a red fugitive dye. Curing compound applied to surfaces to be left permanently exposed to view shall not cause permanent discoloration or otherwise adversely affect the appearance of these surfaces. Curing compounds shall not be used on surfaces to receive hardeners or other finishes.

9.02.9 NONSHRINK GROUT:

(a) All column base plates and all equipment base plates shall be grouted with nonshrink grout, whether called for or not on the Contract Drawings.

(b) Nonshrink grout used for grouting column base plates and equipment base plates shall be non-metallic aggregate grout capable of developing full strength without vertical confinement, and requiring no cutting or capping of shoulders.

9.02.10 STONE FILL UNDER SLABS ON GRADE:

A minimum thickness of 6 inches of N. C. Department of Transportation, Division of Highway Standards Size No. 5 stone shall be provided under all slabs on grade and at other locations noted on the Contract Drawings unless specifically denoted otherwise on the Contract Drawings.

9.02.11 VAPOR BARRIER UNDER SLABS ON GRADE:

"Moistop" manufactured by American Sisalkraft Corporation, "Ply-Bar Plus" Manufactured by Glas-Kraft, Inc., "Sealtight Premoulded Membrane" by W. R. Meadows, Inc., or an equivalent vapor barrier conforming to the requirements of ASTM E154, shall be provided under all slabs on grade within building lines and at other locations noted on the Contract Drawings.

9.02.12 MATERIAL TESTING

(a) CEMENT

Certified copies of Mill reports shall be required on all cement used.

(b) SAND - Fine Aggregate

Fine aggregate shall comply with ASTM C 33 and shall consist of sand having clean, hard, durable grains free from deleterious substance, with gradation and samples submitted to the Engineer for approval prior to pouring any concrete. Sand shall be tested for impurities in accordance with ASTM C 40 and shall be rejected for exposed work if it shows a color darker than the reference color. A soundness test shall be conducted in accordance with ASTM C 88.

(c) COARSE AGGREGATE

Coarse Aggregate shall comply with section 9.02.2(b) and shall consist of clean gravel or crushed stone free from soft or elongated pieces and deleterious substances. In no case shall the maximum size be greater than 75% of the minimum clear spacing between reinforcing or 20% of the smallest dimension between side forms. Gradation and samples of the proposed coarse aggregate shall be submitted to the Engineer for approval prior to pouring any concrete.

(d) REINFORCING STEEL

Certified copies of Mill reports.

(e) ADVANCE DESIGN OF CONCRETE MIXES

(1) Concrete

a. Mix Designs - Where required, an advance design of each concrete mix required shall be made by an independent Testing Laboratory in accordance with ACI 613 to attain the properties of strength, slump and entrained air content.

b. Tests - Advance tests of each class of concrete where required shall be made in accordance with ASTM C31 by an independent Testing Laboratory. Four standard 6 inch compression cylinders, two to be tested at 7 days and two at 28 days, per ASTM C39, shall be made with the proportioning and materials proposed to be used on this Contract. The slump shall not be less than the greatest slump expected to be used in the structures. The tests made on the aggregates as required above may be made a part of these tests if suitably referenced on the reports which shall be issued at 7 and 28 days. These tests shall be repeated if necessary because of changes in materials or unsatisfactory results.

(f) TESTS OF CONCRETE AS PLACED

The Contractor shall be responsible for all testing of concrete. He shall be responsible for preparing, transporting, storing, curing, testing and reporting test sample cylinders for compressive strength. He shall also perform slump tests unless instructed otherwise by the Engineer. All tests and the manner in which they are conducted shall be satisfactory to the Engineer. The testing laboratory shall have prior approval from the Engineer.

(1) The following listed tests of concrete as placed shall be performed with reports and results filed with the Engineer:

a. Concrete Strength - During the progress of the work, and for each different mix of concrete, a set of four standard 6 inch concrete cylinders shall be made and tested where less than 50 cubic yards of concrete are placed during each and every day's operation. An additional set of cylinders shall be made for each 100 cubic yards or major fraction thereof over and above the first 50 cubic yards. The cylinders of each set shall be molded from the same sample of concrete. For precast concrete items, a set of 4 STD. 6" concrete cylinders shall be made and tested for each days casting of each item. Two cylinders shall be tested at 7 days and two at 28 days. Sampling of concrete for test purposes shall be per ASTM C172. Making and curing of test cylinders shall be per ASTM C31. Testing of specimens shall be per ASTM C39.

b. Slump - Where 25 or more cubic yards of concrete are placed, and as necessary to maintain desired consistency

of the concrete, a slump test shall be made. Not less than one such test shall be made for each 50 cubic yards of concrete placed at one operation. Such test shall also be made on each sample of concrete used in fabricating test specimens. Test specimen shall be formed in a standard 16-gauge, galvanized metal slump cone 12" in height, as described by ASTM C-143-52.

(1) SAMPLING:

a. Samples of concrete for test specimens shall be taken at the mixer or from the truck mixer in the case of ready-mixed and transit-mixed concrete, during discharge. Obtain such samples by passing a receptacle completely through the stream of concrete, at three or more regular intervals throughout the discharge of the entire batch except that samples shall not be taken at the beginning or the end of discharge. The sample shall then be transported in a wheelbarrow or some other suitable conveyance to the place of molding.

b. Mix the specimen with a shovel until the specimen is uniform in appearance. Note location of batch from which the sample is taken for future reference.

(2) MOLDING:

a. Dampen the cone and place it on a flat, moist, nonabsorbent surface. From the sample, immediately fill the cone in three layers, each approximately 1/3 of the volume of the cone. In placing, move the scoop around the top edge of the cone in order to insure symmetrical distribution of the concrete. Rod each layer with 25 strokes of a 5/8" standard rod (see equipment list).

b. Distribute the strokes across the cross-section on the cone, penetrating the underlying layer. Rod the bottom layer throughout its depth. After the top layer has

been rodded, strike off surface of the concrete with a trowel so that the cone is exactly filled. Remove the cone by raising it carefully in a vertical direction. The slump shall then be measured by determining the difference between the height of the cone and the height of the specimen.

c. Air Content - Tests for air content shall be made concurrently with making test cylinders per ASTM C231.

d. Additional Strength Tests - The Engineer shall be telephoned immediately if any questionable tests are discovered. In all cases that test results of concrete cylinders fail to meet the strength requirement established in this Specification, the Contractor shall make additional compression tests on cored cylinders at his own expense in accordance with ASTM C42, or make additional load tests in accordance with ACI 318 at the direction of the Engineer. If, in the opinion of the Engineer, these alternate strength tests indicate that concrete has been placed which does not meet the requirements established in this Specification, the defective concrete shall be removed and replaced, at the Contractor's expense.

9.02.7 PREPARATION AND STORAGE OF CONCRETE TEST CYLINDERS IN THE FIELD (Reference ASTM C31; ASTM C172)

(a) SAMPLING:

1. The sampling shall be representative of the batch. (The word batch as here employed shall be understood to refer to one day's pour rather than the contents of one mixer load). It shall consist of portions from different points in the batch. A sample shall be taken for each 100 cubic yards or portion thereof of each pour.

2. When taken from truck mixers or agitators, the samples shall be taken in three or more regular increments throughout the discharge of the entire batch.

3. The composite sample shall be mixed with a shovel sufficiently to insure homogeneity and immediately molded into test specimens.

4. The place of molding shall be such that the cylinders will not have to be moved during the first 24 hours. Molding shall be done on a platform or some other firm, level base not subject to vibration.

(b) SIZE OF SPECIMENS:

Cylinders shall be 6" in diameter and 12" deep. The mold shall be metal or other nonabsorptive material such as paraffined cardboard. If a metal mold is used it must have a machined base which can be secured to the mold and be watertight.

(c) MOLDING:

Place the concrete into the mold three layers of approximately equal volume. Move the scoop around the top edge in placing in order to achieve symmetrical distribution of the concrete. Distribute the concrete further by a circular motion of the tamping rod. Rod each layer with 25 strokes of a 5/8" diameter standard rod (see equipment list). Distribute strokes uniformly over the cross section of the mold, penetrating into the immediate underlying layer. Bottom layer shall be rodded throughout its depth. Where voids are left by the tamping rod, tap sides of the mold to close the voids. After the top layer has been rodded, strike off the surface of the concrete with a trowel and cover with a glass or metal plate to prevent evaporation. Mark number and date on top of cylinder with a nail or similar object.

(d) CURING:

1. Test specimens shall be removed from the molds at the end of 24 hours and stored in a location such that they will be protected from damage. At the end of 48 hours they shall be moved to the laboratory where they shall be placed in a moist room or in a lime saturated water bath until time for testing. The temperature of the moist room or water bath must be controlled between the limits of 60 F and 80 F. All other conditions of curing shall conform to Paragraph 7(c) ASTM C31-57. The test specimens cured as above specified shall be the ones used for the standard 7 day and 28 day reports.

2. Should the Contractor desire to remove shoring and forms before the time stipulated in the Specifications and to subject the concrete to loads of any kind, he will be required to provide an extra set of test cylinders for testing at an agreed upon time to

determine whether the cylinder has actually acquired the design strength of the concrete. These test cylinders shall receive, insofar as practicable, the same protection from the elements as given in the portions of the structure which they represent and shall be stored on the site. They shall be moved to the laboratory not more than two days prior to the date of testing.

(e) SHIPPING INSTRUCTIONS:

When cylinders are moved to a laboratory they shall be packed in boxes having inside dimensions of 7" x 21" X 13" to contain three cylinders. The box shall be made of 1/2" plywood with a separation partition between cylinders and equipped with a hinged lid, hasp and carrying handle. The cylinder shall be packed completely with excelsior, straw or sawdust and kept damp. In the top of the box place a list showing the data listed in paragraph 1 of "Data to be Reported". Fasten the lid securely and tag with a shipping ticket.

(f) EQUIPMENT TO BE FURNISHED BY CONTRACTOR FOR CONCRETE TESTING:

1. Slump cone
2. Platform
3. Concrete molds for cylinders, including machined base if metal molds are used
4. 5/8" round smooth rod approximately 24" long, one end rounded to a hemispherical tip diameter of which is 5/8"
5. Shovel and wheelbarrow for sampling and transporting of samples.
6. Metal or glass covers for protecting cylinders
7. Small scoop for use in filling slump cone and cylinder molds

(g) DATA TO BE REPORTED:

The following data shall be reported by the Contractor to the testing laboratory for each group of cylinders:

1. Mix, including amounts and brands of materials used.
2. Specified 28 day compressive strength.
3. Atmospheric temperature at time of pour.
4. Slump.
5. Type and amount of admixtures used.

6. Location of concrete in the structure. (In sufficient detail to definitely identify the pour at any later date)

The following data shall be reported by the laboratory to the Engineer and to the Contractor:

1. Data listed in Paragraph 1, above.
2. Unit weight of the cylinder (pounds/cubic feet).
3. Type of break.
4. Percentage of aggregate broken.
5. Breaking load (lbs.).
6. Breaking stress (lbs./sq. inch).

9.02.8 QUALIFICATIONS:

(a) CONCRETE PRODUCER:

1. The concrete producer shall have not less than 5 years experience in the production of structural concrete and shall have previously supplied concrete for not less than 5 projects similar in scope of this project.
2. All concrete mixers, stationary or transit mix, shall be equipped with revolution counters in proper working order.
3. When directed by the Engineer, the concrete producer shall submit a written description of production ability, including facilities, personnel and a list of similar completed projects.

(b) TESTING AGENCY:

The testing agency shall provide evidence to the Engineer that an inspection of its facilities within the previous 12 months was made by the Cement and Concrete Reference Laboratory of the National Bureau of Standards and that any deficiencies noted in the report of that inspection have been corrected.

9.02.9 SUBMITTALS:

For review, the Contractor shall prepare and submit to the Engineer data for the following items specified in the Section.

- (a) Concrete mix designs.
- (b) Certificates of analysis for concrete aggregates.

- (c) Cement mill reports.
- (d) Proposed methods of concrete curing and trade names of proposed curing methods.
- (e) Trade names of other proprietary items if different than those specified.
- (f) Trade name and physical data of proposed non-slip aggregate.

9.02.10 PRODUCT HANDLING:

- (a) Revolution counters shall be in operation for all concrete discharged for use on this project.
- (b) All concrete shall be discharged from the mixer within one hour after the introduction of water into the mix or before the drum has revolved 300 revolutions, whichever comes first. To insure mixing at the job site, the drum must be revolved 20 revolutions at mixing speed just before pouring.

9.03 CONSTRUCTION METHODS

9.03.1 PREPARATION OF EQUIPMENT:

- (a) Before placement, all equipment for mixing and transporting the concrete shall be cleaned and all debris and ice shall be removed from the places occupied by the concrete. Forms shall be thoroughly wetted (except in freezing weather) or oiled, and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather). The reinforcement shall be thoroughly cleaned of ice, dirt, rust, scale or other coatings.
- (b) Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. All laitance and other unsound material shall be removed from hardened concrete by sand blasting, chipping or wire brushing before additional concrete is added.

9.03.2 INSPECTION:

After the reinforcing steel is in place and all framework completed, and at least 24 hours before placing concrete, the Contractor shall notify the Engineer that the work is ready for his inspection. The Engineer will then inspect the work. The Contractor shall have capable men on the job who shall assist the Engineer in inspecting the work and who shall make all

changes in the work required by the Engineer prior to placing the concrete. No concrete shall be placed except when the Engineer or his representative is on the job and has approved the work and authorized the placing of the concrete.

9.03.3 STORAGE OF MATERIALS:

Cement and aggregates shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter. Liquid admixtures shall be protected from freezing and from settling out of solution. Any deteriorated or damaged material shall not be used for concrete.

9.03.4 WATERTIGHT STRUCTURES:

All concrete structures shall be made watertight. The Contractor shall use all means necessary to produce structures that are absolutely watertight against hydraulic pressure both from inside and from outside. Concrete walls, etc., that show seepage or damp spots will not be accepted until this condition is corrected. No waterproofing ingredients shall be added to the concrete mix unless approved by the Engineer. Should contractor cracks occur in the concrete work, the Contractor shall make such repairs as necessary to produce a watertight structure.

9.03.5 PROPORTIONING MATERIALS:

(a) Composition - Concrete shall be composed of Portland cement, type I, fine aggregate, coarse aggregate, water and admixtures as specified herein.

(b) The determination of the proportions of cement, aggregate and water to attain the required strengths shall be made by one of the following methods:

1. METHOD 1 - WITHOUT PRELIMINARY TESTS: When no preliminary strength test of the concrete to be used are made, the water cement ratio shall not exceed the values in Table 2.

2. METHOD 2 - WITH PRELIMINARY TESTS AND/OR FIELD DATA: Water cement ratios other than those shown in Table 2 may be used when the strength of the concrete is to be established by tests. Test specimens shall be made before beginning operations, using the consistencies suitable for the work and in accordance with ASTM Method of Making and Curing

Concrete Compression and Flexure Test Specimens in the Laboratory (ASTM C192). Tests shall be conducted according to ASTM Method of Test for Compressive Strength of Molded Concrete Cylinders (ASTM C39). A curve shall be established to represent the relationship between the water cement ratio and the minimum 28 day compressive strength or earlier strength at which the concrete is to receive its full working load. The range of values on the curve shall include all the compressive strengths called for by these Contract Documents. The curve shall be established by at least three points, each point denoting average values from at least four test specimens. **The water cement ratio shall correspond to a strength sufficiently high as to ensure that none of the strength tests shall have values less than the specified strength.**

(c) CONCRETE CONSISTENCY:

The proportions of the concrete shall produce a mixture that will work readily, with the placement method used, into the corners and angles of the forms and around reinforcement. Segregation of materials in the mixture shall not be permitted nor the collection of excess free water on the surface.

(d) Classes and Properties of Concrete - Classes and properties of concrete shall be as shown in the following Tables 1 and 2:

TABLE 1**GRADING OF FINE AND COARSE AGGREGATE FOR CONCRETE**

PERCENTAGE BY WEIGHT PASSING LABORATORY SIEVES HAVING SQUARE OPENINGS

Nominal Sizes	2-1/2"	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 16	No. 30	No. 50	No. 100
Fine Aggregate							100	95-100	45-95	25-75	8-50	0.5-10
1/2"					100	90-100	40-75	0-15				
3/4"				100	90-100		20-55	0-10				
1"			100	90-100		25-60		0-10				
1-1/2"		100	95-100		35-70		10-30	0-5				
2"	100	95-100		35-70		10-30		0-5				

TABLE 2

APPROXIMATE PROPORTIONS FOR CONCRETE

3/4 TO 1" COARSE AGGREGATE

1-1/2 TO 2" COARSE AGGREGATE

Class Designation	Total Water, Gal. Per Bag	Average Minimum Strength lb. per sq. in. 28 days	3/4 TO 1" COARSE AGGREGATE				1-1/2 TO 2" COARSE AGGREGATE					
			Cement lb.	Fine Aggregate lb.	Coarse Aggregate lb.	Mixing Water Gal.	Cement Factor Bags per cu. yd.	Cement lb.	Fine Aggregate lb.	Coarse Aggregate lb.	Mixing Water Gal.	Cement Factor Bags per cu. yd.
A	5-1/2	3,750	94	169	263	4.1	7.2	94	170	303	4.1	6.7
B	6	3,300	94	200	273	4.4	6.5	94	210	334	4.3	6.0
C	6-1/2	3,000	94	221	314	4.6	6.0	94	242	364	4.6	5.5
*D	---	4,500	94	169	312	5.25	6.25	--	---	---	---	---
**E	---	3,500	--	---	---	---	5.0	94	208	390	6.6	5.0

Where methods described under "Controlled Concrete" are not employed, the quantities of cement, aggregates and water gives in Table 2, "Approximate Proportions for Concrete" shall be used. The weights of fine and coarse aggregate have been calculated on the basis of damp weights. A saturated surface-dry specific gravity of 2.65 and average moisture conditions of 5 and 1 percent free surface moisture, respectively, for the fine and coarse aggregate were assumed. The proportions in Table 2 are based on a slump of four inches. The Engineers and/or Architect reserve the right to alter the weight of the fine and coarse aggregate and quantity of mixing water as may be required to produce concrete of desired quality and consistency.

* Use 23.52 oc. of PSI 400-N and 1.56 oc. of Airtite

** Use 18.0 oc. of PSI 400-N and 4-6% air entrainment

No concrete shall be placed prior to written approval of the Engineer of each design mix proposed. Unfavorable results of actual pours may necessitate redesign of Mixes.

(e) Aggregate - Coarse aggregate shall be used in each Class of concrete in the greatest amount consistent with required workability. The ratio of sand to total aggregate shall be from 33 to 42 percent by weight based upon surface- dry material, unless a higher percentage is authorized by the Engineer due to character of coarse aggregate. Over- sanded mixtures will not be accepted. Minor changes in aggregate proportioning shall be made during the progress of the work to adjust for changes in aggregate gradations.

(f) Air Content - All concrete work, other than concrete which in final form will be in enclosed and heated buildings and structures, shall have an entrained air content as follows:

Concrete for finish-troweled surfaces - 3 percent maximum.

