

Carren Johnson

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**SPECIFICATIONS
FOR
EDGEcombe COUNTY MUNICIPAL SOLID
WASTE TRANSFER STATION**

MAY, 1997



Todd A. Tripp 5/30/97
Todd A. Tripp, P.E.
Civil Engineer



Charles W. Chappell 5/29/97
Charles W. Chappell, P.E.
Electrical Engineer

**THE WOOTEN COMPANY
ENGINEERING • PLANNING • ARCHITECTURE
RALEIGH - GREENVILLE, NORTH CAROLINA**

EDGECOMBE COUNTY
MUNICIPAL SOLID WASTE TRANSFER STATION
EDGECOMBE COUNTY, NORTH CAROLINA

June 3, 1997

SUBJECT: ADDENDUM NO. 1
To the Contract Documents
Edgecombe County
Municipal Solid Waste Transfer Station
Edgecombe County, North Carolina

TO: PROSPECTIVE BIDDERS AND OTHERS CONCERNED

This ADDENDUM forms a part of the CONTRACT DOCUMENTS and modifies the original specifications and drawings. BIDDERS must acknowledge receipt of this ADDENDUM in the space provided on the bid form.

Specifications

1. Advertisement for Bids - The date and time for the receiving of bids is hereby changed to 2:00 P. M., Thursday, June 19, 1997. The location of the bid opening and all other information in the Advertisement remains unchanged.

The foregoing changes shall be incorporated into the plans and specifications and a copy of the Addendum must be attached to and made a part of each bid. Bids will be received until 2:00 P.M., June 19, 1997 in the Conference Room 260 of the Edgecombe County Administration Building located at 201 St. Andrews Street, Tarboro, North Carolina and then at said office publicly opened and read aloud.

FOR THE OWNER

COUNTY OF EDGECOMBE

By _____

Todd Tripp

Todd A. Tripp, P.E.

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CERTIFICATION SHEET

A. PROJECT MANAGEMENT AND CIVIL ENGINEERING DESIGN

I, Todd A. Tripp, P.E., hereby certify that the Bidding Requirements and Division 1 through Division 15 of the Specifications for the Edgecombe County Municipal Solid Waste Transfer Station were prepared by me or under my direct supervision.

SEAL



Todd A. Tripp 5/30/97

B. ELECTRICAL DESIGN

I, Charles W. Chappell, P.E., hereby certify that Division 16 of the Specifications for the Edgecombe County Municipal Solid Waste Transfer Station was prepared by me or under my direct supervision.

SEAL



---END OF SECTION---

SECTION 00105

ADVERTISEMENT FOR BIDS

COUNTY OF EDGECOMBE
TARBORO, NORTH CAROLINA
OWNER

Separate sealed bids for the construction of Solid Waste Transfer Station - Edgecombe County, North Carolina will be received by the Edgecombe County Board of Commissioners in Conference Room 260 of the Edgecombe County Administration Building located at 201 St. Andrews Street, Tarboro, North Carolina until 2:00 P.M., June 11, 1997, and then at said place publicly opened and read aloud for construction of the following facilities:

A 11,000 square foot pre-engineered metal transfer station building with earthwork and 200 cubic yard concrete turning slab and miscellaneous site work including asphalt and gravel parking areas and access roads, storm drainage piping and chain link fencing.

The CONTRACT DOCUMENTS, consisting of Advertisement for Bids, Information for Bidders, Bid, Bid Bond, Agreement, Payment Bond, Certificate of Owner's Attorney, Performance Bond, Notice of Award, Notice to Proceed, Change Order, Sales Tax Report, Certificate of Insurance, General Conditions, Special Conditions, Drawings, Specifications, and Addenda may be examined at the following locations:

Edgecombe County Manager, 201 St. Andrews Street, P.O. Box 10, Tarboro, NC 27886.

Associated General Contractors Office in Raleigh, 3700 National Drive, Suite 201, Raleigh, NC 27612.

F. W. Dodge Company, 1110 Navaho Drive, Suite 402, Raleigh, NC 27609.

The Wooten Company, Engineer, 301-B West 14th Street, Greenville, NC 27834.

Copies of the Contract Documents may be obtained at the office of the Engineer, The Wooten Company, located at 301-B West 14th Street, Greenville, North Carolina, 27834, upon payment of a \$100.00 deposit for each set of Contract Documents. Deposit will be refunded in full to all bona fide bidders provided the Contract Documents are returned in good condition within 10-days after the bid opening.

After bids are opened, they shall be evaluated by the Owner in accordance with the methods and criteria set forth in the bidding documents. The Owner reserves the right to reject any or all bids, waive informalities and to award contract or contracts which, in the opinion of the Owner, appear to be in its' best interest. Unless all bids are rejected, award will be made to the lowest, responsible bidder.

Each Bidder must deposit with his bid, security in the amount of 5% of the bid and subject to the conditions provided in the Information for Bidders.

Bidders will be required to show evidence that they are licensed to perform the work in the Contract Documents as required by North Carolina General Statute, Chapter 87.

No Bidder may withdraw his bid within 60 days after the actual date of the opening thereof.

County of Edgecombe

By _____
Charlie R. Harrell, Chairman
Board of Commissioners

---END OF SECTION---

SECTION 00110
INFORMATION FOR BIDDERS

BIDS will be received by the County of Edgecombe (herein called the "OWNER"), at the office of the County Manager located at 201 St. Andrews Street, P. O. Box 10, Tarboro, NC 27886 until 2:00 P.M., June 11, 1997, and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to Mr. Joe Durham, County Manager, Edgecombe County, N. C. Each sealed envelope containing a BID must be plainly marked on the outside as "BID for Edgecombe County MSW Transfer Station", and the envelope should bear on the outside the name of the BIDDER, his address, his license number, his classification and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at 201 St. Andrews Street, Tarboro, North Carolina 27886.

All BIDS must be made on the required BID form. All blank forms for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required. The bid price must be stated in words and numbers; in case of a conflict, words will take precedence. BIDS by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature. BIDS by partnerships must be executed in the partnership name and signed by a partner. His title must appear under his signature and the official address of the partnership and names of all partners must be typed or printed below the signature.

The OWNER may waive any informalities or minor defects or reject for good cause all BIDS. Any BID may be modified or withdrawn by an appropriate document duly executed (in the manner that a BID must be executed) and delivered to the place where BIDS are to be submitted at any time prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. The number of days for the completion of Work (the Contract Time) is set forth in the BID FORM and in the SPECIAL CONDITIONS and will be included in the executed AGREEMENT. Any provisions for liquidated damages are set forth in the CONTRACT DOCUMENTS. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. BIDDER shall familiarize himself with local conditions that may affect performance of the work and carefully correlate his observations with requirements of the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

All questions about the meaning or intent of the CONTRACT DOCUMENTS shall be submitted to ENGINEER in writing by prospective BIDDERS who have obtained CONTRACT DOCUMENTS from the office of the ENGINEER. Replies will be issued by ADDENDA mailed or delivered to all parties recorded by ENGINEER as having received the bidding documents. Questions received less than five (5) days prior to the date for opening of BIDS will not be answered. Only questions answered by formal written ADDENDA will be binding. Oral and other interpretations or clarifications will be without legal effect. Each BIDDER shall ascertain prior to submitting his BID that he has received all ADDENDA issued, and he shall acknowledge their receipt with his BID.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PRODUCT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the CONTRACT.

Each BID must be accompanied by a BID BOND payable to the OWNER for five percent (5%) of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three (3) lowest responsible BIDDERS. When the AGREEMENT is executed, the bonds of the two (2) remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the PAYMENT BOND and PERFORMANCE BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A PERFORMANCE BOND and a PAYMENT BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety listed on the Treasury Department's most current list (Circular 270 as amended), approved by the OWNER, will be required for the faithful performance of the contract. PERFORMANCE BOND shall be valid for one year after project completion.

Attorneys-in-fact who sign BID BONDS or PAYMENT BONDS and PERFORMANCE BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the AGREEMENT and obtain the PERFORMANCE BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary AGREEMENT and BOND forms. In case of failure of the BIDDER to execute the AGREEMENT, the OWNER may, at his option, consult the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER, within ten (10) working days of receipt of acceptable PERFORMANCE BOND, PAYMENT BOND, and AGREEMENT signed by the party to whom the AGREEMENT was awarded, shall sign the AGREEMENT and return to such party to whom the AGREEMENT was awarded and return to such party an executed duplicate of the AGREEMENT. Should the OWNER not execute the AGREEMENT within such period, the BIDDER may, by WRITTEN NOTICE, withdraw his signed AGREEMENT. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within ten (10) working days of the execution of the AGREEMENT by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the ten (10) working day period or within the period mutually agreed upon, the CONTRACTOR may terminate the AGREEMENT without further liability on the part of either party.

The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose within five (5) days of OWNER'S request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the AGREEMENT and to complete the WORK contemplated therein. In evaluating BIDS, OWNER shall consider the qualifications of the BIDDER, whether or not the BIDS comply with the prescribed requirements, and alternates and unit prices if requested in the BID FORMS. OWNER may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the WORK as to which the identity of Subcontractors and other persons and organizations must be submitted as specified in the CONTRACT DOCUMENTS. OWNER may conduct such investigations as he deems necessary to establish the responsibility, qualifications and financial ability of the BIDDERS, proposed Subcontractors and other persons and organizations to do the Work in accordance with the CONTRACT DOCUMENTS.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsible, responsive BIDDER.

All applicable federal, state, and local laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the CONTRACT throughout.

Reference is made to the SPECIAL CONDITIONS of the Specifications for the identification of those surveys and investigation reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the WORK which have been relied upon by ENGINEER in preparing the Drawings and Specifications. OWNER will make copies of such surveys and reports available to any BIDDER requesting them at cost. Before submitting his BID each BIDDER will, at his own expense, make such additional surveys and investigations as he may deem necessary to determine his BID price for performance of the WORK within the terms of the CONTRACT DOCUMENTS.

If the SUPPLEMENTARY or SPECIAL CONDITIONS require the identity of certain Subcontractors and other persons and organizations to be submitted to OWNER in advance of the NOTICE OF AWARD, the apparent low BIDDER, and any other BIDDER so requested, will within five (5) days after the day of the BID opening submit to OWNER a list of all Subcontractors and other persons and organizations (who are to furnish the principal items of material and equipment). Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualifications for each Subcontractor, person, and organization if requested by OWNER. If OWNER or ENGINEER after due investigation has reasonable objection to any proposed Subcontractor, other person, or organization, he may, before issuing the NOTICE OF AWARD, request the apparent low BIDDER to submit an acceptable substitute without an increase in his BID price. If the apparent low BIDDER declines to make any such substitution, he will not thereby sacrifice his Bid Security. Any Subcontractor, other person, or organization so listed and to whom OWNER or ENGINEER does not make written objection prior to the issuance of the NOTICE OF AWARD will be deemed acceptable to OWNER and ENGINEER.

The ENGINEER is The Wooten Company. Their address is 301-B West 14th Street, Greenville, NC 27834.