Concrete other than troweled surfaces - 3 percent minimum to 5 percent maximum.

(g) Admixtures - A water reducing agent as noted in Paragraph 9.02.2(c) conforming to ASTM specification C494 may be used where approved by the Engineer. Proportioning and mixing shall be as recommended by the manufacturer. Admixtures Types A, D or E conforming to ASTM C494 may be used, dependent on the necessity for providing retarding or accelerating characteristics to the mix. The use of calcium chloride in concrete is prohibited.

(h) Classes of Mortar and Grout

(1) For Machinery Bases and Column Base Plates

Type 1 - Composed of 1/4 inch maximum size coarse aggregate; cement, sand and water in same proportions as specified for Class B concrete with Embeco as manufactured by Master Builders Co., added in accordance with the manufacturer's recommendations. All non-confined portions of this grout mixture shall be removed and replaced with general purpose grout for final acceptance. This requirement is in effect unless deleted by the Project Specification.

(2) General Purpose

Type II - Composed of equal parts of sand and cement, with water sufficient to produce required consistency.

9.03.6 CLASSES OF CONCRETE

(a) All cast in place concrete work installed under this Section shall be of the particular Class previously designated, when placed in the following listed types of sections or usage:

Class A - Concrete poured against earth in slabs and footings.

Class B - Concrete in supported slabs, beams, columns and walls.

Class C - Concrete in fillets, cradles and where used to fill voids or for backfilling operations and sidewalks, wheelchair ramps, etc.

Class D - Concrete used for roadways.

Class E - Concrete used for curb and gutter.

9.03.7 BATCHING AND MIXING MATERIALS

(a) Batching - All concrete and mortar materials shall be measured in conformance with ASTM C94.

(b) Mixing Concrete

(1) Mixer - The mixing of concrete shall be done in a batch mixer of approved type or in ready-mix equipment conforming to ASTM C94. The volume of the mixed materials for each batch shall not exceed the manufacturer's rated capacity of the mixer.

(2) Mixing Time - Concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged. For job mixed concrete, the mixer shall be rotated at the speed recommended by the manufacturer and mixing shall be continued for at least one minute after all materials are in the mixer. For mixers larger than 1 cubic yard capacity, the minimum mixing time shall be increased 15 seconds for each additional one-half cubic yard of concrete capacity.

(3) For job mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer. Each batch of one cubic yard or less shall be mixed for at least one minute after all materials are in the mixer. The mixing time shall be increased by 15 seconds for each additional cubic yard or fraction thereof. The entire batch shall be discharged before the mixer is recharged. If job mixed concrete is used, all equipment and methods of mixing employed must be approved by the Engineer.

(4) Cold Weather Batching - In accordance with ACI- 306, "Recommended Practice for Cold Weather Concreting." When the temperature is below 40 degrees F or is likely to fall below 40 degrees F during the 24-hour period after placing, adequate equipment shall be provided for heating the concrete materials. No frozen materials or materials containing ice shall be used. Temperature of the separate materials, including the mixing water, when placed in the mixer shall not exceed 140 degrees F. When placed in forms the concrete shall have a temperature between 60 degrees F and 90 degrees F.

(5) Hot Weather Batching - In accordance with ACI-305, Recommended Practice for Hot Weather Concreting. Concrete temperature shall not exceed 90° F prior to placement.

(c) Mixing Mortars - The mixing of mortars and grouts shall conform to the requirements for Mixing Concrete as stated above.

9.03.8 FORMWORK

(a) Construction - Forms shall be constructed to conform to the shape, form, line and grade indicated on the Contract Drawings; shall be mortar tight and shall be maintained sufficiently rigid to prevent deformation under load. Forms for exposed concrete surfaces shall be faced with smooth plywood. Exposed wall surfaces shall include interior and exterior concrete surfaces, beams, columns, slabs, and all tank, chamber and tunnel walls except those in contact with earth. All exposed corners shall be chamfered 3/4 inch, unless otherwise noted on the Contract Drawings. Unlined forms may be used for concrete work not exposed to view upon completion of the Project. Forms shall be coated with a non-staining mineral oil. Absolutely, under no condition, will the coating of reinforcing or form ties with the form release oil be tolerated. The Contractor shall be completely responsible for the design and the structural safety of the formwork, shoring and bracing and shall provide a reasonable factor of safety in all designs. An adequate amount of walers, stiffeners and braces shall be used to insure straight walls upon stripping of forms.

(b) Alignment - Edges of form panels in contact with concrete exposed to view in the finished work shall be flush within 1/32 inch. Forms for plane surface areas shall be such that the concrete will be plane within 1/8 inch in 4 feet. Leading edges of concrete at top of walls and other exposed locations shall lie within 1/4 inch as measured from a 10 foot template.

(c) Removal - Forms shall be removed in such a manner as to insure the complete safety of the structure. Beam and girder side forms, columns

and wall forms may be removed as soon as the concrete has attained sufficient strength to sustain its own weight, but not less than 48 hours subsequent to placement. Supporting forms and shoring for slabs, beams, girders and other structural members shall not be removed until the members have acquired sufficient strength to support safely their own weight and superimposed loads, but in no case less than 14 days, provided sample test cylinders show a strength of not less than 3,000 p.s.i. in compression when cured under conditions similar to those affecting the structure involved.

9.03.9 FORM TIES

(a) The type of form ties proposed to be used shall be approved by the Engineer before installation. Wire ties will not be permitted. Form ties shall be adjustable in length or of proper fixed length and of such type as to leave no metal closer than one and one half inches to the finished concrete surface. Ties shall not leave holes larger than one inch diameter at the surface of concrete. Unless otherwise permitted ties shall be left in place. A plastic cone spacer shall be used at each end of the form tie allowing a full 1½ inch breakback.

(b) Removable portion of form ties shall be removed from the concrete immediately after removing the forms. Care shall be exercised to avoid spalling the exposed concrete surfaces.

(c) Within 24 hours after forms are removed, holes left by removal of ties shall be thoroughly roughened and wetted, brush-coated with neat cement grout, and filled with mortar. Mortar shall be a stiff mix of one part cement to two parts fine aggregate passing the No. 16 mesh sieve, and minimum water content. Mortar shall be thoroughly compacted in place and finished flush with adjacent surfaces. When dry, the color of the mortar shall approximately match the adjoining concrete.

9.03.10 ANCHORAGE ITEMS, CHASES, SLOTS, INSERTS, PIPING AND CONDUIT SUPPORTS AND GUIDES, ETC.

(a) All pipe chases, cavities, slots, inserts, anchors, etc., required may not be shown on the Contract Drawings. Nevertheless, they shall be provided for before concrete is poured. It shall be the requirement of this Section to notify other Sections or Contractors in due time, so they may provide the essential information as to size and locations and furnish any required embedded items. These embedded items shall be supplied under the other Sections or Contractors, but installed under this Section.

- (b) Install dovetail anchor slots in concrete work for anchorage of masonry as specified in General Specification, Masonry.
- (c) Install inserts as required for support of suspended ceilings and other suspended installations.
- (d) Where items are to be installed later, the space around the fixture shall be made water tight by completely filling with a non-shrink grout such or pre-mixed mortar, all submitted and approved by the Engineer.
- (e) Conduits, pipes, sleeves etc., with the outside diameter not exceeding 1/3 of the thickness of concrete and spaced not closer than 3 diameters on center may be placed in the center of slabs, walls, beams, columns, etc., when approved by the Engineer. Concrete covering shall be not less than 1" and preferably 2".
- (f) Piping carrying liquid, air, gas, etc., shall be tested immediately prior to placing concrete and again after concrete has attained its designed strength.

9.03.11 JOINTS

- (a) Joint Locations - Joints shall be placed at locations indicated on the Contract Drawings. Joints shall have continuous keyways as indicated on the Drawings. Where not specifically indicated on the Contract Drawings, the keyways shall be a minimum width equal to the width of the wall divided by 3 and a minimum depth of 1-5/8 inches. In order to minimize shrinkage, long rows of walls shall not be poured at one time. No more than 80 feet in the horizontal direction shall be poured at one time without a construction joint, unless the Engineer has given written approval of such procedure.
- (b) Joints not indicated on the Contract Drawings shall be so made and located as to impair least the strength of the structure. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance removed by sweeping the top of the joint with a stiff broom just before the concrete becomes thoroughly hard. No such joints shall be made without first obtaining the permission of the Engineer in writing. In addition to the foregoing, vertical joints shall be thoroughly wetted and flushed with a coat of neat cement grout, to which has been added an approved bonding agent, immediately before the placing of new concrete.
- (c) Additional Construction Joints - If it becomes necessary to place construction joints at locations not shown on the Contract Drawings, the locations of such joints shall be approved by the Engineer. Such joints

shall be so made and located as to least impair the strength of the structure. At least two hours must elapse after depositing concrete in columns or walls before depositing concrete in beams, girders or slabs supported thereon. Beams, girders, brackets, column capitals and haunches shall be considered as part of the floor system and shall be placed integrally therewith. Construction joints in floors shall be located near the middle of the spans of slabs, beams or girders and shall have an adequate keyway.

(d) Roadway and Curb and Gutter Joints -- The Contractor shall form a 1" expansion joint between all concrete curb and gutter and retaining walls. This expansion joint shall be an impregnated fiber material recessed from the surface one half inch (1/2"). Upon completion of the area work, the 1" x 1/2" joint shall be vacuumed clean and poured full of self-leveling sealer submitted and approved by the Engineer.

Crack joints shall be sawed as per the Contract Drawings, longitudinally along the centerline of all paving, and at every 15 feet across the pavement and at the joint between the concrete paving and the curb and gutter. All crack joints shall be vacuumed and sealed with self-leveling sealer submitted and approved by the Engineer. All sealant shall be applied to a backer rod.

(e) Water Stops - Water stops and expansion joint materials shall be securely anchored to the formwork and reinforcing steel in a manner which will prevent displacement during pouring of concrete. Water stops and expansion joint materials for joints shall be continuous around all corners and intersections. Splices shall be made using an electric splicing tool as recommended by the water stop or expansion joint manufacturer. Heated steel plates or torches for joining water stops will not be permitted. Water stops shall be used in the following locations:

- (1) All vertical construction joints in walls which in the final project are adjacent to soil.
- (2) All vertical construction joints in walls of structures to be kept dry and which are adjacent to water containing compartments, chambers or tanks.
- (3) All construction joints in slabs on grade unless specifically omitted in the Project Specifications.
- (4) All construction joints in walls of water reservoirs. Water stops shall be constructed to the details as shown and noted on the Contract Drawings.

(f) Expansion Joints - Expansion joints shall include expansion joint material and water stops of the types designated herein and in locations shown on the Contract Drawings.

(g) Precast Structures - Precast structures shall be cast with tongue and groove or male and female type joints and ends. When assembled the joints shall provide alignment that is continuous and uniform without objectionable deviation from the lines shown on the plans or without excessive grouting or sealing of the joints.

9.03.12 PLACING CONCRETING MATERIALS FOR CAST IN PLACE AND PRECAST STRUCTURES

(a) General - The rate of delivery of concrete for any monolithic unit of a structure shall be that which will permit proper handling, placing, and finishing of the concrete; and shall be so regulated that the maximum interval between the placing of batches at the work site shall not exceed 20 minutes. The Concrete shall be placed before the elapsed time, between adding the mixing water to the mix and placing the concrete in the forms, exceeds the following:

1. 90 degrees F. and above - 30 minutes
2. 80 degrees F. through 89 degrees F. - 45 minutes
3. 79 degrees F. and below - 60 minutes

(b) Reinforcing

(1) Reinforcing steel shall be handled and placed in accordance with ACI 315, ACI 318, ACI 319. Reinforcing steel, at the time concrete is placed shall be free from rust scale or other coatings that will destroy or reduce the bond. It shall be accurately placed in accordance with the Contract Drawings and shall be adequately secured in position by concrete or metal chairs, spacers and tie wires.

(2) Metal reinforcement shall be accurately positioned and secured against displacement by using annealed wire of not less than No. 16 gauge, or suitable clips at intersections, and shall be supported in a manner that will keep all metal away from the exposed surfaces of the wall. Nails shall not be driven into the outside forms to support reinforcement nor shall any other device for this purpose come in contact with the outside form on walls exposed to view after structure is completed.

(3) All bars shall lap a minimum of 36 bar diameters. Adjacent sheets of wire mesh shall lap a minimum of 6 inches and be securely wired together. Reinforcing steel in slabs and footings poured against grade shall be supported on precast concrete units spaced at intervals required by the size of reinforcement used and of the proper height to accommodate the proper positioning of the reinforcing. Steel chairs and slab bolsters supporting reinforcing in beams and slabs (on formwork) shall be galvanized or plastic protected.

(4) Reinforcement shall be carefully formed to the dimensions indicated on the Contract Drawings. Heating of reinforcement will be permitted only when approved by the Engineer. Field bending of reinforcing bars which project from concrete surfaces is prohibited.

(5) Wherever it is necessary to splice reinforcement otherwise than as shown on the Contract Drawings, the character of the splice shall be as specified by the Engineer on the basis of allowable bond stress, and the stress in the reinforcement at the splice. Splices shall not be made at points of maximum stress nor shall adjacent bars be spliced at the same point. Bar splices shall be staggered.

(6) The reinforcement shall be protected by the thickness of concrete indicated in the Contract Drawings. Where not otherwise shown, the thickness of concrete over the reinforcement shall be as follows:

- a. Where concrete is deposited against the ground without the use of forms: not less than 3".
- b. Where concrete is exposed to weather or to the ground but placed in forms: not less than 2".
- c. In slabs and walls not exposed to the ground or the weather: not less than 3/4".
- d. In beams, girders and columns not exposed to the ground or to the weather: not less than 1-1/2".
- e. In all cases: at least equal to the diameter of the bars.

(7) Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

(c) Concrete

(1) Conveying - Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent separation or loss of materials. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of the materials. Aluminum pipe and chutes shall not be used.

(2) Depositing - Before beginning a run of concrete, hardened concrete and foreign materials shall be removed from the inner surfaces of the mixing and conveying equipment. All conveyances, buggies or wheel barrows shall be thoroughly cleaned at frequent intervals during the placing of the concrete.

a. Concrete shall be handled from the mixer to the place of final deposit in carts, buggies or conveyors, and shall not be spouted or delivered by spout or trough from the hoists, or dumped into carts with a free fall from the mixer of more than four (4) feet. Every possible precaution shall be taken to prevent separation or loss of ingredients while transporting the concrete. Delivery carts or buggies shall be kept on temporary runways built over the floor system, and runway supports shall not bear upon reinforcing steel or fresh concrete. The word "conveyors" as used in this specification shall be construed to include concrete pumping machines.

b. Concrete shall not be placed until all reinforcement is securely and properly fastened in its correct position, or until form ties at construction joints have been retightened, or until all bucks, sleeves, castings, hangers, pipe, conduit, bolts, anchors, wire and any other fixtures required to be embedded therein, together with forms for openings to be left in the concrete have been placed and anchored by the Contractor, or until the forms and reinforcement have been oiled and cleaned respectively as specified. Concrete shall not be placed at any time except under direct supervision of the Engineer and/or Inspector.

c. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds. Concrete shall be placed in the forms in such a way as to prevent segregation. All concrete for walls shall be placed through openings in the inside form spaced at frequent intervals or through "elephant trunks" (heavy duck canvas or galvanized iron) equipped with suitable hopper heads. Tremies shall be of variable lengths so that the free fall shall be three (3) to four (4) feet maximum and a sufficient number shall be placed in the forms to insure the concrete being kept level at all times.

d. When placing concrete, sufficient illumination shall be provided in the interior of the forms so that the concrete at places of deposit is visible from deck and runways. Concrete shall be spaded and rodded to thoroughly embed all reinforcement and fixtures. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or "honeycomb." Special care shall be taken to secure dense concrete around all inserts.

(3) Consolidation - All concrete shall be consolidated by the use of mechanical vibrators operated by experienced workmen under competent supervision. Supplement vibrating by spading and rodding. No forking or raking shall be permitted. Vibrators and consolidation shall conform to the requirements of ACI-609.

Where the Contract Drawings require concrete fill to be placed in concrete masonry units, cavity walls or other similar locations where proper placement and consolidation cannot be made, the concrete may be proportioned with 3/8" maximum aggregate size and the maximum slump increased to 8", provided the minimum strength requirements are maintained.

Vibration shall be applied directly to the concrete unless otherwise approved by the Engineer. The intensity of vibration shall be sufficient to cause flow or settlement of the concrete into place. Vibration shall be applied at the point of deposit and in the area of freshly placed concrete. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures. To secure even and dense surfaces, free from aggregate pockets or "honeycomb," vibration shall be

supplemented by forking and spading by hand in the corners and angles of forms and along form surfaces while the concrete is plastic under the vibrator action. If vibrators are used on floor slabs, the bottom of the vibrator must not be permitted to ride the form supporting the slab. Vibrator must be laid on the concrete to prevent marring slab forms.

(4) Slabs on Grade - Prior to placing reinforcement, the grade shall be prepared, the fill and stone base materials compacted, and the vapor barrier, keyways, joint material and other embedded items placed as required by the Contract Drawings and other Sections of the Specifications.

(a) The vapor barrier shall be placed by lapping all edges a minimum of 4" and sealing continuously with an approved roofing mastic, waterproof tape or equivalent material. Seal around all piping and other openings through the vapor barrier and turn up edges 2" minimum at the walls and other vertical surfaces.

(b) Screed chairs or other objects shall not be permitted to damage or penetrate the vapor barrier or waterproofing membrane. Buggy runways shall be used where concrete is required to be transported over the vapor barrier or waterproofing membrane. Screeds may be set in mounded concrete in lieu of screed chairs.

(5) Patching Concrete - If any concrete work is not formed as shown on the Drawings or if for any reason, is out of alignment or level or shows a defective surface, it shall be considered as not conforming with the intent of these Specifications and shall be removed from the job by the Contractor at his expense, unless the Engineer grants permission to patch the defective area. Permission to patch any such areas shall not be considered a waiver of the Engineer's right to require complete removal of the defective work if the patching does not, in his opinion, satisfactorily restore the quality and appearance of the surface.

(a) Immediately after removing forms, all concrete surfaces shall be inspected and any poor joints, voids, stone pockets or other defective areas permitted by the Engineer to be patched and all the holes shall at once be patched before the concrete is thoroughly dry. Defective areas shall be chipped away to a depth of not less than 1" with the edges perpendicular to the surface. Such areas are to be

patched and a space at least 6" wide entirely surrounding them shall be wetted to prevent absorption of water from the patching mortar. The defective areas shall be patched with a mortar containing a special bonding agent mixed and applied in accordance with the manufacturer's instructions. The mortar shall be made of the same material and of the same proportions as used for the concrete except that the coarse aggregate shall be omitted. The amount of water used in mixing the mortar shall be as little as consistent with the requirements of handling and placing.

(b) The mortar shall be thoroughly compacted into place and screeded off so as to leave the patch slightly higher than the surrounding surface. It shall then be left undisturbed for a period of one to two hours to permit initial shrinkage before being finally finished. The patch shall be finished in such a manner as to match the adjoining surface.