BID FOR UNIT PRICE CONTRACT

Place: Edgecombe County, North Carolina

Date: _____

Proposal of _____ (hereinafter called "Bidder") * a corporation,
organized and existing under the laws of the State of _____
doing business as _____

TO: COUNTY OF EDGECOMBE, TARBORO, NORTH CAROLINA
(hereinafter called "Owner")

Gentlemen:

The Bidder, in compliance with your invitation for bids for the construction of EDGECOMBE COUNTY MSW TRANSFER STATION FOR EDGECOMBE COUNTY, NC, having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the contract documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this proposal is a part.

Bidder hereby agrees to commence work under this contract on or before date to be specified in written "Notice to Proceed" of the Owner and to fully complete the project within 120 consecutive calendar days thereafter as stipulated in the specifications. Bidder further agrees to pay as liquidated damages of the sum of \$1,000.00 for each consecutive calendar day thereafter as hereinafter provided in Paragraph 15.0 of the General Conditions for failure to meet the project completion time.

Bidder acknowledges receipt of the following addenda:

The Bidder agrees to perform all the of the EDGECOMBE COUNTY MSW TRANSFER STATION work described in the specifications and shown on the plans for the following unit prices:

BID SCHEDULE

PART I - SITE WORK - SEEDING AND EROSION CONTROL - AND UTILITIES

Item No.	Description	Unit	Estimated Quantity	Unit Bid Price	Extended Total
1	Unclassified Earthwork	LS	1		
2	Undercut Excavation with Select Backfill	CY	2,000		
3	Borrow Area Erosion Control	LS	1		
4	10" Aggregate Base Course	SY	12,400		
5	3" HB Base Course With 2" Heavy Duty Surface Course	SY	4,560		
6	18" RCP	LF	125		
7	15" RCP	LF	705		
8	12" RCP	LF	75		
9	Endwalls For 18" and 15" RCP Including Stone Outlet Aprons	EA	5		
10	Drop Inlets	EA	7		
11	Level Spreader	EA	2		
12	Sediment Traps	EA	5		
13	Erosion Control Fabric	SY	500		
14	6" Curb For the Approach Slab	LF	265		
15	Seeding and Mulching	AC	9.5		
16	Chain Link Fencing	LF	850		
17	Double Hung Chain Link Gates	EA	2		

Item No.	Description	Unit	Estimated Quantity	Unit Bid Price	Extended Total
18	3000 Gallon Sand Trap	LS	1		
19	8000 Gallon Wastewater Holding Tank	LS	1		
20	8" PVC Sanitary Sewer	LF	275		
21	6" PVC Sanitary Sewer	LF	575		
22	4" PVC Sanitary Sewer	LF	75		
23	New 4" Diameter Sanitary Manholes	EA	6		
24	1000 Gallon Wash Water Holding Tank	LS	1		
25	Wash Water Booster Pump	LS	1		
26	Water Service Vault	LS	1		
27	3" PVC Water Line	LF	650		
28	2" PVC Water Line	LF	300		
29	Miscellaneous Water Plumbing Including 1/2" Piping Tees, Valves, Plugs and Appurtenance Required for Roughed-in Water Service	LS	1		
30	Electrical Work	LS	1		

Total - Part I - Site Work - Base Bid - Items 1 - 30 \$ _____

_____ and ____/100 Dollars

Total Bid (Written Out) - Items 1 - 30

PART II - SITE WORK BID ALTERNATE NO. 1

Item No.	Description	Unit	Estimated Quantity	Unit Bid Price	Extended Total
31	3" HB Base Course With 2" Heavy Duty Surface Course	SY	8,000		

Total - Part II - Item 31 - Alternate Bid Sitework \$ _____

Total Bid (Written Out) - Part II

PART III - PRE-ENGINEERED BUILDINGS AND FOUNDATIONS

Item No.	Description	Unit	Estimated Quantity	Unit Bid Price	Extended Total
32	Pre-Engineered Tipping Floor Slab Including 4" Stone Leveling Bed	SY	1,150		
33	Pre-Engineered Approach Slab Including 4" Stone Leveling Bed	SY	1,150		
34	Pre-Engineered Office Building Floor Slab Including 4" Stone Levelling Bed	SY	130		
35	Pre-Engineered Retaining Walls	LS	1		
36	Pre-Engineered Transfer Station Building	LS	1		
37	Truck Bay and Miscellaneous Pre-Engineered Building Foundations	LS	1		
38	Pre-Engineered Office Building	LS	1		
39	Pre-Engineered Truck Loading Bay Access Stairs	LS	1		
40	Guardrail	LF	200		

Total - Part III- Pre-Engineered Buildings and Foundations - Items 32 - 40 \$ _____

_____ and ____/100 Dollars

Total Bid (Written Out)

PART IV - BID ALTERNATE NO. 2 - TRUCK LOADING BAY WEIGHT SCALES

Item No.	Description	Unit	Estimated Quantity	Unit Bid Price	Extended Total
41	Bid Alternate No. 2 - Truck Loading Bay Weight Scales	LS	1		

Total - Part IV - Bid Alternate No. 2 - Item 41 \$ _____

_____ and ____/100 Dollars

Total Bid (Written Out) - Part IV

PART V - BID ALTERNATE NO. 3 - LONG-LIFE TIPPING FLOOR SURFACE

Item No.	Description	Unit	Estimated Quantity	Unit Bid Price	Extended Total
42	Bid Alternate No. 3 - Long-Life Tipping Floor Surface	LS	1		

Total - Part V - Bid Alternate No. 3 - Item 42 \$ _____

_____ and ____/100 Dollars

Total Bid (Written Out) - Part V

TOTAL BID - PARTS I AND III - ITEMS 1 - 30 AND 32 - 40 \$ _____

_____ and ____/100 Dollars

Total Base Bid - PARTS I AND III (Written Out)

TOTAL BID ALTERNATES 1, 2 AND 3 - PARTS II, IV AND V \$ _____

_____ and ____/100 Dollars

Total Bid (Written Out)

The above unit prices shall include all labor, materials, housing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for.