(6) Bonding and Grouting - Concrete surfaces against which new concrete is to be laid shall be thoroughly cleaned and wetted. In addition, the joint shall be roughened as required to develop an adequate bonding surface. Existing concrete shall have a slurry of one (1) part cement and three (3) parts sand brushed on prior to pouring new concrete. Horizontal construction joints in walls shall be slushed with at least 2 inches of cement and sand grout just prior to placing new concrete. This grout shall be of the same mixture as the concrete, but with coarse aggregate omitted. At vertical construction joints, special care shall be taken to work the freshly placed concrete to obtain an adequate amount of mortar at the joint.

(d) Identification of Precast Structures - Each precast structure shall have date of casting stamped or painted on it. If multiple castings are to be erected together, each section shall be numbered to facilitate assembly, alignment and sequence of erection. At vertical construction joints, special care shall be taken to work the freshly placed concrete to obtain an adequate amount of mortar at the joint.

(e) Placement of Precast Concrete Structures - The various sections shall be marked for proper alignment during installation. Precast units shall be lifted and placed using lifting eyes, hooks, holes or other methods acceptable to the Engineer, which will not overstress or damage the concrete. Lifting devices or methods that will mar the surface of the concrete shall not be used. Any precast unit which has been cracked,

damaged, chipped, scarred or otherwise disfigured shall not be used. Precast structures shall not be loaded, stressed, backfilled or utilized until the concrete has reached its specified compressive strength or has been cast for 28 days. The structure shall not be set in place until it has been cast for 14 days or concrete has reached 75% of its specified compressive strength. Unless otherwise specified, precast structures will be set in wet concrete and supported on blocks to maintain proper position until concrete has set.

9.03.13 SURFACE FINISHES

(a) General

The finishing of concrete work shall be in accordance with Chapters 10 and 11 of the ACI Specifications.

(b) Walls and Ceilings

(1) Unexposed Surfaces - Concrete surfaces below grade adjacent to earth and other surfaces not exposed to view after construction such as completely enclosed chambers, wet wells, etc., shall be given a rough finish as follows:

Fins and rough edges shall be removed. Honeycomb, aggregate pockets, voids over 1/2 inch in diameter, and holes left by form ties shall be cut out to solid concrete, thoroughly wetted, brush coated with neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part cement to 2 parts fine aggregate passing the No. 16 mesh sieve, and a minimum amount of water. Mortar shall be thoroughly tamped in place. Patchwork shall be finished flush to adjacent surfaces and damp cured for 48 hours.

(2) Exposed Surfaces - Concrete surfaces which are exposed in the finished work for both exterior and interior locations shall be given a smooth finish as follows:

Follow all the steps noted above for a rough finish. Upon completion of these steps, apply a smooth finish consisting of thoroughly wetting and then brush-coating the surfaces with cement grout composed by volume of 1 part cement to 2 parts fine aggregate passing the No. 30 sieve and mixed with water to the consistency of thick paint. Grout shall be cork or wood-floated to fill all pits, air bubbles, and surface holes. Excess grout shall be scraped off with a trowel and

the surface rubbed with burlap to remove any visible grout film. The grout shall be kept damp by means of fog spray during the setting period. The finish of any area shall be completed in the same day and the limits of a finished area shall be made at natural breaks in the finished surface. Smooth finished surfaces shall include, but shall not be limited to the following:

- a. The full height of walls and surfaces in open tanks, reservoirs and basins.
- b. Exterior walls of tanks and structures adjacent to earth to 1'.0 below finished grade.
- c. Interior surfaces in basements, tunnels, pipe galleries, equipment rooms, and above grade areas.
- d. All surfaces which are to be painted.

(3) Rubbed Surface Finish - A rubbed surface shall be provided on surfaces specifically designated in the Project Specifications or noted on the Contract Drawings. The surfaces to be rubbed shall first be thoroughly saturated with water. They shall then be rubbed with a medium coarse carborundum stone until a light paste has been formed which shall fill all voids, and until all form marks, fins, projections and irregularities have been removed. The paste formed by this rubbing shall be left in place and allowed to set. The final finish shall be obtained by a second rubbing with a fine carborundum stone and clean water. This rubbing shall continue until the entire surface is of a smooth texture and uniform color. After the final rubbing is completed and the surface is dry, it shall be lightly brushed or rubbed with burlap to remove the loose powder. The surface shall be left free from powder blemishes, discolorations and objectionable marks.

(c) Concrete Floor and Roof Slabs

(1) General - Floors shall be level with a tolerance of 1/8 inch in ten feet, except where drains occur, in which case the floors shall be pitched to the drains as indicated on the Contract Drawings. The dusting of wearing surfaces with dry materials will not be permitted.

(2) Monolithic Finish - All floor surfaces, including floor surfaces of channels, tanks and structure floors, exposed to view

upon completion of Project shall be given a monolithic finish as follows:

While the concrete is still green but sufficiently hardened to bear a man's weight without deep imprint, it shall be wood-floated to a true, even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood-floats to bring moisture to the surface. The concrete shall then be double steel troweled to produce a smooth impervious surface. Floor slabs of reservoirs, tanks and basins and roof slabs may be power-machine finished in lieu of steel and hand troweling. Floor slabs receiving a wearing surface, such as asphalt, rubber or vinyl tile, linoleum, cork, etc., may also be power-machine finished.

(3) Rough Slab Finish - Floor slabs to receive a separate topping of concrete, terrazzo, quarry tile, etc., shall be given a rough slab finish by screeding with straightedges and floating to produce a reasonably true and uniform surface. This finish shall also apply to structural floor slabs of channels or flumes to which a membrane waterproofing is to be applied.

(4) Sidewalks, Roadways, Walkways, and Exterior Platforms - Such concrete surfaces shall be wood-floated to a true and even plane and steel troweled. The surface shall then be slightly roughened by dragging burlap across the surface or by other approved means.

(5) Separate Concrete Topping - Aggregates for topping shall conform to requirements of this section of the Specifications, except that maximum size of coarse aggregate shall be 3/8 inch. A maximum of 4½ gallons of water per sack of cement shall be used. Mixture shall be one part Portland cement, one part fine aggregate and 1½ to 2 parts coarse aggregate by volume. A cement grout shall be broomed into the surface of the slab immediately prior to application of the topping materials. A monolithic finish as specified herein shall be given to the surface of the topping.

(6) Floor Hardener - Two coats of a liquid floor hardener shall be applied to all concrete floors in buildings not designated to receive other finish or floor covering. Hardener shall be Horn Clear Seal as manufactured by W. R. Grace and Co., Clear Bond by Guardian Chemical Co., Sherman-Williams, or approved equal.

(d) Precast Units

All finished precast units shall be neat and smooth in appearance. The concrete surface shall be dense and free of holes, voids, honeycombs, or other irregularities. Precast units having a mottled, uneven, or discolored appearance will be rejected. The finish requirements for the precast concrete will be the same as for cast in place concrete.

9.03.14 PROTECTION AND CURING

(a) General - Concrete damaged by freezing or flash set drying shall be removed as directed by the Engineer and replaced at the Contractor's own expense.

(b) Provisions shall be made for maintaining concrete in a moist condition for a period of at least 7 days after placement. For high early strength concretes, however, moist curing shall be provided for at least the first 2 days when concrete and air temperatures are above 50 F; and for longer periods when temperatures are below 50 F.

(c) All concrete shall be cured by one or more methods specified in Chapter 12 of the ACI Specifications. Membrane forming curing compounds shall not be used on any surfaces against which additional concrete or other cementitious finishing materials are to be bonded.

(d) Waterproofing curing shall be used for final curing of flatwork only. When selected for final curing, the paper shall be placed as follows:

1. Unroll curing paper over the entire surface to be cured. Lap ends and edges a minimum of 4" and seal continuously with masking or pressure sensitive tape and provide sufficient weights over paper to prevent separation from concrete surface.

2. Curing paper shall be used for curing purposes only.

(e) Additional care shall be exercised in protecting and curing the concrete topping to prevent rapid loss of moisture at any time during and immediately after the curing period.

(f) Curing of Precast Concrete - Precast units shall be subjected to any one of the methods of curing described below or to any other method or combination of methods approved by the Engineer that will give satisfactory results. The precast units shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less.

(1) Steam Curing - Precast units shall be placed in curing chamber, free from outside drafts, and cured in a moist atmosphere maintained by the injection of steam for such time and such temperature as may be needed to enable the units to meet the strength requirements. The curing chamber shall be so constructed as to allow circulation of steam around the entire unit.

(2) Water Curing - Precast units may be water-cured by covering with water-saturated material or by a system of perforated pipes, mechanical sprinklers, porous hose, or by any other approved method, that will keep the units moist for a minimum of 5 days after casting.

(3) The manufacturer may, at his option, combine the methods above as long as the required concrete compressive strength is attained.

(4) A sealing membrane may be applied and should be left intact until the required strength requirements are met. The concrete at the time of application shall be within 10 degrees F. of the atmospheric temperature. All surfaces shall be kept moist prior to the application of the compounds and shall be damp when the compound is applied. This method shall not be used on surfaces to be painted, surfaces to receive a bituminous membrane or surfaces which are to receive a finish treatment of any kind.

(g) Cold-Weather Requirements - In accordance with ACI 306 and the following:

Whenever the temperature of the surrounding air is below 40 degrees F or when the possibility exists that the temperature will fall below 40 degrees F within the 24-hour period after concrete pouring operations, concrete placed in the forms shall have a temperature between 70 degrees F and 100 degrees F. All concrete shall be maintained at a temperature of not less than 50 degrees F for at least 72 hours and shall be protected from freezing for at least an additional 72 hours or for as much time as is necessary to insure proper curing of the concrete. The housing, covering or other protection used in connection with curing shall remain in place and intact at least 24 hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

(h) Hot-Weather Requirements - In accordance with ACI 305 and the following:

Adequate measures shall be taken to avoid high temperatures in fresh concrete and to prevent rapid drying on newly placed concrete.

(1) Aggregate stockpiles shall be kept moistened as required.

(2) Long water supply lines shall be kept covered or painted white or aluminum. Similar precautions shall be taken with water storage tanks.

(3) Subgrades on which concrete is to be placed shall be saturated in advance and then sprinkled just ahead of the placing operation.

(4) Fresh concrete shall be shaded as soon as possible after finishing and moist curing shall be started as soon as it can be done without marring surface.

(i) Floor slabs against earth, including slabs of tanks, reservoirs and basins, shall be protected with a covering of suitable insulating material to prevent frost penetration into the subgrade. Such insulation shall be of the non- staining type.

9.03.15 FIELD QUALITY CONTROL:

(a) TESTING:

(1) Routine testing of materials and concrete for compliance with the Specifications shall be the responsibility of the Contractor. The Contractor shall be responsible for taking, handling, transporting and curing concrete samples.

(2) Four cylinders shall be molded from each sample of concrete for compressive strength tests. Two specimens shall be tested at 7 days and two specimens tested at 28 days.

(b) FAILURE TO MEET STRENGTH REQUIREMENTS:

(1) If strength tests fail to meet the minimum requirements of the Engineer, the concrete represented by such test shall be

considered questionable and shall be subject to further testing at the expense of the Contractor.

(2) Additional tests of questionable concrete shall be conducted at the expense of the Contractor in accordance with "Methods of Securing, Preparing and Testing Specimens from Hardened Concrete for Compressive and Flexural Strengths" (ASTM C-42).

(3) Additional tests of the hardened concrete may be required by the Engineer even though the requirements of the Specifications were met when, in their opinion, there is cause for concern over the adequacy of the structure.

(4) If core tests fail to demonstrate strengths adequate for the intended purposes of the member or members in question, as determined by the Engineer, or if the failure to meet specified strength requirements occurred in members from which it is impracticable to secure test specimens by the method of ASTM C-42, load tests shall be conducted and their results evaluated in accordance with Chapter 2 of "Building Code Requirements for Reinforced Concrete" (ACI-318).

(c) FIELD REVIEW BY THE ENGINEER:

(1) The Contractor shall give a 48 hour notice to the Engineer prior to placing concrete to permit review of the general construction work as well as mechanical, electrical and other work to be incorporated.

(2) The Contractor shall afford the Engineer whatever casual labor, platforms or other access as may be required for proper field observation of the concrete work.

(3) Field review of the work by the Engineer shall in no way relieve the Contractor of his responsibility to furnish materials and workmanship in full compliance with the Contract Drawings and Specifications.

9.04 COMPLETION OF CONTRACT

9.04.1 WATERTIGHTNESS

All structures shall be watertight. The Contractor will be required to take such steps as are necessary to correct any and all leakage through floors or walls of structures without additional compensation.

9.04.2 CLEAN-UP

Upon completion of all work performed under this Section, all excess materials, storage facilities and temporary facilities shall be removed from the site. Areas which were occupied during construction operations shall be smoothed and left in first-class condition.

9.05 MEASUREMENT FOR PAYMENT AND COMPENSATION

9.05.1 LUMP SUM CONTRACTS AND ITEMS

On lump sum contracts and on lump sum items in unit price contracts, concrete and reinforcing steel or precast structures will not be measured for separate payment and no additional allowance will be made for formwork, appurtenances, finishing, placing, protecting, curing or admixtures, if used.

9.05.2 UNIT PRICE CONTRACTS AND ITEMS

On unit price items and on unit prices for changes in lump sum items or contracts, measurement and compensation for concrete and reinforcing steel, or precast structures, placed or omitted will be made as follows:

- (a) Concrete - Measurement in cubic yards for payment or deduction will be made computed from nominal finished dimensions of concrete of each Class and each type of construction on which unit prices are included in the Contract. No additional allowance will be made for formwork, appurtenances, finishing, protecting, curing or admixtures, if used.
- (b) Reinforcing Steel - Measurement in pounds for payment or deduction will be made computed on the basis of the theoretical weight per foot of each size of bar multiplied by the length installed or omitted. No additional allowances will be made for accessories or installation.
- (c) Precast Structures - Measurement for payment or deduction will be made computed on the basis of the number of units of precast structures installed or omitted. No additional allowances will be made for formwork, appurtenances, finishing, curing, placing, or admixtures, if used.

GENERAL SPECIFICATIONS
10.0 MANHOLES, INLETS, CATCH BASINS, VAULTS AND DRAINAGE
STRUCTURES

10.01 GENERAL

10.01.1 SCOPE OF WORK

(a) All labor, materials, equipment, tools, and services required for the work under this section shall be furnished and performed in compliance with the following General Specifications, the Project Specifications and the Contract Drawings.

(b) This General Specification designated as Section 10.0, Manholes, Inlets, Catch Basins, Vaults, and Drainage Structures, covers the materials and the installation of such materials generally utilized for manholes, catch basins, inlets and drainage structures. The Project Specifications and the Contract Drawings designate the specific work, the materials, location, grade, details and construction methods to be employed on the furnishing and installation of all manholes, inlets, catch basins and drainage structures. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

(c) Manholes, inlets, catch basins, vaults, drainage structures and appurtenances constructed and/or installed under the provisions of Section 10.0; Manholes, Inlets, Catch Basins, Vaults and Drainage Structures, shall include: providing and installing all necessary castings; providing, placing, setting and erecting all precast concrete structures; providing materials, placing, setting, erecting and providing form work for built in place structures; the excavation and backfill for all such structures and providing, placing and forming all concrete necessary to build structures.

10.01.2 SHOP DRAWINGS

(a) Attention is directed to the provisions in the General Conditions of the Contract requiring the submission to the Engineer of descriptive details and of shop and setting drawings. For manhole, catch basin, inlet, vault and drainage structure installation, such submission shall include the following, even though items proposed to be furnished conform to the exact description stated in the Project or General Specifications.

- (1) Precast concrete joints, joint sealing material and reinforcing details.

- (2) Full details of all castings or fabricated metals used as part of structure.

10.01.3 STANDARDS

Where materials and methods are indicated in the following Specifications as being in conformance with a standard specification, it shall refer in all cases to the latest edition of the specification and shall include all interim revisions. Listing of a standard specification without further reference indicates that the particular material or method shall conform with such listed specification. Where manufacturer(s) or trade names appear, it is only to represent a level of quality expected and in no way is to be construed to preselect the Contractor's supplier or equipment.

10.02 CONSTRUCTION MATERIALS

10.02.1 GENERAL

All materials and appurtenances shall be furnished by an established and reputable manufacturer or supplier. All materials and appurtenances shall be new and shall be of first class ingredients and construction, designed and guaranteed to perform the service required and shall conform to the following standard specifications or shall be the product of the listed manufacturer or similar and equal thereto as approved by the Engineer.

10.02.2 PRECAST, REINFORCED CONCRETE MANHOLES

- (a) All precast reinforced concrete manhole sections shall meet ASTM C478 specification except as modified herein.
- (b) Manhole steps shall be composition material, grouted into the side of the manhole structure. The rung or cleat shall project a minimum clear distance of seven (7) inches from the wall of the riser or cone section measured from the point of embedment. Embedment of steps shall be a minimum of four (4) inches.
- (c) Pipe inlets and outlets on new manholes shall be through precast holes fitted with waterproof rubber boots and stainless steel tightening bands. When tying new pipes into existing manholes and rubber boots are not used, each inlet and outlet pipe shall have a brick masonry collar built around a new 3'-6" D.I.P. extended from the manhole wall where the specified pipe will be attached to the D.I.P. by use of an Engineer approved adapter.

(d) Where openings must be cut into sides of manhole sections for drop connection, extreme care shall be exercised so as not to damage the manhole. The method of cutting these openings shall be approved by the Engineer. All openings cut into sides of manholes shall have a minimum of six (6) inches clearance between holes and manhole section joints.

(e) Eccentric cone sections shall be used where depth of a manhole will permit it.

(f) The top ring of cone sections shall have a flat surface formed to receive the first course of brick masonry or grade ring.

(g) Lifting holes in sections of manholes shall be plugged with grout.

10.02.3 BRICK OR BLOCK MASONRY FOR MANHOLES, VAULTS, INLETS, CATCH BASINS AND DRAINAGE STRUCTURES

(a) Masonry shall include all manholes, vaults, catch basins, inlets and drainage structures of common brick and cement mortar; brick courses, where required to bring frames and covers to grade, for vaults, concrete block or precast concrete pipe and manholes; and the building in of metal castings, pipes, sleeves and other items required in the work, complete as shown, specified and directed. All common brick shall be ASTM Des: C32-73, Grade MS or ASTM C62, Grade SW.

(b) Mortars shall be mixed in the proportions that follow:

1 sack of masonry cement (94 lbs.)
3 cubic feet of dry sand (240 lbs.)

(1) Masonry cement shall be Brixment, Huron, Alpha or approved equal, ASTM Des: C139.

(2) Sand shall be of graded quality conforming to the requirements of ASTM Des: C144. Water shall be clean potable water, free from injurious or deleterious materials.

(c) All bricks shall be of the best quality, hard burned brick, shall be whole, sound straight, hard, uniform in structure, with true faces and shall be of standard size.