Bidder understands that the Owner reserves the right to accept or reject any or all bids and to waive any informalities in the bidding.

The Bidder agrees that the Owner may increase or decrease the quantities stated in all items above at the unit prices quoted for the appropriate item. The final quantity of bid items 1 - 30 and 32 - 40 and bid alternates shall be the measured in-place quantities. All measurements will be verified and approved by the Engineer prior to final payment.

Bidder understands that this bid shall be good and may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving bids. Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by the General Conditions. The bid security in the sum of:

_____ (\$ _____)

is to become the property of the Owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Respectfully submitted:

By _____

Title _____

Business Address
License No. _____

Classification _____

Limit _____

Date _____

(SEAL - if bid is by a Corporation)

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
_____ as Principal, and _____
_____ as Surety, are hereby held and
firmly bound unto _____, as Owner in the
penal sum of _____ for the
payment of which, well and truly to be made, we hereby jointly and severally bind ourselves,
successors and assigns.

Signed, this _____ day of _____ 19_____.

The Condition of the above obligation is such that whereas the Principal has submitted to _____
_____ certain Bid, attached hereto and hereby made a part to enter
into a contract in writing, for the

NOW THEREFORE,

- (a) If said Bid shall be rejected, or in the alternate,
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid,

then this obligation shall be void, otherwise the same shall remain in force and effect: it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____(L.S.)
Principal

Surety

By:_____

IMPORTANT - Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

AGREEMENT

THIS AGREEMENT, made this _____ day of _____,

19 _____, by and between _____, hereinafter
(name of Owner), (an individual)

called "OWNER" and _____ doing business as (an
individual,) or (a partnership,) or (a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter
mentioned:

1. The CONTRACTOR will commence and complete the construction of

2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment,
labor and other services necessary for the construction and completion of the project described
herein.

3. The CONTRACTOR will commence the work required by the CONTRACT
DOCUMENTS within _____ calendar days after the date of the NOTICE TO PROCEED
and will complete the same within _____ calendar days unless the period for completion
is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the
CONTRACT DOCUMENTS for the sum of \$_____.

5. The term "CONTRACT DOCUMENTS" means and includes the following:

- (A) Advertisement For Bids
- (B) Information For Bidders
- (C) BID
- (D) BID Bond
- (E) Agreement
- (F) General Conditions

- (G) SUPPLEMENTAL GENERAL CONDITIONS
- (H) Payment Bond
- (I) Performance Bond
- (J) NOTICE OF AWARD
- (K) NOTICE TO PROCEED
- (L) CHANGE ORDER
- (M) Drawings prepared by _____
 numbers ____ through _____, and dated _____, 19__
- (N) SPECIFICATIONS prepared or issued by _____
 _____,
 dated _____, 19_____
- (O) ADDENDA:
 No. _____, dated _____, 19 _____
 No. _____, dated _____, 19 _____

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in (_____) each of which shall be deemed an original on the date first above written.
 (number of copies)

OWNER:

BY _____

Name _____
(please type)

Title _____

(SEAL)

ATTEST:

Name _____
(please type)

Title _____

CONTRACTOR:

BY _____

Name _____
(please type)

Address _____

(SEAL)

ATTEST:

Name _____
(please type)

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal,
(Corporation, Partnership, or Individual)

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

(Name of Owner)

(Address of Owner)

hereinafter called Owner, in the penal sum of _____

_____ Dollars, \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 1997, a copy of which is hereto attached and made a part hereof for the construction of:

NOW THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alternation or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligation 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 work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one
(number)
of which shall be deemed an original, this the _____ day of _____, 19_____

ATTEST:

Principal

(Principal) Secretary

(SEAL) By _____

(Address)

Witness as to Principal

(Address)

Surety
By _____
Attorney-in-fact

ATTEST:

(Surety) Secretary
(SEAL)

Witness as to Surety
By _____
(Address)

(Address)

NOTE: Date of Bond must not be prior to date of Contract. If Contract is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

(Name of Owner)

(Address of Owner)

hereinafter called Owner, in the penal sum of _____ Dollars, \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 19 _____, a copy of which is hereto attached and make a part hereof for the construction of:

NOW THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety and during the one year guaranty period and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the 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 the same shall in any wise affect its obligation 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 work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of
(number)
which shall be deemed an original, this the _____ day of _____, 19_____

ATTEST:

(Principal) Secretary

(SEAL)

Witness as to Principal

(Address)

ATTEST:

(Surety) Secretary

(SEAL)

Witness to Surety

(Address)

Principal

By _____(s)

(Address)

Surety

By _____
Attorney-in-Fact

(Address)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the
duly authorized and acting legal representative of _____
_____, do hereby certify as follows:

I have examined the foregoing contract and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements have been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provisions thereof.

Date: _____

PRE-AUDIT STATEMENT

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

Date: _____

Director of Finance

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 _____, 19____, 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 and Payment Bond within ten calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said bonds within ten 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 _____, 19_____.

Owner

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF
AWARD is hereby acknowledged

By _____,

this the _____ day of _____, 19_____

By _____

Title _____

NOTICE TO PROCEED

To _____

Date: _____
PROJECT: _____

You are hereby notified to commence WORK in accordance with the Agreement (Contract) dated _____, 19 _____, on or before _____ 19 _____, and you are to complete the WORK within _____ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 19 _____.

Owner

BY _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____

this the _____ day of _____
_____, 19 _____

BY _____

Title _____

CHANGE ORDER

Order No _____

Date: _____

Agreement Date: _____

NAME OF PROJECT: _____

OWNER: _____

CONTRACTOR: _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

Justification:

Change to CONTRACT PRICE:

Original CONTRACT PRICE \$ _____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER \$ _____

The CONTRACT PRICE due to this CHANGE ORDER will be (increased) (decreased) by:

\$ _____

The new CONTRACT PRICE including this CHANGE ORDER will be \$ _____

Change to CONTRACT TIME:

The CONTRACT TIME will be (increased) (decreased) by _____ calendar days.

The date for completion of all work will be _____ (Date).

Approvals Required:

To be effective this Order must be approved by the Federal agency if it changes the scope or objective of the project, or if it will increase the budgeted amounts of Federal funds needed to complete the project, or as may otherwise be required by the SUPPLEMENTAL GENERAL CONDITIONS.

Requested by: _____

Recommended by: _____

Ordered by _____

Accepted by: _____

Federal Agency Approval (where applicable) _____

SALES TAX REPORT

OWNER:

PROJECT:

CONTRACTOR:

FOR PERIOD: _____, 19____

VENDOR	ADDRESS	INVOICE NUMBER	DATE	AMOUNT	*1% STATE TAX	3% STATE TAX	2% COUNTY TAX	COUNTY IN WHICH PAID
				\$	\$	\$	\$	
TOTALS:				\$	\$	\$	\$	

*Special 1% Tax applicable to Water Plants only.

_____ being duly sworn, certifies that the foregoing statement of Sales Taxes paid in connection with referenced contract is true to the best of his knowledge and belief.

Sworn and subscribed to before me this _____ day of _____, 19____.

President

Notary Public

Expires: _____

CERTIFICATE OF INSURANCE—CONSTRUCTION

AIA DOCUMENT G705

SEE EXPLANATORY NOTES (REFERENCED BY BRACKETED NUMBERS) ON REVERSE SIDE

This certificate is issued as a matter of information only and confers no rights under the policies indicated upon the addressee. It does not amend, modify or alter the coverage afforded by the policies listed below. This is to certify that the following described policies, subject to their terms, conditions and exclusions, have been issued to the named insured and are in force at this time.

Name and Address of Insured:	CODE	COMPANIES AFFORDING COVERAGE
	A	
	B	
	C	
	D	
Addressee: (Owner)	E	

TYPE OF INSURANCE	CO. CODE	FORM [1]			POLICY NUMBER	[2]	[3]	LIMITS OF LIABILITY IN THOUSANDS		
		COMP.	OCCUR.	CL. MADE		EFFECTIVE DATE	EXPIRATION DATE		EACH OCCURRENCE	AGGREGATE
[4] General Liability including: <input type="checkbox"/> Premises-Operations <input type="checkbox"/> Explosion and Collapse Hazard <input type="checkbox"/> Underground Hazard <input type="checkbox"/> Independent Contractors <input type="checkbox"/> Broad Form Property Damage <input type="checkbox"/> Contractual Liability <input type="checkbox"/> Products and Completed Operations <input type="checkbox"/> Personal Injury with Employment Exclusion Deleted					[5] GENERAL AGGREGATE, THIS PROJECT ONLY: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A					\$
								Bodily Injury	\$	\$
								Property Damage	\$	\$
								Bodily Injury and Property Damage Combined	\$	\$
								Personal Injury		\$
Automobile Liability <input type="checkbox"/> Owned <input type="checkbox"/> Hired <input type="checkbox"/> Non-Owned								Bodily Injury (Each Person) Bodily Injury (Each Accident)	\$	
								Property Damage	\$	
								Bodily Injury and Property Damage Combined	\$	
Excess Liability <input type="checkbox"/> Umbrella Form <input type="checkbox"/> Other than Umbrella								Bodily Injury and Property Damage Combined	\$	\$
[6] A <input type="checkbox"/> Workers' Compensation <input type="checkbox"/> Voluntary Compensation								A Statutory		
B Employer's Liability								\$		Each Accident
								\$		Disease—Policy Limit
								\$		Disease—Each Employee
Other (Specify):										

1—Requirement in General Conditions, AIA Document A201, Subparagraph 9.10.2 for Certificate evidencing continuation of Products-Completed Operations insurance for at least _____ years after final payment is hereby acknowledged.

2—Has each of the above-listed policies been endorsed to include the company's obligation to notify addressee in the event of cancellation non-renewal? Yes No

Project Name and Location:	CERTIFICATION I hereby certify that I am an authorized representative of each of the insurance companies listed above, and that the coverages afforded under the policies listed above will not be cancelled or allowed to expire unless thirty (30) days written notice has been given to the addressee of this certificate. by registered mail.
_____	_____
(Name of Issuing Agency)	(Signature of Authorized Representative)
_____	_____
(Address)	(Date of Issue)



This document has important legal consequences: consultation with an attorney is encouraged with respect to its completion or modification.

**STANDARD
GENERAL CONDITIONS
OF THE
CONSTRUCTION CONTRACT**

Prepared by
Engineers Joint Contract Documents Committee

and

Issued and Published Jointly By



PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

CONSTRUCTION SPECIFICATIONS INSTITUTE

This document has been approved and endorsed by

The Associated General  Contractors of America

These General Conditions have been prepared for use with the Owner-Contractor Agreements (No. 1910-A-1 or 1910-8-A-2) (1990 Editions). Their provisions are interrelated and a change in one may necessitate a change in the others. Comments concerning their usage are contained in the Commentary on Agreements for Engineering Services and Contract Documents (No. 1910-9) (1986 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910-17) (1990 Edition). When bidding is involved, the Standard Form of Instructions to Bidders (No. 1910-12) (1990 Edition) may be used.