(1) Bricks shall be sampled and tested for absorption in accordance with ASTM Des: C67. Absorption shall not exceed 9%. Certified test reports shall be furnished to the Engineer.

(2) The bricks shall be culled and sorted when delivered on the ground by experienced men furnished by the Contractor, and all bricks condemned shall be immediately removed from the site of work.

(d) When specified, concrete blocks shall be used for manhole construction. All concrete block shall be of the special type manufactured for manhole construction. Such manhole blocks shall conform to ASTM C139.

10.02.4 STEPS

Structure steps shall be composition material, embedded into masonry a minimum of four (4) inches. The rung or cleat shall project a minimum of seven (7) inches from the wall of the structure measured from the point of embedment. The minimum cross sectional dimension shall be one (1) inch. The minimum design live load shall be a single concentrated load of three hundred (300) pounds. Steps shall be spaced twelve (12) inches apart and aligned vertically.

10.02.5 CASTINGS FOR FRAMES AND COVERS

(a) Manhole rings and covers, catch basin frames, grates and covers and other drainage structure castings shall be constructed of cast iron conforming to the latest ASTM Standard Specifications, Serial Designation A 48, for Class 30 Gray Iron Castings. All castings shall be made accurately to the required dimensions, fully interchangeable, sound, smooth, clean and free from blisters, blowholes and/or other defects. Defective castings which have been plugged or otherwise treated shall not be used. All castings shall be thoroughly cleaned and painted or coated with a bituminous paint. Each casting shall have its actual weight in pounds stenciled or painted on it in white paint. The weight of all castings shall be within 5% of the weight shown on the manufacturers' approved shop drawing submittal. Castings will be weighed at random. Those weighing less than the approved minimum weight allowance shall be rejected. All castings shall be true to the manufacturer's approved shop drawing submittal with a tolerance of 1/16 inch. Prior to shipping, the manufacturer shall fit up all casting components to insure that all castings furnished are of proper fit and free from rattle. Castings which do not have properly fitting lids will be rejected.

(b) All castings shall be of the size and weights shown on the plans and as manufactured by the Griffin Foundry Co., Russell Pipe & Foundry Co., Dewey Brothers, Inc., Neenah Foundry Co., or approved equal. Sanitary sewer manhole covers shall have the word "Sewer" cast on the top in letters

2 inches high. All casting components shall have permanently casted into them the manufacturer's name and approved part number.

(c) Manufacturers shall furnish to the engineer for approval, certified tensile test results as performed by an independent testing laboratory at no additional cost to the owner. Warranty documentation and a legal certificate of compliance shall also be provided at this time by the manufacturer.

(d) All castings that fail to meet the beforementioned specifications shall be rejected. All associated cost for the furnishing of approved castings shall be the responsibility of the contractor. The approved status of the manufacturers, providing rejected casting components shall be revoked.

10.02.6 HATCHES AND COVERS

Hatches and covers for vaults shall be as shown on Contract Drawings and/or as described in Project Specifications.

10.03 METHOD OF CONSTRUCTION

10.03.1 PRECAST CONCRETE MANHOLES

(a) Precast concrete "pipe" manholes shall be constructed on Class "C" (2500 PSI) concrete slab foundations. The concrete slab foundations shall be as indicated on the Contract Drawings. The precast base ring section shall be set on the "wet" concrete within two (2) hours of slab pour. Each precast base section shall have its flat bottom and sides adjoining the bottom, for a vertical distance of not less than (12) inches, wetted and cleaned of dirt, mud and foreign material. Each precast base section shall be brushed, on the flat bottom only, with a slurry of one (1) part cement and three (3) parts sand just prior to being set on the slab.

(b) Precast concrete manhole base sections shall be placed on a bed of NCDOT No. 67 stone not less than six (6) inches in depth unless otherwise noted on the Contract Drawings.

(c) The joints between sections of manholes shall be of such design that they will be water proof and shall be sealed with mastic or rubber O-rings.

10.03.2 BRICK OR BLOCK MASONRY MANHOLES, INLETS, CATCH BASINS AND DRAINAGE STRUCTURES

(a) All brick or block masonry structures shall be constructed on poured in place concrete bottoms. Concrete for the bottom shall be Class "C" (2500 PSI) and shall have attained full strength before brick or block

masonry is started. The bottom slab thickness shall be a minimum of eight (8) inches thick or as shown on the Contract Drawings.

(b) The manhole shall be constructed with care being exercised to form the incoming and outgoing appurtenances or pipes into the wall of the structure at the required elevations.

(c) The bricks shall be laid in mortar of a kind and quality as above specified. They shall be laid with a "shove joint" and all spaces between bricks shall be solidly and completely filled with mortar.

A "Shove Joint" method is obtained by spreading an abundant amount of mortar along the base of the structure and then sliding the masonry unit with a lateral motion causing the mortar to extrude up between the two units and forming a solid joint.

(d) The bricks shall be laid to a line with the bed in the line of the radii of the curves. Bricks shall be thoroughly moistened before laying. Each brick shall be completely bedded in mortar at its bottom side and end, in one operation. Joints of face work shall be struck and neatly pointed. Care shall be taken to have the interior surface smooth and regular. The masonry units shall be laid in a workmanlike manner, true to lines and grades indicated on the Contract Drawings. All joints shall have a thickness of at least 3/8". Competent masons shall be employed for this work.

(e) No masonry shall be erected when the temperature has dropped below 45 degrees F. unless it is rising and at no time when it has dropped below 40 degrees except by permission of the Engineer. Masonry shall not be laid on frozen work. Any work which freezes before the mortar has set shall be removed and replaced at the Contractor's expense.

(f) Unfinished work shall be stepped back for jointing new work.

(g) The outside faces of the brick work of each structure shall be neatly plastered with mortar not less than 3/8 inch thick, and trowelled smooth.

(h) The Contractor shall provide all necessary forms and centers required for laying brick masonry. They shall be true to the required curves, shapes and sizes, strong enough to withstand all operations incidental to the placing of the brick work and the face against which the work is to be laid shall be satisfactorily smooth and clean.

(i) All fresh work shall be protected from injury of all kinds and any injured work shall be made good by the Contractor in a manner satisfactory

to the Engineer. All new work, unless immediately covered with earth, shall be kept moist until the mortar has become hard and will not crack in the sun.

(j) The Contractor shall build into the brick masonry the iron steps, the pipes and other objects shown on the Contract Drawings or as directed, and all necessary precautions shall be taken to prevent the pipes and other work from being displaced, broken or deformed. The bricks and mortar shall be tightly packed around the embedded materials so as to prevent leakage and secure perfect adhesion.

(k) Concrete block may be used for manhole construction when approved by the Engineer. All concrete block shall be of the special type manufactured for manhole construction, or approved equal for this type. Such manhole block shall conform to ASTM C139.

(l) A "vertical joint" will be used in manhole construction when shaped manhole block is being used. A 1/2-inch minimum joint will be constructed on both the bottom and top of the shaped block. A "vertical joint" is obtained by filling the circular shaped hole, formed by placing the ends of two shaped blocks together, with mortar. The mortar placed in this hole must be compacted with a tool specifically approved by the Inspector. This tool will be kept at the job site and used on all occasions. No substitute for this tool will be permissible. The masonry units shall be laid in a workmanlike manner, true to lines and grades indicated on the Contract Drawings.

10.03.3 BACKFILL

Excavation for manholes, inlets, catch basins, vaults and drainage structures shall be backfilled in the same manner as the adjoining pipelines to which they are connected or a part thereof. All forms, false work, sheeting and bracing shall be removed before backfilling around the structure. Masonry structures shall be allowed to set for a minimum period of 24 hours before backfilling.

10.03.4 INVERTS AND CHANNELS

Inverts and channels shall be grouted into bottoms of structures so as to provide smooth transitions for change in direction of flow and change in grade. The channel shall be formed by grouting up to the springline of the pipe and uniformly sloping the bottom, on a three to one slope, to the sides of the manhole. Bricks may be used to reduce the quantity of grout required on the "shelf" of the invert. At no time shall the Contractor use calcium chloride to speed the setting of the grout. The Contractor shall use hydraulic grout sealers only with the Engineer's prior approval.

10.03.5 PLACING AND SETTING CASTINGS

The castings for the drainage structure shall be set at the required elevation and properly anchored and grouted to the masonry. Where manholes are constructed in paved areas, the top surface of the frame and cover shall be tilted to conform to the exact slope, crown and grade of the existing adjacent pavement.

10.03.6 MANHOLE DIAMETER

Internal diameter of manhole shall be sized according to the diameter of the largest pipe exiting the manhole. For nominal size pipe of twenty-four (24) inch diameter or smaller, the internal diameter of the manhole shall be four (4) feet unless otherwise shown on the Contract Drawings. For nominal size pipe greater than twenty-four (24) inch diameter, but equal to or less than thirty-six (36) inch diameter, the internal diameter of the manhole shall be five (5) feet. For nominal pipe sizes larger than thirty-six (36) inch diameter, the internal diameter of the manhole shall be as specified in the Project Specifications or as shown on the Contract Drawings.

10.03.7 MANHOLES, INLETS, CATCH BASINS, VAULTS AND DRAINAGE STRUCTURES OVER EXISTING LINES

All structures that will be constructed over existing lines shall have any abandoned, connecting pipe broken out. The pipe openings shall be bricked up and sealed with new flow lines formed as required in the Contract Drawings.

10.03.8 BREAKING DOWN & FILLING OF ABANDONED MANHOLES, CATCH BASINS, ETC.

(a) All structures noted to be abandoned shall have all connecting pipe plugged with grout and/or mortar and brick. The top of the structure shall be removed to an elevation of 2 feet below subgrade or below the springline, where noted, and the structure filled with select earth material properly tamped. The Contractor shall dispose of all surplus materials resulting from the abandoning of any structures; however, every effort shall be made to salvage the castings which shall become the property of the Owner.

(b) The quantity of abandoned structures broken down, filled in and accepted will be measured and paid for at the contract Lump Sum price per each "Breaking Down and Filling Abandoned Manholes, Catch Basins, and etc.". Such prices and payments will be full compensation for all material, plugging pipe openings, breaking down of structures, backfilling, removing

of broken materials and other incidentals necessary to complete the work as required.

10.03.9 DROP MANHOLES

(a) A drop manhole shall be constructed when the difference between the inverts of inlet and outlet pipe is greater than two feet. A drop manhole shall consist of a standard manhole having a drop of pipe, encased in Class "C" concrete constructed on the outside of the manhole as shown on the Contract Drawings. Unless otherwise specified, the fitting and pipe material for the drop shall be cast iron mechanical joint pipe.

(b) The pipe specials at the top and bottom of the drop, the straight pipe used in drop and the concrete encasement for the drop shall be included and constructed as part of the unit price for drop manholes.

10.03.10 CLEAN-UP OF STRUCTURES

All excess materials, dirt, sand, rock, grout, concrete, forming materials, trash and debris shall be removed from structures and disposed of by the Contractor off the project site unless specific arrangements are made to the contrary with the Engineer.

10.03.11 CAST IN PLACE CONCRETE MANHOLES, CATCH BASINS, INLETS, VAULTS AND DRAINAGE STRUCTURES

(a) Cast in place structures shall be constructed as specified in Section 12, Miscellaneous Metalwork and Section 9, Concrete Reinforcing, of the General and Project Specifications and the Contract Drawings.

(b) Cast in place structure shall be paid for as part of the Lump Sum Base Bid and shall be complete as specified or shown on the Contract Drawings unless otherwise indicated.

10.04 COMPLETION OF CONTRACT

10.04.1 TESTS

(a) GENERAL

It is the intent of these specifications to secure manholes with a minimum amount of leakage. All manholes shall undergo tests as herein described. Unless otherwise noted by the Project Specifications, no testing will be performed on manholes used to transport storm water.

All air used shall pass through a single control panel. Individual air hoses shall be used from control panel to pneumatic plugs; from control panel to sealed line for introducing low pressure air; and from sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe(s) in the manhole wall. The plugs shall resist internal test pressures without requiring external bracing or blocking. Each entrance into the manhole shall be sealed with the plugs used in the sewer pipe test. Air shall be introduced into the plugs to 25 psig. The Contractor shall record all test and provide a written record of these tests and their results to the ENGINEER prior to final payment.

10.05 TESTING OF MANHOLES

(1) EXFILTRATION TESTING

Inflatable stoppers shall be used to plug all lines into and out of the manhole being tested. The stoppers shall be positioned in the lines far enough from the manhole to insure testing of those portions of the lines not air tested. The manhole shall then be filled with water to the top. A 12-hour pre-soak shall be allowed. Leakage shall not exceed 1/2 gallon per hour. Test duration shall be 2 hours.

(2) VACUUM TESTING

Vacuum testing of manhole construction will be allowed on all precast concrete manholes. Manholes shall be tested after assembly and prior to backfilling and all stubouts, manhole boots and pipe plugs shall be secured to prevent movement during the test.

A measure vacuum of ten (10) inches of mercury shall be established in the manhole. The time for the vacuum to drop to nine inches of mercury shall be recorded. This time is the leakage rate and the maximum of allowable rate shall be as follows:

<u>Minimum Elapsed Time for 1 Inch of Hg Pressure Change</u>			
<u>Manhole Depth</u>	<u>4 Ft. Diameter</u>	<u>5 Ft Diameter</u>	<u>6 Ft. Diameter</u>
10 ft. or less	60 seconds	75 seconds	90 seconds
> 10 ft. or <15 ft.	75 seconds	90 seconds	105 seconds
> 15 ft. or >25 ft.	90 seconds	105 seconds	120 seconds

10.06 METHOD OF PAYMENT AND MEASUREMENT

10.06.1 MEASUREMENTS OF MANHOLES

Manhole depths shall be measured from the lowest invert to the top of manhole ring. Payment shall be based on a unit price for the depth of manhole built. Each manhole depth shall be as shown on the Contract Drawings. The depth classification shall be as follows:

- Greater than 0 feet but equal to or less than 6 feet.
- Greater than 6 feet but equal to or less than 8 feet.
- Greater than 8 feet but equal to or less than 10 feet.
- Greater than 10 feet but equal to or less than 12 feet.
- Greater than 12 feet but equal to or less than 14 feet.
- Greater than 14 feet but equal to or less than 16 feet.
- Greater than 16 feet but equal to or less than 18 feet.

To be continued in this manner until the depth range covers the deepest manhole in the proposed Project.

10.06.2 MEASUREMENT OF CATCH BASINS, DROP INLETS, CURB INLETS OR ANY OTHER DRAINAGE STRUCTURE

Catch basins, drop inlets, curb inlets or any other drainage structures shall be measured from the lowest invert to the inlet point of the structure. Payment shall be based on a unit price for the depth of the structure built. The depth of each structure shall be as shown on the Contract Drawings.

Depth classification shall be as follows:

- Greater than 0 feet but equal to or less than 6 feet.
- Greater than 6 feet but equal to or less than 8 feet.
- Greater than 8 feet but equal to or less than 10 feet.
- Greater than 10 feet but equal to or less than 12 feet.
- Greater than 12 feet but equal to or less than 14 feet.
- Greater than 14 feet but equal to or less than 16 feet.
- Greater than 16 feet but equal to or less than 18 feet.

To be continued in this manner until the depth range covers the deepest structure in the proposed Project.

10.06.3 MEASUREMENT FOR PAYMENT OF MASONRY VAULTS

Masonry vaults shall be paid for as Lump Sum unit price items.

GENERAL SPECIFICATIONS
11.0 INSIDE PROCESS PIPING

THIS SECTION NOT USED

GENERAL SPECIFICATIONS
12.0 MISCELLANEOUS METALWORK

THIS SECTION NOT USED

GENERAL SPECIFICATIONS
13.0 STRUCTURAL STEEL

THIS SECTION NOT USED

GENERAL SPECIFICATIONS
14.0 PAINTING

THIS SECTION NOT USED

GENERAL SPECIFICATIONS
17.0 RESTORATION AND CLEAN-UP

17.01 GENERAL

17.01.1 SCOPE OF WORK

(a) All labor, materials, equipment, tools and services to fulfill the requirements of this General Specification, the Project Specifications and the Contract Drawings shall be furnished by the Contractor as part of his Base Bid.

(b) All concrete sidewalk, asphalt and concrete driveways, asphalt and concrete pavements, ditches, curb and gutter, fences, poles, mail boxes, landscaped areas and all other disturbed areas shall be replaced or restored to equal or better than their condition prior to work beginning. Upon completion of the work in this Contract, all surplus material, earth, rubbish, etc., shall be removed from the site of the work. That portion of the surface of each yard or street disturbed by construction under this Contract shall be left in as good condition as it was before the commencement of the work, and it shall be promptly and regularly maintained in such condition during a period of one year after the acceptance of the work. This work of maintenance shall apply only to items of materials and workmanship improperly installed under this Contract, and maintenance measures made necessary by the ordinary wear and tear shall not be at the expense of the Contractor. However, any repairs required because of unsatisfactory trench backfilling shall be at the expense of the Contractor. The inclusion of items of material or work within this Specification does not necessarily constitute their use on this Project.

17.02 PAVEMENTS, CURBS AND GUTTERS

(a) In all streets or parts of streets or other areas that are paved or macadamized, all backfilling shall be well compacted by jetting. After the trench or excavation has been backfilled and jetted to the required height, the subgrade for the new paving, curb and/or curb and gutter shall be replaced.

(b) All pavements, curbs and gutters shall be replaced to the section and of the same materials as that removed in accordance with the Owner's established standards or in their absence to the Standards of the State Highway Department.

17.03 DRIVEWAYS AND SIDEWALKS

- (a) The backfill and subgrade for all driveway and sidewalk replacement shall be jetted and compacted in the same manner as that specified for pavements. All edges broken from driveways and sidewalks shall be sawed or cut off at right angles to the driveway or sidewalk and after approval of Engineer replaced.
- (b) All driveways and sidewalks shall be replaced to the section and of the same materials as that removed in accordance with the Owner's established standards for similar work.

17.04 MISCELLANEOUS

All ditches disturbed during this construction shall be regraded to their original line and grade unless otherwise noted. All regrading of ditch lines shall be followed by reseeding and adequate protection from erosion until seed can be established. Any part of any lawn disturbed whether part of road right-of-way or not shall be regraded to its original grade, shall have a minimum of four (4) inches of topsoil placed and shall be reseeded with seed similar to the original sod. All damaged trees and shrubs in yards shall be replaced with similar items unless otherwise noted. This replacement of damaged trees and shrubs does not apply to those planted within established road rights-of-way unless specifically stated otherwise in the Project Specification.

PROJECT SPECIFICATIONS

PROJECT SPECIFICATIONS

1.0 CLEARING AND GRUBBING

1.01 GENERAL:

This Project Specification designated as Section 1.0, Clearing and Grubbing, covers the descriptions and explanations of items required of work to be performed that is different from that appearing in the General Specification, Section 1.0 along with the clarification of the Contractor's Responsibility for all aspects of this Contract.

1.02 SCOPE OF WORK:

All materials required to be removed from this project shall be disposed of by the Contractor "off this site".