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American Society of Civil Engineers
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Construction Specifications Institute
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GENERAL CONDITIONS

ARTICLE I—DEFINITIONS

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

- 1.1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Bidding Requirements or the Contract Documents.
- 1.2. *Agreement*—The written contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.
- 1.3. *Application for Payment*—The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
- 1.4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
- 1.5. *Bid*—The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
- 1.6. *Bidding Documents*—The advertisement or invitation to Bid, instructions to bidders, the Bid form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).
- 1.7. *Bidding Requirements*—The advertisement or invitation to Bid, instructions to bidders, and the Bid form.
- 1.8. *Bonds*—Performance and Payment bonds and other instruments of security.
- 1.9. *Change Order*—A document recommended by ENGINEER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
- 1.10. *Contract Documents*—The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agree-

ment, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders and ENGINEER's written interpretations and clarifications issued pursuant to paragraphs 3.5, 3.6.1, and 3.6.3 on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to paragraphs 6.26 and 6.27 and the reports and drawings referred to in paragraphs 4.2.1.1 and 4.2.2.2 are not Contract Documents.

1.11. *Contract Price*—The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).

1.12. *Contract Times*—The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13.

1.13. *CONTRACTOR*—The person, firm or corporation with whom OWNER has entered into the Agreement.

1.14. *defective*—An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.8 or 14.10).

1.15. *Drawings*—The drawings which show the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.

1.16. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

1.17. *ENGINEER*—The person, firm or corporation named as such in the Agreement.

1.18. *ENGINEER's Consultant*—A person, firm or corporation having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

1.19. *Field Order*—A written order issued by ENGINEER which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Times.

1.20. *General Requirements*—Sections of Division I of the Specifications.

1.21. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

1.22. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

1.23. *Liens*—Liens, charges, security interests or encumbrances upon real property or personal property.

1.24. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

1.25. *Notice of Award*—The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

1.26. *Notice to Proceed*—A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

1.27. *OWNER*—The public body or authority, corporation, association, firm or person with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be provided.

1.28. *Partial Utilization*—Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

1.29. *PCBs*—Polychlorinated biphenyls.

1.30. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.

1.31. *Project*—The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

1.32. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

1.33. *Resident Project Representative*—The authorized representative of ENGINEER who may be assigned to the site or any part thereof.

1.34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

1.35. *Shop Drawings*—All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

1.36. *Specifications*—Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

1.37. *Subcontractor*—An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

1.38. *Substantial Completion*—The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.39. *Supplementary Conditions*—The part of the Contract Documents which amends or supplements these General Conditions.

1.40. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

1.41. *Underground Facilities*—All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

1.42. *Unit Price Work*—Work to be paid for on the basis of unit prices.

1.43. *Work*—The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

1.44. *Work Change Directive*—A written directive to CONTRACTOR, issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.23. A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in paragraph 10.2.

1.45. *Written Amendment*—A written amendment of the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

ARTICLE 2—PRELIMINARY MATTERS

Delivery of Bonds:

2.1. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

2.2. OWNER shall furnish to CONTRACTOR up to ten copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Times; Notice to Proceed:

2.3. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement, or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty days after the Effective Date of the Agreement. In no event will the

Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

Starting the Work:

2.4. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence to run.

Before Starting Construction:

2.5. Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents, unless CONTRACTOR knew or reasonably should have known thereof.

2.6. Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for review:

2.6.1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2.6.2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing and processing such submittal;

2.6.3. a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.7. Before any Work at the site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with paragraphs 5.4, 5.6 and 5.7.

Preconstruction Conference:

2.8. Within twenty days after the Contract Times start to run, but before any Work at the site is started, a conference

attended by CONTRACTOR, ENGINEER and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.6, procedures for handling Shop Drawings and other submittals, processing Applications for Payment and maintaining required records.

Initially Acceptable Schedules:

2.9. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.6. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until the schedules are submitted to and acceptable to ENGINEER as provided below. The progress schedule will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within any specified Milestones and the Contract Times, but such acceptance will neither impose on ENGINEER responsibility for the sequencing, scheduling or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor. CONTRACTOR's schedule of Shop Drawing and Sample submissions will be acceptable to ENGINEER as providing a workable arrangement for reviewing and processing the required submittals. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT,
AMENDING, REUSE

Intent:

3.1. The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for. When words or phrases which have a well-known technical or construction industry or trade meaning are used to describe Work, materials or equipment, such words or phrases shall be interpreted in accordance with that meaning. Clarifi-

cations and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 9.4.

3.3. Reference to Standards and Specifications of Technical Societies; Reporting and Resolving Discrepancies:

3.3.1. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

3.3.2. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any Supplier referred to in paragraph 6.5, CONTRACTOR shall report it to ENGINEER in writing at once, and, CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.23) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.5 or 3.6; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

3.3.3. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement thereto issued by one of the methods indicated in paragraph 3.5 or 3.6, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and:

3.3.3.1. the provisions of any such standard, specification, manual, code or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

3.3.3.2. the provisions of any such Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

No provision of any such standard, specification, manual, code or instruction shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to OWNER, ENGINEER or any of ENGINEER's Consultants, agents or employees any duty or authority to supervise or direct the furnishing or

performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.13 or any other provision of the Contract Documents.

3.4. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved" or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.13 or any other provision of the Contract Documents.

Amending and Supplementing Contract Documents:

3.5. The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.5.1. a formal Written Amendment.

3.5.2. a Change Order (pursuant to paragraph 10.4), or

3.5.3. a Work Change Directive (pursuant to paragraph 10.1).

3.6. In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.6.1. a Field Order (pursuant to paragraph 9.5),

3.6.2. ENGINEER's approval of a Shop Drawing or Sample (pursuant to paragraphs 6.26 and 6.27), or

3.6.3. ENGINEER's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.7. CONTRACTOR, and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER (i) shall not have or acquire any title to or ownership rights in any

of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER.