1.03 CONTRACTOR'S RESPONSIBILITY:

The Contractor shall endeavor to damage no area outside the provided easements. Existing buildings, structures, trees, etc. both above and below ground, shall be protected. In the event that any public or private property is damaged by reason of or consequence from any facet of work contracted herein, the Contractor shall, at his own expense, make all such repairs as may be necessary as a result of such damage and indemnify and hold harmless the Owner and his agents from and against all suits, actions, claims, demands and liabilities. Failure on the part of the Contractor to make all such necessary and proper repairs in a timely manner, or to satisfy any legal demand or liability, shall confer upon the Owner the right to make, or to have made such repairs and discharge any such liability and demand. The cost and expense shall be deducted from any monies due, or to become due, the Contractor under the terms of this Contract and Specifications. The Owner may, at his option, require the Contractor's Bondsman to satisfy any and all such claims for damage.

1.04 PAYMENT:

No separate payment for clearing and grubbing is provided for in the Proposal.

PROJECT SPECIFICATIONS

2.0 STRUCTURES - EXCAVATION AND BACKFILL

2.01 GENERAL:

This Project Specification designated as Section 2.0, Structures - Excavation and Backfill, covers the descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specifications, Section 2.0.

2.02 SCOPE OF WORK:

- (a) The Contractor is advised that soil boring information for the project is unavailable. The Contractor shall make his own investigations as to the nature of the subsurface of any area of concern within this project.
- (b) Excess materials resulting from any excavation shall be disposed of by the Contractor at his expense off this site.
- (c) The Contractor is required to have the compaction of each trench tested every 200 feet for each utility (water, sewer and storm drain) or two (2) per town block for each utility, whichever is greater, throughout the project by a qualified geotechnical engineering firm. Any failures of the test shall be recompacted, per the geotechnical recommendations, to meet the compaction requirements.
- (d) The Contractor is required to have the compaction of the roadway base and subbase tested every 600 SY of roadway.

2.03 COMPACTION/DENSITY:

- (a) **Testing** – Testing of backfill shall be performed by an independent laboratory approved by the Owner and the Contractor. The Contractor shall be responsible for excavation of both types (QC and/or QA) of testing at no additional cost to the Owner.
- (b) **Quality Control (QC) vs. Quality Assurance (QA)** – QC testing is required testing that shall be performed by the Contractor to assure compliance with the requirements of these specifications. The associated cost for QC testing is the Contractor's responsibility. The Contractor is also responsible for "re-testing" costs incurred by the Owner when test results (tests for QA) in a "failure". QA testing, and associated costs will be paid for by the Owner. The Owner will contract with a separate testing firm for QA testing. QA testing may be conducted to ensure Contractor compliance with these specifications.
- (c) **Quality Assurance (QA)** – In the course of backfilling trenches for utility installations, the Owner may require "Field Density Determinations" or compaction tests. The Owner will determine the location of the tests and shall engage a qualified testing firm to perform the test. The Contractor shall perform

the excavation during normal working hours at no additional cost to Owner. Field density determinations shall be performed in accordance with AASHTO T191, T204, and T205 modified to include material sizes used in the laboratory determination of density with nuclear field density testing device or by other approved methods. A representative of the Owner will observe tests and a copy of the test results and inspection report will be submitted by the testing firm directly to the Owner or Engineer. When the average of three (3) test results, with no one test failing by more than 3 percentage points, indicate that the density is less than the percent specified, the Contractor shall excavate and re-compact the areas that have failed at no expense to the Owner. Payment for a failed compaction test shall be made by the Contractor.

- (d) **Quality Control (QC)** – The Contractor is required to perform Quality Control testing. Field density of compaction tests determinations shall be performed in accordance with AASHTO T191, T204, and T205 modified to include material sizes used in the laboratory determination of density with nuclear field density testing device or by other approved methods. A representative of the Owner will observe tests and a copy of the test results and inspection report will be submitted by the testing firm directly to the Owner and/or Engineer. When the average of three (3) test results, with no one test failing by more than 3 percentage points, indicate that the density is less than the percent specified, the Contractor shall excavate and re-compact the areas that have failed at no expense to the Owner. However, where backfill compaction is suspect and questionable, the material shall be removed as directed by the Owner or Engineer and the area tested. If a suspect area fails to meet the prescribed minimum moisture density test requirements, the soil shall be removed, replaced, compacted and re-tested, as directed by the Owner or Engineer, until the backfill meets or exceeds the minimum density requirements. The Contractor shall pay for all costs associated with testing.
- (e) Compaction requirements shall meet those noted in the General Specification 2.0.
- (f) In place density testing shall reference the ASTM standard for the soil type and classification.

2.04 PAYMENT:

All work associated with this Section 2.0 shall be Unclassified. All costs shall be merged into the total cost for that appropriate item and entered into the Proposal as part of the Unit Price or Lump Sum Price whichever is applicable for that item.

PROJECT SPECIFICATION

3.0 PAVEMENT, SIDEWALK, CURB & GUTTER AND RELATED WORK

3.01 GENERAL:

This Project Specification designated as Section 3.0, Pavement, Sidewalk, Curb & Gutter and Related Work, covers only descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specification, Section 3.0.

PROJECT SPECIFICATION

4.0 SITE WORK

4.01 GENERAL:

This Project Specification designated as Section 4.0, Site Work, covers only the descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specification, Section 4.0.

4.02 SCOPE OF WORK:

- (a) All excavation on this project is unclassified.
- (b) Alignment and Grade: All construction location and stake-out for this project shall be the responsibility of the Contractor and all materials and labors required shall be at the Contractor's expense. The Owner or Engineer may check the Contractor's construction sequence as the construction progresses to assure that the Contractor is following the Contract Drawings and/or previously established procedures. In the event the Owner or Engineer finds deviations from these procedures the Contractor may be required to stop work at no cost to the Owner or produce a new construction sequence that is acceptable to the Owner or his representative.
- (c) Spoil materials resulting from removal of existing manholes, structures (concrete, masonry or metal), organic material, excess fill, etc. shall be disposed of off site and included in the contractor's price to complete the project. All required disposal permits are the responsibility of the Contractor.
- (d) Grassing shall be used as erosion control except in disturbed areas containing existing catch basins or in areas disturbed that drain into existing catch basins. In these locations, the Contractor shall install and maintain silt fence, containment ponds and ditches for the duration of the project. This silt fence may be field located to meet existing conditions. Temporary seeding shall be used if the construction of the utilities and/or sidewalks will be delayed for more than 14 days.
- (e) The permanent grass seeding shall be installed as soon as possible. The contractor shall submit a coastal blend grass seed with a higher percentage of bermuda grass recommended for the beach and coastal areas. All soil amendments necessary to establish a viable growth of ground cover is the responsibility of the contractor.
- (f) All silt fence shall be removed by the contractor after the grass seeding is established and accepted in writing by the Owner.
- (g) Coordinates for staking components of this project are located on the Contract Drawings.

- (h) The contractor shall be careful not to destroy or damage any property iron or markers. If any property markers or corners are damaged due to construction, the contractor shall have a North Carolina licensed surveyor to reestablish the property marker.

4.03 PAYMENT:

- (a) Alignment, Grade and Site Grading: No direct payment will be made for this work. Payment at the Unit Price Items or Lump Sum Items for the various works will be full compensation for all work covered by this item in the Proposal.
- (b) All erosion control work and grassing as described in the General Specification for this Section, including but not limited to ground preparation, temporary seeding, permanent seeding, irrigation, mulching, mowing and maintenance until final acceptance by the Owner or Engineer shall be paid in the Unit or Lump Sum Price Item for Seeding and erosion control respectively.

PROJECT SPECIFICATIONS

5.0 FENCING

THIS SECTION NOT USED

PROJECT SPECIFICATIONS

6.0 BURIED PRESSURE PIPELINE

6.01 GENERAL:

This Project Specification designated as Section 6.0. Buried Pressure Pipelines, covers only the descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specification, Section 6.0.

6.02 CONSTRUCTION MATERIALS:

- (a) All pipe noted by the Contract Drawings as ductile iron pipe (D.I.P.) shall be Class 350 with rubber single gasket Push-On joints and mechanical joint fittings. Where ductile iron pipe is indicated on the Contract Drawings or where it's use is required in locations where a 10' horizontal or 18" vertical separation cannot be maintained between water and sewer lines, Class 350 ductile iron pipe shall be used. Ductile iron pipe shall be provided by US Pipe, American or an engineer approved equal.
- (b) All pipes noted by the Contract Drawings as cast iron pipe (C.I.P.) shall be for 18/40 iron strength with rubber single gasket Push-On joint and mechanical joint fittings.
- (c) All pipe noted by the Contract Drawings as plastic pipe (P.V.C.) shall be DR18 C-900 PVC pipe or as noted on the drawings. Other (P.V.C.) pipe shall be as specified on the Contract Drawings. All PVC water line 4" and larger shall be fitted with Cast Iron rubber gasketed fittings. All PVC water line smaller than 4" shall be fitted with rubber gasketed or solvent welded PVC fittings.
- (d) All valves shall be Class A with a working pressure of 150 p.s.i. All valves shall be installed with adjustable screw-type cast iron valve boxes. Should the valve box not adjust to the top of the installed valve, the Contractor shall cut and install six (6") inches PVC pipe from the top of the valve to the valve box.
- (e) The standard yard hydrant shall be a 1" main valve opening, automatic draining, backflow protected, frost proof yard hydrant, model Y2 by Woodford or an Engineer approved equal. The contractor shall install a 4" thick, 24" square concrete pad and the hydrant base.
- (f) All water service pipe shall be High Molecular Weight Polyethylene tubing rated for 160 p.s.i. All service line shall be S.D.R.-9 Copper Tube Size. All pipes shall be National Sanitation Foundation approved and shall bear the NSF logo.
- (g) All service clamps shall be bronze units suitable for the main pipe size used and tapped for a corporation stop with AWWA threads. All service clamps shall be double strap units furnished with Neoprene gaskets meeting or exceeding the specifications for Mueller H-13431.
- (h) All meter yokes shall be 7" high for the 3/4" setters. All 3/4" setters shall be all bronze units with horizontal 3/4" inlets and outlets, lock wing meter stops and integral outlet check valves suitable for 5/8" x 3/4" water meters. Ford 3/4" setters shall be V-172-7W with "Pack Joint" Copper Tube Size inlets and double purpose outlets with adapters for 3/4" Class 160 P.V.C. glue joint tubing. All meters shall have dual check valve backflow preventer built in.

- (i) All buried fittings and valves shall have mechanical joints. All exposed fittings and valves shall have flanged joints.
- (j) All meter boxes shall have 12" deep body with all cast iron construction.
- (k) All pressure pipeline shall have a 10 gauge insulated copper locator wire run approximately 12" above the top of the pipe. The wire shall run continuously and be accessible from above ground at 1,000 foot intervals with the Owner having access through a metal cleanout box or a cathodic test station.
- (l) In the event water and sewer lines cross, water lines shall be on top.
- (m) The Contractor is responsible for the abandonment and or replacement of the existing water mains, valves, and yard hydrants in the project area, which are being replaced as part of this project. Once the proposed water system has been installed, tested, approved and placed into service, the Contractor shall abandon the old water mains by physically disconnecting the main to be abandoned, as closely as possible to the main which is to remain in service. Once the existing main has been disconnected, the Contractor shall physically remove any unused valves.
- (n) All tapping sleeve and valve installation shall be pressure tested in accordance with AWWA C223, prior to tapping operations.

6.03 CONSTRUCTION METHODS:

- (a) The Contractor shall, inasmuch as possible, maintain water service connections during the construction of this project.
- (b) All hydrants shall be set such that the break-away flange is level with the natural ground.
- (c) All disinfecting procedures outlined by Section 6.04.2 of the General Specifications shall be followed. Placement of powdered HTH in new sections will not be allowed.
- (d) Valve boxes in unpaved areas shall be installed with pre-cast concrete collars.
- (e) Water lines shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 18 inches above the top of the sewer pipe. Where water lines are less than 18 inches above the sewer lines, or cross under sewer lines, the sewer pipe for a distance of at least 10 feet each side of the crossing shall be made of ductile iron pressure pipe with no joint located within 3 feet horizontally of the crossing.
- (f) Sewer force mains shall not be laid in the same trench with sewer lines, water lines, gas lines or electric wiring.

6.04 PAYMENT:

- (a) All hydrant prices shall include the barrel section as required to place the break-away flange at the natural ground elevation plus all valves, accessories and labor.

- (b) All work associated with the installation of a new valve shall include all accessories such as valve boxes, sleeves, extension pipe, concrete collars, etc.
- (c) All work performed under this Section 6.0 shall be compensated by the appropriate pay item in the Proposal.
- (d) No payment will be made for pipe installation until the installed pipe has passed the required pressure test and the project area has been cleaned up with the appropriate erosion control measures established.

PROJECT SPECIFICATIONS

7.0 GRAVITY SEWER, CONDUITS AND DRAINS

7.01 GENERAL:

This Project Specification designated as Section 7.0, Gravity Sewer, Conduits and Drains, covers only the descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specifications, Section 7.0.

7.02 SCOPE OF WORK:

- (a) All sewer line Bid as PVC Gravity Sewer Pipe shall conform to the AWWA C900 specification, with gaskets meeting ASTM F477 and joints in compliance with ASTM D3139, shall be DR18 for gravity sewer, in the green color.
- (b) Ductile iron gravity sewer pipe shall be class 350 push-on joint pipe, conforming to ASTM A536, Grade 65-45-12. Piping inside pump stations shall be flanged D.I.P., class 50 and painted according to the painting Section 14.0.
- (c) Ductile iron pipe for gravity sewer shall be used where indicated on the Contract Drawings or where required due to inadequate cover on the pipe or where a horizontal separation of 10' or a vertical separation of 18" cannot be maintained between water and sewer mains or as directed by the Owner or Engineer. The ductile iron pipe shall comply with ASTM A-746, latest revision, AWWA C150 (ANSI A21.50). Pipe joints shall comply with AWWA C111 (ANSI A21.11).
- (d) All service laterals shall be PVC or ABS conforming to ASTM D1788-62-T Type 1, Grade 2 schedule 40 with matching fittings as required by the standard details in the Contract Drawings.
- (e) The Contractor shall be responsible for locating and reconnecting all existing sewer services to the new main line, unless written permission from the Owner is provided to the Engineer and Contractor.
- (f) Alignment and Grade: The Engineer will provide reference bench marks as noted by the Contract Drawings. All construction stakeouts for this project shall be the responsibility of the Contractor and all materials and labors required shall be at the Contractor's expense. Construction stakeout shall include, but not be limited to, all horizontal and vertical alignment necessary for the construction of the lines as shown by the Contract Drawings.

The Engineer may check alignments and grades from time to time as the construction progresses to assure that the Contractor is following the Contract Drawings. In the event the Engineer finds deviations from the alignments and

grades, the Contractor may be required to remove, repair or replace all such work at no cost to the Owner.

- (g) The Contractor shall refer to Major Equipment Item No. 3 for sewerline rehabilitation specifications.
- (h) Should the Contractor encounter any petroleum-contaminated soils during construction, he shall use only petroleum compatible materials (i.e. ductile iron sewer mains and laterals) and select fill materials for construction in contaminated area.

7.03 PAYMENT:

- (a) All work performed under this Section 7.0 shall be compensated by the appropriate Unit Price Item in the Proposal to the limits as described by the Contract Drawings.
- (b) All gravel bedding shall be compensated by separate Unit Prices as specified by Section 8.0, PIPELINE - TRENCH EXCAVATION AND BACKFILL of the General Specifications.
- (c) All rock excavation is unclassified.

7.04 COMPLETION OF CONTRACT -- TESTS

All pipe shall undergo visual tests for soundness. All "new" pipe shall undergo air tests as specified by 7.04.1 of the General Specifications unless the Engineer is of the opinion that such tests are unnecessary. Air test and Deflection test will not apply to sections of the existing sewer line that have undergone rehabilitation.

All "new" sewer pipe shall be subject to random selection of sections of the line for deformation tests. It shall be the Contractor's responsibility to "prove" that line sections selected for test by the Engineer will pass the specified deflection percentage. For the purpose of these tests, the Contractor shall purchase or fabricate a nine (9)-arm mandrel to pull through the test sections of line. This mandrel shall have a minimum O.D. of 7.37 inches for the 8" sewer, 9.23 inches for the 10" sewer, and a minimum O.D. of 10.98 inches for 12" sewer. This corresponds to a 5% deflection on a Base inside Diameter of 7.76 inches for 8" sewer, 9.71 inches for a 10" sewer, and 11.56 inches for 12" sewer respectively.

The Contractor should include in his Bid the cost required to properly test 2,000 L.F. of "new" PVC pipe for Deflection. If any failures are in this 2,000 L.F. of tested "new" pipe, the entire project may be required to be tested by the Owner and the Engineer. The Engineer will be responsible for selecting the area in which the initial test will be carried out. The Contractor shall bear the costs of all Deflection Tests.

Additionally, the Owner will randomly select areas of the Contractor's backfill adjacent to the pipe for Density Testing. For these areas, the Owner will pay the complete cost of this

Density Testing in whatever chosen area of the Project for the "initial" test only. All areas not passing the required compaction specified in Section 8.02 of these Project Specifications shall be compacted and tested at the Contractor's expense until such compaction is reached.

PROJECT SPECIFICATIONS

8.0 PIPELINE - TRENCH EXCAVATION AND BACKFILL

8.01 GENERAL:

This Project Specification designated as Section 8.0, Pipeline - Trench Excavation and Backfill, covers only the descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specification, Section 8.0.

8.02 CONSTRUCTION METHODS:

- (a) Install PVC pipe in strict accordance with ASTM D2321. The Contractor shall be especially careful when backfilling the trench on all PVC sewer pipe. Since this is a flexible conduit and is subject to deformations if improperly backfilled, the Owner or Engineer will not allow any deviations from the specified backfilling techniques. In all cases, this pipe will be laid on a well tamped uniform bed prepared to the grade required. Thereafter, the backfill will be brought up around the pipe in loose layers not exceeding 6" in depth of a loose and finely divided sandy material. This material will receive hand tamping on each layer to 85% compaction by the Standard Proctor Test. This layering of material shall continue until approximately 6" of the compacted material exists above the top of the pipe. In the event that very wet clayey material is encountered, the Contractor, at the Owner or Engineer's direction, shall backfill to the springline of the pipe with #67 Stone.
- (b) Spoil or excess materials resulting from the laying of any pipelines may be disposed of on site in areas that are to be designated at the time of disposal.
- (c) The Contractor is required to have the compaction of each trench tested every 200 feet for each utility (water, sewer and storm drain) or two (2) per town block, whichever is greater, throughout the project by a qualified geotechnical engineering firm. Any failures of the test shall be recompacted to meet the compaction requirements.
- (d) Also See Section 7.0 of these Project Specifications for further comments on PVC pipe.
- (d) **SHORING, SHEETING AND WELL-POINTING:** The Contractor shall include in their price bid for pipe the placing of all necessary shoring, sheeting and well-pointing, gravel bedding, and any other dewatering devices to prevent damage to other installations and where required by the Owner.