ARTICLE 4—AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

Availability of Lands:

4.1. OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of CONTRACTOR. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a correct statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's lien against such lands in accordance with applicable Laws and Regulations. OWNER shall identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which CONTRACTOR will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR and OWNER are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times as a result of any delay in OWNER's furnishing these lands, rights-of-way or easements, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2. Subsurface and Physical Conditions:

4.2.1. *Reports and Drawings:* Reference is made to the Supplementary Conditions for identification of:

4.2.1.1. *Subsurface Conditions:* Those reports of explorations and tests of subsurface conditions at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents; and

4.2.1.2. *Physical Conditions:* Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by ENGINEER in preparing the Contract Documents.

4.2.2. *Limited Reliance by CONTRACTOR Authorized:* *Technical Data:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

4.2.2.1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto, or

4.2.2.2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or

4.2.2.3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such data, interpretations, opinions or information.

4.2.3. *Notice of Differing Subsurface or Physical Conditions:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:

4.2.3.1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is materially inaccurate, or

4.2.3.2. is of such a nature as to require a change in the Contract Documents, or

4.2.3.3. differs materially from that shown or indicated in the Contract Documents, or

4.2.3.4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then

CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.23), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

4.2.4. *ENGINEER's Review:* ENGINEER will promptly review the pertinent conditions, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

4.2.5. *Possible Contract Documents Change:* If ENGINEER concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 4.2.3., a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

4.2.6. *Possible Price and Times Adjustments:* An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of such uncovered or revealed condition causes an increase or decrease in CONTRACTOR's cost of, or time required for performance of, the Work: subject, however, to the following:

4.2.6.1. such condition must meet any one or more of the categories described in paragraphs 4.2.3.1 through 4.2.3.4, inclusive;

4.2.6.2. a change in the Contract Documents pursuant to paragraph 4.2.5 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment;

4.2.6.3. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.10 and 11.9; and

4.2.6.4. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Times if:

4.2.6.4.1. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a bid or becoming bound under a negotiated contract; or

4.2.6.4.2. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test or study of the site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

4.2.6.4.3. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.2.3.

If OWNER and CONTRACTOR are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.3. *Physical Conditions—Underground Facilities:*

4.3.1. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on

information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

4.3.1.1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

4.3.1.2. The cost of all of the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

4.3.2. *Not Shown or Indicated:* If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.23), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the Underground Facility. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document such consequences. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or the amount or length of any such adjustment in Contract Price or Contract Times, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages incurred or sustained by CONTRACTOR on or in connection with any other project or anticipated project.

Reference Points:

4.4. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and shall make no changes or relocations

without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

4.5. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material:

4.5.1. OWNER shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. OWNER shall not be responsible for any such materials brought to the site by CONTRACTOR, Subcontractor, Suppliers or anyone else for whom CONTRACTOR is responsible.

4.5.2. CONTRACTOR shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by paragraph 6.23), and (ii) notify OWNER and ENGINEER (and thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such hazardous condition or take corrective action, if any. CONTRACTOR shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR special written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of such Work stoppage or such special conditions under which Work is agreed by CONTRACTOR to be resumed, either party may make a claim therefor as provided in Articles 11 and 12.

4.5.3. If after receipt of such special written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a claim therefor as provided in Articles 11 and 12. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

4.5.4. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's

Consultants and the officers, directors, employees, agents, other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from such hazardous condition, provided that: (i) any such claim, cost, loss or damage is 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, and (ii) nothing in this subparagraph 4.5.4 shall obligate OWNER to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

4.5.5. The provisions of paragraphs 4.2 and 4.3 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site.

ARTICLE 5—BONDS AND INSURANCE

Performance, Payment and Other Bonds:

5.1. CONTRACTOR shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

5.2. If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.1, CONTRACTOR shall within ten days thereafter substitute another Bond and surety, both of which must be acceptable to OWNER.

5.3. Licensed Sureties and Insurers; Certificates of Insurance:

5.3.1. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance

companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.3.2. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain in accordance with paragraph 5.4. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain in accordance with paragraphs 5.6 and 5.7 hereof.

CONTRACTOR's Liability Insurance:

5.4. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and furnished and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance and furnishing of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed or furnished by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

5.4.1. claims under workers' compensation, disability benefits and other similar employee benefit acts;

5.4.2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

5.4.3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

5.4.4. claims for damages insured by customary personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5.4.5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

5.4.6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

The policies of insurance so required by this paragraph 5.4 to be purchased and maintained shall:

5.4.7. with respect to insurance required by paragraphs 5.4.3 through 5.4.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers and employees of all such additional insureds;

5.4.8. include the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

5.4.9. include completed operations insurance;

5.4.10. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.12, 6.16 and 6.31 through 6.33;

5.4.11. contain a provision or endorsement that the coverage afforded will not be cancelled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.3.2 will so provide);

5.4.12. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing defective Work in accordance with paragraph 13.12; and

5.4.13. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

OWNER's Liability Insurance:

5.5. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.4, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

Property Insurance:

5.6. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insur-

ance upon the Work at the site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

5.6.1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

5.6.2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework and Work in transit and shall insure against at least the following perils fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils as may be specifically required by the Supplementary Conditions;

5.6.3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

5.6.4. cover materials and equipment stored at the site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER; and

5.6.5. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR and ENGINEER with thirty days written notice to each other additional insured to whom a certificate of insurance has been issued.

5.7. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

5.8. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 will contain a provision or endorsement that the coverage afforded will not be cancelled or materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.11.