Where sheeting, shoring, bracing or trench boxes are used, they must be designed and sealed by a professional Owner or Engineer licensed to practice in the State of North Carolina.

Trenches shall, at all times, be properly and adequately sheeted and braced to prevent accidents, caving of the sides of the trench or prevent breaking of the ground outside of the lines of the trenches or prevent damage to buildings or other structures along the line of construction. Underground structures of all types shall be protected by the Contractor, who shall use all necessary shoring, bracing or other appliances for the protection of same. Care must be taken not to damage in any way water mains, water service pipes, drain pipes, sanitary or stormwater sewers, gas mains, oil mains, electric conduits or other structures encountered on the line of the work.

Only shoring authorized by the Owner or Engineer and approved by the Owner or Engineer shall be left in place.

Whenever timber or other sheeting is driven to a depth below the elevation of the top of the pipe, that portion of the sheeting below the elevation of the top of the pipe shall not be disturbed or removed. Whenever timber or other sheeting is driven for the protection of trench walls in water-bearing soil, no portion of such sheeting below a level of 4 feet above the pipe shall be removed.

- (e) **DEWATERING:** All ground water which may be found in the trenches and any water which may get into them from any cause whatsoever shall be pumped or bailed out so that the trench shall be dry during pipe laying period. No water shall be permitted to reach concrete until it has set sufficiently. All water pumped from the trenches shall be disposed of in compliance with the applicable local regulations of the appropriate governing body. The Contractor shall provide a minimum of two pumps for each trench opened in wet ground, one operating and one standby. The standby pump shall be of a size that will replace the largest operating pump. The Contractor shall be required to well point, pump, or provide other measures necessary to keep the trench dry.

The Contractor shall provide and place all necessary flumes or other channels of adequate size to carry temporarily all streams, brooks, stormwater or other water which may flow along or across the lines of the pipe line. All flumes or channels thus utilized shall be tight so as to prevent leakage into the trenches. Water pumped from trenches shall be pumped through a sediment filter bag prior to discharge to the gravity sewer system. The Contractor shall submit for approval the dewatering/by-pass plan to the Owner or Engineer.

No separate payment will be made for Dewatering. All costs incurred by the Contractor for this work should be included in the unit price or lump sum price for the item of work to which it pertains.

- (f) **EXCESS WATER CONTROL:** The Contractor shall grade and maintain all areas of the site to preclude surface runoff into excavations and prevent ponding of water. Excavations should be kept free of surface water and/or groundwater. Provide and maintain at all times the necessary means and devices to prevent water from entering the excavations and for removing all water entering the excavations. All soil softened or eroded by the presence of water shall be removed and replace with suitable backfill material.

- (g) Service Connections: Sewer laterals shall be connected to the main by means of a wye fitting installed at the 10 or 2 o'clock location of the pipe but shall not be installed straight up. Where it is necessary to lay new house services or relay or tie in existing house services, the Contractor shall use the materials and type joints as set forth on the plans, as given in the specifications, or as directed by the Owner or Engineer. These services shall be sized as designated on the plans or as shown on details.

Service piping shall be perpendicular with the main unless otherwise approved by the Owner or Engineer. Where new mains are being laid, the house service shall be connected to the main by means of a wye set in the main with the branch turned up in such manner that a good square connection will be made with the grade of the house service. Service lines shall be terminated at property line or edge of easement

Existing service connections found in existing manholes scheduled for replacement shall be relocated to the main line. Service pipes shall only connect to the manholes when noted on the drawings "Reconnect to Manhole" or when requested by the Owner or Engineer by coring and rubber boot the manhole.

All house connections shall be laid to the property line or right-of-way and re-connect to the existing property sewer service. The Contractor shall provide a clean-out and stub solvent weld cap at termination. Clean-out termination shall be at the right-of-way line.

A nominal 6" diameter by 12" cast-iron box and cover (Larger size for 6" services) shall be furnished and installed flush with the final grade at the edge of the easement or right-of-way. "C.O." shall be stamped on lid. During construction or installation, any services or utilities damaged by the Contractor shall be properly maintained and repaired by the Contractor at his expense.

8.03 PAYMENT:

- (a) All excavation and backfill cost shall be merged into the appropriate Price Items for the pipeline, structures and manholes, except as provided for herein.
- (b) The washed stone bedding or structure bedding stone required for the installation of the work under this Section 8.0 shall be included in the appropriate line item cost to install the pipelines under this section.

PROJECT SPECIFICATIONS

9.0 CONCRETE AND REINFORCING

9.01 GENERAL:

This Project Specification designated as Section 9.0, Concrete and Reinforcing, covers only descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specification, Section 9.0.

PROJECT SPECIFICATIONS

10.0 MANHOLES, INLETS, CATCH BASINS, VAULTS AND RELATED STRUCTURES

10.01 GENERAL

This Project Specification designated as Section 10.0 Manholes, Inlets, Catch Basins, Vaults and Related Structures, covers only the descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specification, Section 10.0.

10.02 SCOPE OF WORK

- (a) All manholes constructed around existing piping shall be 4'-0" in diameter and shall be constructed in accordance ASTM C478 and with Section 10.02.3 of Section 10 of the General Specifications. Dog house manholes are not allowed unless specifically called out by the project plans.
- (b) All iron casting for manhole frames and covers, inlet frames and traps and other sewer appurtenances, unless otherwise specified, shall conform to ASTM A48 "Grey Iron Castings: Class 35B and shall be marked "Sanitary Sewers". Watertight covers shall be Vulcan No. V-1357, or equal. All manhole castings shall be American made. All castings shall have a 24 inch inside diameter opening.
- (c) Mortar: ASTM C270, Type S.
- (d) Grout: Grout for sealing openings and joints in manholes shall be nonshrinking grout Embeco 153 or approved equal.
- (e) Brick: Brick shall be used to bring manhole rings to grade or filler for forming manhole inverts only and shall conform to ASTM C62 Grade SW or ASTM C32 Grade MS.
- (f) Manholes 4' deep or less shall have an eccentric cone or a flat top.
- (g) Manholes over 4 feet deep shall have an eccentric cone.
- (h) Manholes shall have a minimum inside diameter of 4 feet for sewer mains 18 inches diameter and smaller shall be 5 feet inside diameter for sewer mains larger than 18 inches. Larger inside diameters may be required for larger pipe sizes, more than two pipes, or when entrance/exit angle requires.
- (i) Drop manholes shall be inside drop with a minimum inside diameter of 5 feet.

- (j) All 5 foot diameter manholes 8 feet deep or greater shall have an 8 inch extended base. All 4 foot diameter manholes 8 feet deep or greater shall have a 6 inch extended base.
- (k) Manhole steps shall be provided in bases, risers, cones, transition cones and transition top sections aligned vertically on 16" centers. Steps shall be secured to the wall with a compression fit in tapered holes or cast in place. Steps shall not be vibrated or driven into freshly cast concrete or grouted in place. The steps shall be Copolymer Polypropylene Plastic reinforced with a ½" diameter grade 60 bars and have serrated tread and tall end lugs. Step pullout strength shall be 2000 pounds minimum when tested according to ASTM C497.
- (l) Sewer Guard Manhole Inserts: Each manhole shall be equipped with an insert of high density copolymer meeting the requirements of ASTM 124 with gas and vacuum relief valves matching manhole covers and rings. The insert shall be similar or equal to Sewer Guards manufactured by Southwestern Packing and Seals. Manholes located in traffic areas shall have stainless steel sewer guards by Southwestern Packing and Seals or approved equal.
- (m) All in place penetrations into manholes must be by core boring methods including main line and service drops. Properly sized elastometric boots shall be set in penetrations.
- (n) Adjusting Rings:
 - a) Cast iron adjusting rings shall conform to ASTM A536 Grey Iron Castings.
 - b) Concrete adjusting rings shall be precast and conform to ASTM C478.
- (n) All manholes shall be vacuum tested in accordance with Section 10 General Specifications. All testing shall be successfully completed prior to any final grading or pavement installation. Any vacuum leakage above the allowable, will be repaired before the manhole is approved or included in the payment request. Any manhole failing the initial vacuum test, will have repairs made to the manhole with a non-shrink grout or other approved material while the vacuum is being drawn. All repairs shall be completed from the outside of the manhole. Once the grout has setup, the manhole shall be re-tested until a satisfactory test is performed.

10.03 CONSTRUCTION METHODS

- (a) The precast concrete base shall be placed on an eight inch (minimum) stone bedding foundation which shall extend up around the pipes to at least 3 inches above the top line of the pipes. The stone bedding shall be considered as incidental to the unit price bid for the installed manhole.

Pipes entering the precast sections of the manhole shall be inserted into the adapter couplings provided. All precast manhole components shall be lifted and moved by use of suitable lifting slings and plugs that will not damage the precast manhole lip. All damage to precast sections shall be thoroughly repaired in the presence of the Owner or Engineer. Repair and patching of minor breaks shall be done by chipping and scarifying the defective area before application of grout. Precast sections shall be subject to rejection on account of failure to conform to any of the specification requirements. In addition, individual sections of manhole sections may be rejected because of fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint; defects that indicate imperfect proportioning, mixing, and molding; surface defects indicating honey-combed or open texture; damaged or cracked end, where such damage would prevent making a satisfactory joint; and/or any continuous crack having a surface which width of 0.01 inches or more and extending for a length of 12 inches or more, regardless of position in the section wall.

- (b) The Contractor is responsible for getting the manhole tops to proper grade. Profiles on the plans are for cost estimates only. The top of the precast manhole may be brought to proper grade for receiving manhole frames by using brick with a maximum adjustment of 12 inches from precast cone to the cast iron ring. Masonry construction shall be performed by experienced and qualified workmen. All work shall be laid plumb, straight, level, square, and true. The Contractor shall set and bond the manhole frame in a full bed of mortar. All manhole steps and miscellaneous items shall be properly bedded. The masonry walls shall be parged on the inside and outside with a ½-inch coat of mortar. Wedging or the placing of the shims to secure proper level will not be used in setting of manhole sections. Manholes located in unpaved roads shall be constructed with top of lid located 8 inches below road surface and a concrete reference marker shall be placed at the adjacent right of way line.
- (c) Invert Channels: The invert channels shall be 3/4 the depth of the largest pipe and shall be smooth and semicircular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth curve of as large a radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly. The invert channels shall be formed directly in the concrete of the manhole base or shall be built up with brick and mortar. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than 1 inch per foot or more than 2 inches per foot. No laser bowl invert manholes shall be permitted.
- (d) Grade Rings: Manhole castings shall be installed to grade using 24 inch inside diameter cast iron rings, precast concrete grade rings, or brick grouted in place, for a maximum adjustment of 12 inches. Manhole

sections shall be used for greater adjustment, unless approved otherwise. Flat top manholes shall not be adjusted by more than one course of brick.

- (e) Sewer Guard Manhole Inserts: Provide manhole inserts in all manholes.
- (f) Bedding: Provide 6 inches Class I bedding to at least 6 inches outside of base.
- (g) Drop Manholes: Inside drop only with minimum 5' diameter. Where sewer lines enter on a grade 24 inches or more above the invert of the discharge line, a drop manhole shall be constructed as directed by the Owner or Engineer. The drop or drops, shall be constructed in accordance with the Standard Detail, as shown on the plans.

10.04 PAYMENT

All work associated with this Section 10.0, including stone bedding, shall be merged into the appropriate Unit Price Bid Item in the Proposal for manholes, inlet, catch basin, etc.

PROJECT SPECIFICATIONS

11.0 INSIDE PROCESS PIPING

THIS SECTION NOT USED

PROJECT SPECIFICATIONS

12.0 MISCELLANEOUS METALWORK

THIS SECTION NOT USED

PROJECT SPECIFICATIONS

13.0 STRUCTURAL STEEL

THIS SECTION NOT USED

PROJECT SPECIFICATIONS

14.0 PAINTING

THIS SECTION NOT USED

PROJECT SPECIFICATIONS

15.0 ELECTRICAL MOTORS

THIS SECTION NOT USED

PROJECT SPECIFICATIONS

16.0 ELECTRICAL

THIS SECTION NOT USED

PROJECT SPECIFICATIONS

17.0 RESTORATION AND CLEAN-UP

17.01 GENERAL:

This Project Specification designated as Section 17.0, Restoration and Clean-Up, covers only the descriptions and explanations of items required or work to be performed that is different from that appearing in the General Specification, Section 17.0

17.02 SCOPE OF WORK:

- A. The Contractor shall provide complete and thorough clean up of his Construction efforts at the end of each work day. This requirement shall be enforced along all roads in the State Road system and along all Town Streets. Additionally, water flushing and/or sweeping of the streets as required to provide reasonable prevention of dust, gravel and mud shall be used in all Residential areas, during the project. The Owner or Engineer shall determine if and when these additional measures are required.
- B. Clean up and restoration shall be performed at the earliest possible time. Within seven (7) days of completion of backfilling, clean up shall be complete for backfilled construction areas. Within fourteen (14) days of the completion of the work for a section of a Town Street, the final restoration shall be complete.
- C. The Owner or Engineer shall consider site conditions, weather limitations, and the Contractor's diligence, and if warranted, the Owner or Engineer shall extend the time limitations for clean up and restoration.
- D. If project areas are found to be out of compliance with the Contract Documents, the Owner will provide a written notification of the items to the Contractor. If the clean up and restoration of the project area of concern is not addressed within 24 hours, a stop work order will be issued until the clean up and restoration items are complete. No claim for extra time will be allowed as a result of stop work orders for clean up and restoration.

PROJECT SPECIFICATIONS

18.0 CONSTRUCTION COMMENTS AND START-UP

18.01 GENERAL

This Project Specification does not have a complimentary General Specification. Its sole purpose is to advise the Contractor of site operations and his part in them.

18.02 PRELIMINARY MATTERS

18.02.1 PROJECT MEETINGS

PRECONSTRUCTION CONFERENCE

A pre-construction conference will be held at the office of the Owner at least one (1) week before construction proceeds.

The attendees will include the contractors project manager, superintendent and representatives from Engineering Services, PA.

MONTHLY PROGRESS MEETINGS:

The Owner shall conduct a regularly-scheduled monthly meeting, to be held at the job site. These meetings will be open to subcontractors, material suppliers, and others who can contribute toward maintaining job progress. It is required that the prime contractor be represented by both home office and project personnel. These representatives shall have authority to act on behalf of the Contractor. It shall be the purpose of these meetings to effect coordination, cooperation, and assistance in maintaining the progress of the project in order to complete the project within the contract time.

18.02.2 SCHEDULES

PREPARATION

Each Contractor shall prepare a progress or work schedule for the project awarded.

Each activity in the progress or work schedule shall be identified and a time for the performance of such activity indicated. Each activity shall be preceded by all work that must be accomplished prior to that activity. All abbreviations, codes and/or symbols used shall be described on the schedule.

SUBMISSION

Submit seven (7) copies of schedule to Engineer for review within thirty (30) days after award of contract. Update and resubmit schedule monthly thereafter until completion of work. Updated schedule shall have completed activities removed or indicated as such. Whenever modifications are made to the contract which add or

delete activities and/or review time of completion, schedule shall be revised and resubmitted to the Engineer within ten (10) days after such modification is authorized.

In the event that the work is behind schedule, the schedule shall be revised, through the use of overtime work or by other means, to insure that the work is completed within the time schedule.

Payment: No separate payment will be made for the Schedule. All costs incurred by the contractor for this work should be included in the unit price or lump sum price for the item of work to which it pertains.

18.02.3 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

(a) GENERAL

This section specifies the contractor's responsibilities for providing temporary facilities and the necessary controls required for the successful completion of this contract.

(b) CONSENTS FOR PRIVATE PROPERTY UTILIZATION

The contractor is responsible for obtaining written consent from the proper parties prior to entering or occupying any properties for any purpose related to this contract unless the properties or rights-of-ways have been previously obtained specifically for work performance.

(c) TRAFFIC INTERFERENCE AND STREET PROTECTION

The Contractor shall not close or obstruct any portion of a street, road or private way without obtaining permits from the proper authorities. If any street or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the appropriate authority. Streets, roads, private ways and walks not closed shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made. Traffic shall be maintained in accordance with the North Carolina Department of Transportation and County traffic maintenance procedures.

The Contractor shall, 24 hours in advance of closing any street, notify the police and fire department in writing, with a copy to the Engineer. He shall cooperate with the police department in the establishment of alternate routes and, at his own expense, shall provide adequate, plainly-marked detour signs.

For the proper control of traffic, the Contractor shall provide an adequate number of flagmen or uniformed special officers.

(d) TRAFFIC SAFETY

The Contractor shall furnish, erect and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work, (especially

when excavating adjacent to existing roadways). When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated. When directed by the Engineer, a flagman shall be provided to facilitate safe movement between construction operations and normal traffic flow.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).

The Contractor is responsible for obtaining permission from the North Carolina Department of Transportation or the Town as appropriate for road closures or detours, and for open cuts.

(e) ROADWAYS AND HAUL ROADS

In general, the Contractor shall confine his equipment and hauling where practical to existing public rights-of-way or easements acquired by the Owner. If existing pavement is damaged by the Contractor's hauling operations, it shall be repaired to its original condition at the Contractor's expense, including full width overlay if determined by the Owner and/or Engineer. Existing roads shall be kept clean and free from all dirt, mud, or construction debris.

(f) SAFETY PRECAUTIONS

Until final acceptance of the work, the Contractor shall continuously maintain adequate protection of the work and work in progress from damage. He shall adequately protect adjacent private and public property as provided by law and these Specifications.

The Contractor shall take all necessary precautions for the safety of employees on the work, and shall comply with all applicable provisions of federal, state and local safety laws and building codes to prevent accidents or injury; to persons on, about or adjacent to the premises where the work is being performed. He shall erect and properly maintain at all times as required by the conditions and progress of the work, all necessary safeguards and barricades for the protection of employees performing the work and provide for the safety of others near the work site. The contractor shall post danger signs and warning lights warning against the hazards created by such features of the construction as protruding nails, hoists, excavations, scaffolding, stairways and falling materials. He shall designate a responsible employee of his organization, whose duty shall be the prevention of accidents. The name and position of the person so designated shall be reported in writing to the Engineer.

(g) SAFETY PROVISIONS

The Contractor shall adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations,

Part 1926 published in Volume 39, Number 122, Part II, June 24, 1974 Federal Register, or latest edition), which are hereby incorporated in these requirements.

- (h) **ACCIDENT REPORTING AND RISK ASSUMPTION**
The Contractor shall immediately report in writing, giving full details, to the Engineer all serious accidents which arise out of or in connection with the performance of the work, whether on or adjacent to the site. Where death, serious personal injury or substantial property damage is caused, the accident shall be reported immediately by telephone or messenger to the Engineer. If a claim is made or suit is filed by anyone against the Contractor, or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim. The Contractor shall assume all risks of loss or damage of any kind to any vehicles, machinery, equipment, materials or supplies that it shall provide in doing the work.
- (i) **OPERATIONAL HOURS**
The contractor shall limit his work activities to daylight hours between sunrise and sunset.
- (j) **NOISE CONTROL**
Every possible measure or method will be employed by the contractor to minimize the effect of noise from equipment and pumps to include mufflers, baffles, etc. Special effort shall be to exercise noise abatement between sunset and sunrise.
- (k) **PROVISION OF SANITARY FACILITIES**
The Contractor shall provide, maintain and remove when no longer required an adequate number of temporary, prefabricated, chemical-type toilets with proper enclosures for the use of workmen during construction. When connected to water and sewer, the toilets shall meet all code requirements. These toilets shall be kept clean and supplied with toilet paper at all times and will comply with local and state health and sanitary requirements and regulations.
- l) **DUST CONTROL**
The Contractor shall conduct his operations and maintain the work area in such a way as to minimize the creation and dispersion of dust. Water dispensing equipment may be required to reduce dust.
- (m) **WATER**
The Contractor shall make necessary arrangements and supply all water required during entire construction period. If the Contractor desires to use public water, then he must make the necessary applications and obtain a meter from the applicable utility. The Contractor is responsible for payment of all water used.
- (n) **PAYMENT FOR TEMPORARY FACILITIES AND CONTROL**
No separate measurement and payment will be made for temporary facilities and control.
- (o) **REMOVAL OF PIPE**

Any pipeline (including laterals) placed outside of public rights-of-way and/or acquired easements by the Owner will be removed and reinstalled at correction location at the Contractor's expense.

- (p) **WATER FOR PRESSURE TESTING**
Contractor shall obtain and pay for all water used for pressure testing and/or infiltration/exfiltration testing, and any other use. Water to be used shall be approved by Engineer.
- (q) **VIDEOTAPE**
The Contractor shall videotape the entire project area prior to start of construction. The Contractor shall provide video tape players, TVS, etc., as may be required by the Owner and/or Engineer in order to review existing conditions. Special effort shall be exercised to videotape all road intersection signs and markers in the contract area.
- (r) **DRAINAGE**
The Contractor shall maintain drainage ways to a condition at least equal to preconstruction conditions. Positive drainage shall be provided at all times.
- (s) **TRAFFIC SIGNS**
Street signs and markers which are temporarily removed shall be protected and reinstalled within the same day in which they are taken down.
- (t) **OTHER CONTRACTORS**
The Contractor is responsible for coordinating work with that of other contractors working within the same area.
- u) **TEMPORARY STORAGE AREAS**
The Contractor is responsible for obtaining and maintaining storage areas for materials and equipment. Maintenance shall include grass cutting, positive drainage, regular clean-ups, final clean-up, and restoration.
- v) **NOTIFICATION TO RESIDENTS**
The Contractor shall notify local residents of construction activity at least seven (7) days prior to beginning work in an area. At the Preconstruction Conference, the Contractor will provide a detailed method of the procedure to accomplish this work. Copies of letters to be distributed to local residents shall be submitted to the Engineer for approval prior to distribution.
- (w) **PAVEMENT RESTORATION**
Minimum thickness for restoration pavement shall be equal to the originally disturbed pavement (or thicker if so specified elsewhere). Minimum thickness for restoration of aggregate base course shall be equal to the originally disturbed pavement (or thicker if so specified elsewhere).
- (x) **REPAIR OF EXISTING ROADS**

Attention is brought to the Contractor that he is to re-grade and repair (as required) all dirt and gravel roads that have been disturbed by construction operations in the project area to the satisfaction of the Engineer. Each road shall be re-graded as required prior to final completion and acceptance of the project by the Owner. The Contractor shall use a motor-grader to make all repairs in re-grading operations.

(y) COMPLAINT RECTIFICATION

The Contractor shall assign an individual who shall be responsible for rectifying complaints of the Owner, Engineer, residents, landowners, governmental agencies, and other interested parties. This individual shall be available at the work site during all construction hours, and shall take action to resolve complaints within two working days of the time the complaints were brought to the Contractor's attention.

(z) EXCESS MATERIAL

The Owner reserves the right and option to retain excess material from the construction of the project. This material shall be clean, suitable material. The Owner may or may not (at Owner's option) require the Contractor to place excess material at various locations (to be determined by Owner within the project area).

(aa) CONTRACTOR WORK FORCE

The Contractor shall not bid with the intent nor will be permitted to subcontract more than 50% of the total dollar value of the total contract as determined from the breakdown of unit prices contained in this proposal. This provision will be interpreted to mean that the on-site labor associated with the construction of those items of work which total at least 50% of the total dollar value of the total contract must be provided by the Contractor's own forces. However, in the accomplishment of his 50% of the total contract the prime Contractor may utilize materials supplied on a subcontract basis to meet the 50% requirement. The County may waive this requirement if it is deemed to be in its best interest.

(ab) PERMITS

The Contractor shall obtain all permits necessary for work, and shall obey all federal government, state, and local laws and ordinances pertaining to work.

(ac) PRIVATE PROPERTY ENCROACHMENTS

The Contractor is forbidden to work off the right-of-way or easement without the written permission of the property owner. If it comes to the attention of the Owner or Engineer that the Contractor has so encroached, it will be cause for suspension of work until such written permission is obtained. In the case of permanent easements, the Contractor is to ascertain that such easements have been acquired prior to commencing construction. The Contractor is advised that the County may not be able to obtain all temporary easements. In this case, the Contractor is to work within the right-of-way and/or any permanent easement or make land use arrangements with individual property owners.

(ad) DRAINAGEWAYS

The Contractor shall protect at all times existing drainageways. Placement of excavation materials into existing drainageways for convenience will not be allowed.

18.03 ALL DIVISIONS

The flow through the existing system must be maintained. Short term (less than two (2) hours) storage of the system's flow is possible in some areas. Longer term diversion of the flow from one (1) structure to another may be necessary to complete this work and are the Contractor's responsibility. However, the Contractor shall in all cases coordinate such operations both with each Owner's operators and the Engineer's Construction Coordinator. Adequate (48 hour) notice shall be given for all such requests.

18.04 EXISTING UTILITIES

Utility Contacts:

1. Town of Carolina Beach
Mr. Brian Stanberry
910-458-2525
2. Media-Com Cable
Phone: 800-334-5010
3. Sprint Telephone
Phone: 252-977-9011
4. NC Power - Electric
Phone: 888-667-3000
5. North Carolina One-Call
1-800-632-4949

18.05 LOCATION AND PROTECTION OF UTILITY LINES:

The location of all utilities shall be made with locating equipment well in advance of actual work. The located facility shall be plainly marked by coded paint designations on the paved areas or by coded stakes or flags along the unpaved areas. All marked locations are to be made at least 500 feet in advance of all trench excavation and the location and utility protection provided by the contractor must be to the satisfaction of the engineer at no extra cost. Further, the contractor shall uncover any utility and obtain the utility elevation as required by the engineer at no additional cost. All damages to existing utility facilities in the work area during trenching and installation of facilities for this contract are the responsibility of the contractor and he shall repair or replace damaged lines to the satisfaction of the utility owner at no extra cost to the Owner.

18.06 PROTECTION OF EXISTING UTILITIES AND FACILITIES:

- (a) In the conducting of his operations, the Contractor shall take special precautions to protect equipment, structures, utility lines, roadways and subsurfaces, and submerged and overhead facilities remaining in place for damage or disturbed by his operations. In the event the facilities are disturbed, damaged or injured as a result of the contractor operation, the contractor shall immediately notify the owner and in conjunction with the owner determine the proper method of replacing, repairing or restoring the affected facilities at least to the conditions which existed prior to the Contractor's operations. The Contractor shall, at his own expense, replace, repair or restore the affected facilities or areas to their original condition or shall reimburse the owner of said facilities for such expenses as the said owner may accrue in performing the work.
- (b) In the conducting of his operation, the contractor shall notify the Postal Service as to coordinate and facilitate the mail delivery with the construction.

18.07 SUGGESTED CONSTRUCTION SEQUENCE:

- (a) The contractor shall submit to the Owner and Engineer a preliminary construction schedule for approval. The contractor shall make every effort to work within the Town and NCDOT Right of Ways. Notifications to the property owners within 48 hours shall be made prior to any work on property owner driveways. The Town and Engineer shall be notified, in writing, within 72 hours of any necessary road closures or detours. A detailed detour plan shall be submitted to the Town for approval.

18.08 START-UP

The Contractor for each Division of work is responsible for all start-up duties associated with his work. The Owner's only role in this project, until acceptance, will be to aid the Contractor in his efforts to understand the location of existing utilities and to provide assistance with property owners.

APPENDIX “A”



**FOR BID PURPOSES
ONLY**

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

October 25, 2023

Town of Carolina Beach
Attn: Bruce Oakley, Town Manager
1121 N. Lake Park Blvd.
Carolina Beach NC 28428

SUBJECT: Encroachment Agreement (E033-065-23-00201) at US 421 (South Lake Park Blvd) and SR 1539 (Ocean Blvd) in the Town of Carolina Beach, New Hanover County

Dear Applicant,

Attached for your files is a copy of Right of Way Encroachment agreement properly executed. This agreement covers the following:

Install 2,180 linear feet of 5 ft. wide concrete sidewalks, 23 ADA ramps, 265 LF of 15" RCP, 223 LF of 24" RCP, 48 LF of 30" RCP storm drainage and 61 concrete drop inlet boxes. For specific details see attached summary sheet.

- **This is for bid purposes only. Once a contractor is selected, an issue for construction drawings "IFC" must be submitted and reviewed by NCDOT. This encroachment must be revised to reflect any changes and include the "IFC".**
- Time Restriction – Peak Hours Restricted: No lane closures shall be allowed from 6:00am to 9:00am and from 4:00pm to 7:00pm and NO weekend lane closures. (HOURS SUBJECT TO CHANGE DUE TO TRAFFIC CONDITIONS – NIGHTTIME OPERATIONS WILL BE REQUIRED WHEN WARRANTED)
- The Town of Carolina Beach has provided a letter stating that they will not release their contractor's payment until the NCDOT agrees that the work performed under this permit meets or exceeds NCDOT standards. The Encroaching Party shall notify NCDOT at 910-398-9100 upon completion of the work for a final inspection.
- A Pre-construction meeting is required prior to beginning work. Meetings are valid for 90 days. Contact the District office to schedule.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
5505 BARBADOS BOULEVARD
CASTLE HAYNE, NC 28429-5647

Telephone: 910-341-2001
Fax: 910-675-7827
Customer Service: 1-877-368-4968

Location:
5505 BARBADOS BOULEVARD
CASTLE HAYNE, NC 28429-5647

Website: www.ncdot.gov

As per this approval it is subject to this work being done in accordance with the attached plan sheets and special provisions.

Sincerely,

DocuSigned by:
Michael Bass
E254FB0739E2460...

Michael L. Bass, Jr., Assistant District Engineer
For Chad Kimes, PE, Division Engineer
DCK/mlb/akh

cc: Trey Moore, NCDOT Brunswick County Maintenance Supervisor

DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY ENCROACHMENT AGREEMENT FOR CURB AND GUTTER, PAVEMENT WIDENING AND STORM DRAINAGE

-AND-

Town of Carolina Beach (910.458.2999)
1121 N. Lake Park Blvd.
Carolina Beach, NC 28428

THIS AGREEMENT, made and entered into this the 25th day of October, 20 23, by and between the Department of Transportation, party of the first part; and Town of Carolina Beach

party of the second part,

WITNESSETH

THAT WHEREAS, the party of the second part desires to encroach on the right of way of the public road designated as Route(s) US 421 (South Lake Park Blvd.) and SR 1539 (Ocean Blvd.), located in the Town of Carolina Beach

with the construction and/or erection of: 2,180 linear feet of 5 ft. wide concrete sidewalks, 23 ADA ramps, 265 LF feet of 15" RCP, 815 LF of 18" RCP, 223 LF of 24" RCP, 48 LF of 30" RCP storm drainage and 61 concrete drop inlet boxes.

WHEREAS, it is to the material advantage of the party of the second part to effect this encroachment, and the party of the first part in the exercise of authority conferred upon it by statute, is willing to permit the encroachment within the limits of the right of way as indicated, subject to the conditions of this agreement;

NOW, THEREFORE, IT IS AGREED that the party of the first part hereby grants to the party of the second part the right and privilege to make this encroachment as shown on attached plan sheet(s), specifications and special provisions which are made a part hereof upon the following conditions, to wit:

That the said party of the second part binds and obligates himself to install the encroaching facility in such safe and proper condition that it will not interfere with or endanger travel upon said highway.

That the party of the second part agrees to provide during construction proper signs, signal lights, flagmen and other warning devices for the protection of traffic in conformance with the latest Manual on Uniform Traffic Control Devices for Streets and Highways and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the Division Engineer of the party of the first part.

That the party of the second part hereby agrees to indemnify and save harmless the party of the first part from all damages and claims for damage that may arise by reason of the installation and maintenance of this encroachment.

It is clearly understood by the party of the second part that the party of the first part will assume no responsibility for any damage that may be caused to such facilities, within the highway rights of way limits, in carrying out its construction.

That the party of the second part agrees to restore all areas disturbed during construction to the satisfaction of the Division Engineer of the party of the first part. The party of the second part agrees to exercise every reasonable precaution during construction and maintenance to prevent eroding of soil; silting or pollution of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces or other property; or pollution of the air. There shall be compliance with applicable rules and regulations of the North Carolina Division of Environmental Management, North Carolina Sedimentation Control Commission, and with ordinances and regulations of various counties, municipalities and other official agencies relating to pollution prevention and control. When any construction operation disturbs the ground surface and existing ground cover, the party of the second part agrees to remove and replace the sod or otherwise reestablish the grass cover to meet the satisfaction of the Division Engineer of the party of the first part.

That the party of the second part agrees to assume the actual cost of any inspection of the work considered to be necessary by the Division Engineer of the party of the first part.

That the party of the second part agrees to have available at the encroaching site, at all times during construction, a copy of this agreement showing evidence of approval by the party of the first part. The party of the first part reserves the right to stop all work unless evidence of approval can be shown.

Provided the work contained in this agreement is being performed on a completed highway open to traffic; the party of the second part agrees to give written notice to the Division Engineer of the party of the first part when all work contained herein has been completed. Unless specifically requested by the party of the first part, written notice of completion of work on highway projects under construction will not be required.

That in the case of noncompliance with the terms of this agreement by the party of the second part, the party of the first part reserves the right to stop all work until the facility has been brought into compliance or removed from the right of way at no cost to the party of the first part.

That it is agreed by both parties that this agreement shall become void if actual construction of the work contemplated herein is not begun within one (1) year from the date of authorization by the party of the first part unless written waiver is secured by the party of the second part from the party of the first part.

R/W (161B) : Party of the Second Part certifies that this agreement is true and accurate copy of the form

R/W (161B) incorporating all revisions to date.

IN WITNESS WHEREOF, each of the parties to this agreement has caused the same to be executed the day and year first above written.

DEPARTMENT OF TRANSPORTATION

DocuSigned by: Michael L. Bass, Jr., Assistant District Engineer
BY: Michael Bass For Chad Kimes, PE, Division Engineer
DIVISION ENGINEER
E254FB0739E2460...

ATTEST OR WITNESS:

Kimberlee Ward
Kimberlee Ward

BRUCE OAKLEY
1121 N. LAKE PARK BLVD. CAROLINA BEACH
Second Party 28128



INSTRUCTIONS

When the applicant is a corporation or a municipality, this agreement must have the corporate seal and be attested by the corporation secretary or by the empowered city official, unless a waiver of corporate seal and attestation by the secretary or by the empowered City official is on file in the Raleigh office of the State Utilities Manager. In the space provided in this agreement for execution, the name of the corporation or municipality shall be typed above the name, and title of all persons signing the agreement should be typed directly below their signature.

When the applicant is not a corporation, then his signature must be witnessed by one person. The address should be included in this agreement and the names of all persons signing the agreement should be typed directly below their signature.

This agreement must be accompanied, in the form of an attachment, by plans or drawings showing the following applicable information:

1. All roadways and ramps.
2. Right of way lines and where applicable, the control of access lines.
3. Location of the proposed encroachment.
4. Length and type of encroachment.
5. Location by highway survey station number. If station number cannot be obtained, location should be shown by distance from some identifiable point, such as a bridge, road, intersection, etc. (To assist in preparation of the encroachment plan, the Department's roadway plans may be seen at the various Highway Division Offices, or at the Raleigh office.)
6. Drainage structures or bridges if affected by encroachment.
7. Typical section indicating the pavement design and width, and the slopes, widths and details for either a curb and gutter or a shoulder and ditch section, whichever is applicable.
8. Horizontal alignment indicating general curve data, where applicable.
9. Vertical alignment indicated by percent grade, P.I. station and vertical curve length, where applicable.
10. Amount of material to be removed and/or placed on NCDOT right of way, if applicable.
11. Cross-sections of all grading operations, indicating slope ratio and reference by station where applicable.
12. All pertinent drainage structures proposed. Include all hydraulic data, pipe sizes, structure details and other related information.
13. Erosion and sediment control.
14. Any special provisions or specifications as to the performance of the work or the method of construction that may be required by the Department must be shown on a separate sheet attached to encroachment agreement provided that such information cannot be shown on plans or drawings.
15. The Department's Division Engineer should be given notice by the applicant prior to actual starting of installation included in this agreement.
16. Method of handling traffic during construction where applicable.
17. Scale of plans, north arrow, etc.

Encroachment Agreement Standard Conditions

District Office Contact Information:
5911 Oleander Drive, Suite 101
Wilmington, NC 28403
(910) 398-9100

The **Standard Conditions** in this document apply to this and all encroachment agreements issued by District 3.

- SC1** A **Pre-Construction meeting must be held with the District Office within 90 days of approval.** All Locates Shall be completed prior to the scheduling of meeting.
- SC2** The Encroaching Party shall follow any and all revisions shown in **RED** on attached plan(s).
- SC3** This permit along with all terms and agreements shall be incorporated into any lease or sales agreement.
- SC4** If the approved permit encroaches within the limits of an active construction project the Encroaching Party will be required to coordinate with the NCDOT contractor as well as secure a hold harmless agreement prior to commencing work. If the approved permit encroaches within the limits of project in preconstruction, the Encroaching Party will be required to coordinate with the Department's Project Development Unit to ensure no conflicts are created with the installation.
- SC5** A Performance and Indemnity Bond posted with the North Carolina Department of Transportation is hereby obligated to cover work under this encroachment agreement. This bond is only for work within NCDOT Right of Way.
- SC6** An **Initial Construction Inspection is required** after the completion of the work. An Initial Inspection Report will be issued upon satisfactory completion of the work and begins the one year warranty period. Contact the District Office to schedule an inspection by calling 910-398-9100 or email at Div3Dist3@ncdot.gov.
- SC7** A **Final inspection is required** after one year and prior to release of the bond. Contact the District Office three months prior to the end of the one year bonding period for final inspection and creation of a list of deficiencies; this should provide enough time for corrective action prior to the end of one year. A Final Inspection Acceptance will be issued once the work has been completed and any deficiencies addressed.
- SC8** All bonds will be held for a minimum of one year from the time of the Initial Construction Inspection Acceptance. At the end of that time period, the bond may be released at the request of the applicant pending Final Inspection Acceptance.
- SC9** All flagging operations within NCDOT right-of-way require qualified and trained Work Zone Flaggers. Qualified and trained Work Zone Traffic Control Supervisors will be required on significant projects. Training for this certification is provided by NCDOT approved training sources and by private entities that have been pre-approved. For more information, visit <https://connect.ncdot.gov/projects/WZTC/Pages/Training.aspx> or contact Steve Kite, PE with the NCDOT Work Zone Traffic Control Unit at (919) 814-4937, or skite@ncdot.gov.
- SC10** No lane closures shall be allowed on State Holidays (day of, day before, and day after) or during Local events.
- SC1** No lane closures or impediment to traffic shall be allowed on weekends without prior written approval from the District Engineer. Work would be permitted on-site during these events, as long as, there are no lane closures or the impediment of traffic.
- SC12** One lane must always be open to traffic; only one lane closure will be allowed in each direction. Ingress and egress shall be maintained to all businesses and dwellings affected by the project. Special attention shall be paid to Police and Fire Stations, fire hydrants and Hospitals.
- SC13** All roadway signs removed during project work shall be reinstalled immediately after completion of work. All equipment and materials shall be removed from the NCDOT right-of-way when not in use.
- SC14** Any work requiring personnel or equipment within 5' of the travel lane on an undivided roadway, or 10' of the travel lane, on a divided roadway shall require a lane closure per the latest edition of the MUTCD and the NCDOT Standard Specifications. The more stringent standards shall apply.
- SC15** Approval is only for work within NCDOT right-of-way. Any construction planned or proposed outside NCDOT right-of-way shall require the permittee to obtain concurrence and/or right-of-way from subject property owner and/or local government. This approval excludes area(s) within Railroad right-of-way and/or Municipal right-of-way which will require separate approval from the Railroad, City or Town. Approval is with the understanding that NCDOT does not guarantee the right-of-way on any road.

- SC16** All traffic control, asphalt mixes, structures, construction, workmanship and construction methods, and materials shall be in compliance with the most-recent versions of the following resources: *Manual on Uniform Traffic Control Devices*, *Policy on Street and Driveway Access to North Carolina Highways*, *Policies and Procedures for Accommodating Utilities on Highway Rights of Way*, *Subdivision Roads Minimum Construction Standards*, *NCDOT Standard Specifications for Roads and Structures*, *NCDOT Roadway Standard Drawings*, *AASHTO Policy on Geometric Design of Highways and Streets*, *NCDOT Asphalt Quality Management System manual*, **and the approved plans.**
- SC17** Prior to beginning work, it is the requirement of the Encroaching Party to contact the appropriate Utility Companies involved and make arrangements to adjust or relocate any utilities that conflict with the proposed work.
- SC18** NC 811 services DOES NOT provide locates of traffic signal cables. If the work is located within ½ mile of a signalized intersection, the Encroaching Party shall contact NCDOT Traffic Services at (910) 341-2200 no less than one week prior to beginning work, for the location of all traffic signal and detection cables. Location is required prior to excavation. **Cost to replace or repair NCDOT signs, signals or associated equipment shall be the responsibility of the Encroaching Party.**
- SC19** If modifications to a traffic signal are required under this encroachment agreement, a separate traffic agreement is required prior to work. Contact the Division Traffic Engineer or Deputy Division Traffic Engineer at (910) 341-2200.
- SC20** If pavement markings are required under this encroachment agreement, the Encroaching Party shall have the pavement markings pre-marked, inspected, and approved by NCDOT personnel prior to the placement of final pavement markings. Contact Traffic Services at (910) 341-2200 for pre-marking inspections or field changes.
- SC21** All concrete or paved channelization islands shall have a 12 inch diameter round or square smooth wall hole drilled, cored, formed, or air-hammered to the subgrade and backfilled with soil placed a minimum of 10 feet from the nose of each end of the island (see Roadway Standard Drawing 904.50), or as directed by the engineer. All sign supports that are to be erected in existing or proposed concrete or paved channelization islands shall meet the same requirements. If necessary, contact Traffic Services at (910) 341-2200 to mark core locations.
- SC22** Prior to beginning work, if the area of work is within a municipality limit, it is the responsibility of the Encroaching Party to notify the municipal authorities.
- SC23** The Encroaching Party shall comply with all applicable Federal, State, and local statutes, rules, regulations, and ordinances that may be imposed by other governmental agencies. The Encroaching Party shall obtain all necessary Federal, State, and local environmental permits, including but not limited to, those related to sediment control, storm water, wetlands, streams, endangered species, and historical sites.
- SC24** All wiring and related work shall conform to the latest edition of the National Electrical Safety Code.
- SC25** No alteration of the approved plan will be allowed without written approval by NCDOT. All design plan changes proposed by the contractor shall be prepared by the Engineer of Record and submitted by the Owner/Permittee to NCDOT for review to ensure that the Engineer and Owner participate in all construction changes. Field changes constructed without prior written approval by NCDOT will not be accepted by NCDOT during the inspection process.
- SC26** An executed paper copy of the Encroachment Agreement and approved plans shall be present at the work site at all times while performing work. NCDOT reserves the right to stop all work unless evidence of approval can be shown. Additionally, NCDOT reserves the right to further limit, restrict, or suspend operations within the right-of-way.
- SC27** Material shall NOT be unloaded or stockpiled on the roadway at any time without proper lane closure during the project. Work is not permitted when the shoulder material is wet or during adverse weather conditions.
- SC28** All erosion control devices shall be placed as needed prior to disturbance and maintained throughout the project. All areas disturbed (shoulders, ditches, removed accesses, etc.) shall be graded and seeded within 15 calendar days with an approved NCDOT seed mixture. For disturbance of residential/commercial lawns, vegetation shall be replaced in like kind.
- SC29** For disturbance of plants, vegetation, trees or plant beds in the NCDOT right-of-way, they shall be replaced with plants, vegetation or trees of like kind or similar shape. Contact the Division Roadside Environmental Engineer at 910-259-4919.
- SC30** The placement of curb and gutter is not allowed within shoulder sections of roadway (from the Right of Way to the edge of pavement).
- SC31** It shall be the responsibility of the property owner or local municipality to maintain any proposed sidewalk that will be placed within the NCDOT Right of Way. It is the responsibility of the Encroaching Party to place the sidewalk and wheelchair ramps per NCDOT standards and the latest edition of the Americans with Disabilities Act. This maintenance requires an encroachment agreement through the District Office.

- SC32** It shall be unlawful to place any highway obstruction, including a driveway headwall, fence, rural mailbox, newspaper delivery box, or other roadside obstruction, so as to interfere with the traffic or maintenance of the roads and highways of the state highway system. See North Carolina Administrative Code 19A NCAC 2E.0404.
- SC33** Fire Hydrant(s) shall be placed a maximum of 1 foot from the right-of-way line. (STD. 1515.02 in the NCDOT Roadway Standard Drawings).
- SC34** The Encroaching Party shall comply with all OSHA requirements and **provide a competent person on site** to supervise excavation at all times.
- SC35** The Encroaching Party is responsible for any and all damages caused from project work within the right-of-way, including damage to drainage structures, pavement, vegetation, etc.
- SC36** Any pavement damaged including settlement of the pavement or damage by equipment used to perform the project work, shall be re-surfaced to the satisfaction of the District Engineer or their representative. This may include the removal of pavement and a 50' mechanical overlay. All temporary and final pavement markings are the responsibility of the Encroaching Party.
- SC37** Centerline pavement markings shall be installed the same day resurfacing is accomplished. All other pavement markings shall be completed within five days of resurfacing.
- SC38** All pipes placed within the NCDOT Right of Way shall be NCDOT approved materials. All joints shall be sealed with mortar or other NCDOT approved material. Backfill compaction shall meet NCDOT Standardized Testing Method.
- SC39** Throughout the life of the project, the Encroaching Party shall maintain all drop-offs within the work zone such that they do not exceed the maximum of 2".
- SC40** All removed curb, driveways, and shoulder areas shall be backfilled at a 6:1 slope or flatter at the end of the days' production.
- SC41** For projects with open cuts and roadway improvements, a PE certification may be required. When applicable, upon completion of construction, a certification memo that has been signed and sealed as appropriate under General Statute 89C-16 by a North Carolina Professional Engineer or Registered Land Surveyor shall be submitted to the District Engineer prior to opening the access connection for public use. Supporting documentation shall be attached certifying that improvements for the driveway access(s) meet the approved plan and NCDOT standards. All documentation shall be dated and initialed by the contractor. Verification will include inspection reports, testing reports, or any supporting documentation and calculations. Verification will cover, but is not limited to, subgrade, pavement structure, drainage, and traffic control items.
- SC42** Directional drilling methods have not been given statewide approval for use on NCDOT right-of-way. Under no condition shall jetting alone or wet boring with water be used for the installation of utility pipelines.
- Directional boring **is not** allowed in embankment material. Directional boring **is** allowed beneath embankment material in naturally occurring soil.
 - Any changes shall be submitted to the District Engineer for approval prior to construction.
 - Directional bores are not allowed beneath bridge footings, culvert wingwall footings or retaining walls.
 - HDPE pipe installed by directional boring shall not be connected to existing pipe or fittings for one (1) week from the time of installation to allow tensional stresses to relax.
 - Directional boring using jetting with a Bentonite (or equivalent material) slurry is approved with the following conditions:
 - Minimum depth of ten (10') feet below the pavement surface of roads with no control of access or fifteen (15') feet below the surface of roads with partial or full control of access.
 - Minimum depth of five (5') feet below any ditch line and/or creek bed.
 - Minimum depth of (5') for parallel installations. Must be outside the theoretical 1:1 slope from the existing edge of pavement except where the parallel installation crosses a paved roadway.
 - Minimum horizontal distance of ten (10') feet from the nearest part of any structure, including but not limited to bridges, footings, pipe culverts, and box culverts.
 - Minimum vertical distance of ten (10') feet from the nearest part of pipe culverts or box culverts.
 - Tip of the drill string shall have a cutter head and detection wire installed with non-ferrous material.
 - All directional drilled piping for sewer force mains and waterlines shall be a minimum of SDR-9.

- Minimum horizontal separation of five (5') feet between each conduit which is part of a multiple conduit installation (including perpendicular and parallel installations). Alternatively, install multiple conduits within a single duct.
- Over bores for pipe or encasements shall not be more than 1.5 x O.D. for pipe 12 inches or less and O.D. +6 inches for pipes larger than 12 inches.
- An overbore exceeding the prescribed maximums for pipe or encasements will only be considered if the encroachment agreement includes a statement signed and sealed by a North Carolina Registered Professional Engineer indicating that the proposed overbore in excess of NCDOT guidelines of the diameter of the pipe or encasement will arch and no damage will be done to the pavement or sub- grade.

SC43 All excavations inside the theoretical 1:1 slope from the existing edge of pavement to the bottom of the nearest trench wall shall be done in accordance with the following conditions:

- Any excavation encroaching upon the theoretical 1:1 slope from the edge of pavement of any NCDOT maintained road shall require temporary active shoring that must be reviewed and approved by NCDOT **prior to work**.
- All trench excavation inside the limits of the theoretical 1:1 slope, as defined by the policy, shall be completely backfilled and compacted at the end of each construction day. No portion of the trench shall be left open overnight.
- The length of parallel excavation shall be limited to the length necessary to install and backfill one (1) joint of pipe at a time.
- Traffic shall be moved to a travel lane outside the limits of a theoretical 1:1 slope from the bottom of the nearest trench wall to the pavement surface.
- Installation of trench shoring shall be accomplished with minimal over-excavation. **Trench boxes shall not be used as shoring.**
- An NCDOT Inspector, the cost of which is to be borne by the Encroaching Party, shall be assigned to this project if deemed necessary by the Division Engineer.
- The trench backfill material shall meet the Statewide Borrow Criteria. The trench shall be backfilled, in accordance with Section 540-6 of the latest NCDOT Standard Specifications for Roads and Structures, which requires the backfill material to be placed in thicknesses between 4" and 8" loose and compacted to at least 97% of the maximum density obtained by compacting a sample in accordance with AASHTO T 180, as modified by the Department.
- At the first sign of trench failure, a trench shall be immediately backfilled with materials consisting of A-1, A-3, A-2-4 soils or A-4 soils having a maximum of 45% passing a No. 200 sieve and a maximum P.I. of 6. All work shall cease, and the Division Engineer shall be contacted. The Encroaching Party shall be required to repair any damage to the pavement caused by the excavation.
- No part of any pit shall be within three (3) feet of edge of pavement or back of curb.
- Detection tape shall be buried in the trench approximately one foot above the utility or fiber optic cable, whenever conduit is installed in right-of-way and is not of ferrous material.

SC44 The proposed manholes, handholes, valves or other appurtenances shall be installed flush to match the elevation of the existing ground and shall not be located in the existing ditch line, front slope of a ditch, or in a manner that would restrict the maintenance or flow of the existing ditch line.

SC45 Any open cutting of pavement shall be repaired using the following method:

- Pavements shall be cut full depth and removed.
- After trench work is complete, the edges of the existing pavement along the trench shall be recut a minimum of 1' wider on each side of the trench. If the pavement is undermined, the edges of the existing pavement along the trench shall be recut to 1' beyond the undermined portion and the pavement removed. The design section stated below is to be placed in those areas.
- The pavement repair shall be performed using the following method and pavement design section:
 - 11.0" B25.0C or B25.0B Asphalt Concrete Base Course (accomplished in 2 lifts minimum) according to NCDOT Standard 654.01.
 - Mill the entire area a depth of 2.0", starting from 15' in front of the edge of the final pavement cut.

- Overlay entire area (a minimum 50' length mechanical overlay) with 2.0" S9.5C or S9.5B Asphalt Concrete Surface Course for a total asphalt depth of 13". Butt joints are required with no feathering of joints.

- All open cuts shall be backfilled, paved and traversable prior to removing lane closure.

- SC46** Abandoned pipes 12" in diameter and larger in fills 20' or less shall be removed and backfilled, filled with grout, or plugged, as directed by the Manager of Right-of-Way, Division Engineer or State Design Services Engineer. There may be unusual circumstances where the same requirements will apply on pipes smaller than 12".
- SC47** Any sewer manholes, telephone vaults or valve vaults that are to be abandoned shall either be removed or broken down two (2) feet below subgrade, plugged and filled with suitable material.
- SC48** For trenching excavations within the typical ditch cross-section, positive drainage shall be restored within the existing ditch by grading between driveway pipe invert elevations or by re-establishing the original hydraulic grade line.
- SC49** Sidewalk closures shall be installed, as necessary. Pedestrian traffic shall be detoured around these closures and shall be signed appropriately and in accordance with The American with Disabilities Act Accessibility Guidelines. The encroaching party must adhere to the guidelines for accommodating pedestrians in encroachment work zones as described in the NCDOT Pedestrian Work Zone Accommodations Training found at <https://www.youtube.com/watch?v=A0uYa51W3dg&feature=youtu.be>



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

DATE: March 9, 2020
TO: NCDOT Construction Unit, NCDOT Divisions, AGC, CAPA, ATSSA
FROM: Steve Kite, PE, State Work Zone Engineer
SUBJECT: Work Zone Installer Certification

DocuSigned by:
Steve Kite
E27CE30E1DFC442...

This memo will serve as an update to the Revised Work Zone Certification Requirements memo sent September 2019.

All employees responsible for the setup and installation of traffic control devices within any highway right of way are required to be trained and certified. In response to questions and concerns raised about the Installer Certification implementation date of June 1, 2020 and possible situations where certified installers may not be required, the following practices will be accepted in lieu of Work Zone Installer Certifications until January 1, 2021:

- **Any person who is currently certified as a Work Zone Installer does NOT have to be re-certified under this requirement.**
- **Any person who is currently certified as a Work Zone Technician through the ATSSA training program does NOT have to be re-certified under this requirement.**
- **Any person who is currently certified as a Work Zone Supervisor does NOT have to be certified as Work Zone Installer.**
- **If a Work Zone Supervisor is continuously on-site during all traffic control operations, the employees under their supervision may work without Work Zone Installer Certifications until January 1, 2021.**
- **General laborers who are not responsible for physically placing signs or devices for lane closures do NOT have to be certified.**

We are extending the timeframe to obtain Work Zone Installer Certifications to January 1, 2021 so that ample time is available to industry to either schedule training from an approved training company or to conduct this training in house through the self-certification program.

This time extension does not apply to personnel working on interstates and high-speed freeways. Any individual involved with the installation of traffic control devices on interstates and high-speed freeways must be Work Zone Installer certified before working on them.

For companies seeking self-certification, training materials and testing exams are to be approved by NCDOT prior to conducting this training. Additionally, companies shall identify their training personnel and their traffic control experience.

If anyone has any questions, feel free to contact me at skite@ncdot.gov or Roger Garrett at rmgarrett@ncdot.gov. WZSafetyTraining@ncdot.gov

cc:

Joe Hummer, PE, Traffic Management Engineer
NCDOT Approved Training Companies
Ellis Powell, PE, Director CAPA
Victor Barbour, PE, Director AGC-Heavy Highway Division
Lamar Sylvester, PE, Director of Field Support
Attn: Brian Skeens, PE, Asst. State Construction Engineer
Attn: Wiley Jones, PE, Asst. State Construction Engineer
Chris Fresa, President, Carolina's ATSSA Chapter
Division Engineers

VERIFICATION OF COMPLIANCE WITH ENVIRONMENTAL REGULATIONS

(Check Appropriate Box)

- Permits from the N.C. Department of Environmental Quality and the U.S. Army Corp of Engineers are not required for this project. However, all applicable federal and state regulations have been followed.
- The required permits from the N.C. Department of Environmental Quality and the U.S. Army Corp of Engineers have been obtained for this project. Copies of the permits are attached.
- All applicable NPDES Stormwater Permit requirements have been or will be met for this project.
- The project is in compliance with all applicable sedimentation and erosion control laws and regulations.

Project Name: Ocean Blvd. Sidewalk

Township: Carolina Beach County: New Hanover

Project Engineer: Engineering Services Phone Number 919.662.7272

Project Contact: Brian Cox

Applicant's Name: Town of Carolina Beach

Date Submitted: 4-20-2023



Lynn Barbee
Mayor

Joe Benson
Council Member

Deb LeCompte
Council Member



Jay Healy
Mayor Pro Tem

Mike Hoffer
Council Member


Bruce Oakley
Town Manager

Town of Carolina Beach
1121 N. Lake Park Blvd.
Carolina Beach, NC 28428
Tel: (910) 458-2999
Fax: (910) 458-2997

To: North Carolina Department of Transportation
From: Town of Carolina Beach
Date: March 20, 2023

Ocean Blvd Sidewalk Project

The Town of Carolina Beach will withhold final payment of funds to the contractor and also will not release the contractor from the bond until the NCDOT has provided a final approval of the work.

By: 
Title: Town Manager
Date: 3/20/23