5.9. OWNER shall not be responsible for purchasing and maintaining any property insurance to protect the interests of CONTRACTOR, Subcontractors or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount, will be borne by CONTRACTOR, Subcontractor or others suffering any such loss and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.10. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraphs 5.6 or 5.7, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.11. Waiver of Rights:

5.11.1. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraphs 5.6 and 5.7 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds in such policies and will provide primary coverage for all losses and damages caused by the perils covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

5.11.2. In addition, OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them, for:

5.11.2.1. loss due to business interruption, loss of use or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of or resulting from fire or other peril, whether or not insured by OWNER; and

5.11.2.2. loss or damage to the completed Project or part thereof caused by, arising out of or resulting from fire or other insured peril covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.10, after substantial completion pursuant to paragraph 14.8 or after final payment pursuant to paragraph 14.13.

Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in this paragraph 5.11.2 shall contain provisions to the effect that in the event of payment of any such loss, damage or consequential loss the insurers will have no rights of recovery against any of CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them.

Receipt and Application of Insurance Proceeds

5.12. Any insured loss under the policies of insurance required by paragraphs 5.6 and 5.7 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.13. OWNER shall deposit in a separate account any money so received, and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

5.13. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within fifteen days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

Acceptance of Bonds and Insurance; Option to Replace:

5.14. If either party (OWNER or CONTRACTOR) has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within ten days after receipt of the certificates (or other evidence requested) required by paragraph 2.7. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was

required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

Partial Utilization—Property Insurance:

5.15. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be cancelled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6—CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. CONTRACTOR shall supervise, inspect and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

6.2. CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours and

CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's written consent given after prior written notice to ENGINEER.

6.4. Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.5. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

Progress Schedule:

6.6. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.9 as it may be adjusted from time to time as provided below:

6.6.1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.9) proposed adjustments in the progress schedule that will not change the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.6.2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of paragraph 12.1. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.7. Substitutes and "Or-Equal" Items:

6.7.1. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be accepted by ENGINEER under the following circumstances:

6.7.1.1. "Or-Equal": If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

6.7.1.2. *Substitute Items*: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under subparagraph 6.7.1.1, it will be considered a proposed substitute item. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by the ENGINEER will include the following as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall first make written application to ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute.

6.7.1.3. *CONTRACTOR's Expense*: All data to be provided by CONTRACTOR in support of any proposed "or-equal" or substitute item will be at CONTRACTOR's expense.

6.7.2. *Substitute Construction Methods or Procedures*: If a specific means, method, technique, sequence or procedure of

construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.7.1.2.

6.7.3. *Engineer's Evaluation*: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.7.1.2 and 6.7.2. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitutes proposed or submitted by CONTRACTOR pursuant to paragraphs 6.7.1.2 and 6.7.2 and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER accepts a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute item.

Concerning Subcontractors, Suppliers and Others:

6.8.1. CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER and ENGINEER as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

6.8.2. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials or equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement for acceptance by OWNER and ENGINEER, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's or ENGINEER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be adjusted by the difference in the cost occasioned by such

substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject *defective* Work.

6.9.1. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors. Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

6.9.2. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR. CONTRACTOR shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with the ENGINEER through CONTRACTOR.

6.10. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

6.11. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.6 or 5.7, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

Patent Fees and Royalties:

6.12. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance

of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents.

Permits:

6.13. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

Laws and Regulations:

6.14.1. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

6.14.2. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses and damages caused by, arising out of or resulting therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.3.2.

Taxes:

6.15. CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of

the Project which are applicable during the performance of the Work.

Use of Premises:

6.16. CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

6.17. During the progress of the Work, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. CONTRACTOR shall leave the site clean and ready for occupancy by OWNER at Substantial Completion of the Work. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

6.18. CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

Record Documents:

6.19. CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of

the Work, these record documents, Samples and Shop Drawings will be delivered to ENGINEER for OWNER.

Safety and Protection:

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

6.20.1. all persons on the Work site or who may be affected by the Work;

6.20.2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.20.3. other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant or anyone employed by any of them or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

Safety Representative:

6.21. CONTRACTOR shall designate a qualified and experienced safety representative at the site whose duties and

responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

Hazard Communication Programs:

6.22. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with Laws or Regulations.

Emergencies:

6.23. In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER or ENGINEER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

6.24. Shop Drawings and Samples:

6.24.1. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawings and Sample submittals (see paragraph 2.9). All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show ENGINEER the materials and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.26.

6.24.2. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.26. The numbers of each Sample to be submitted will be as specified in the Specifications.

6.25. Submittal Procedures:

6.25.1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

6.25.1.1. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto.

6.25.1.2. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work, and

6.25.1.2. all information relative to CONTRACTOR's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

6.25.2. Each submittal will bear a stamp or specific-written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR'S review and approval of that submittal.

6.25.3. At the time of each submission, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

6.26. ENGINEER will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by ENGINEER as required by paragraph 2.9. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where a particular means, method, technique, sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make corrections required by ENGINEER, and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.27. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract

Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of submission as required by paragraph 6.25.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.25.1.

6.28. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by ENGINEER as required by paragraph 2.9, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

Continuing the Work:

6.29. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.5 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.30. CONTRACTOR's General Warranty and Guarantee:

6.30.1. CONTRACTOR warrants and guarantees to OWNER, ENGINEER and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be *defective*. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

6.30.1.1. abuse, modification or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors or Suppliers; or

6.30.1.2. normal wear and tear under normal usage.

6.30.2. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

6.30.2.1. observations by ENGINEER;

6.30.2.3. recommendation of any progress or final payment by ENGINEER;

6.30.2.3. the issuance of a certificate of Substantial Completion or any payment by OWNER to CONTRACTOR under the Contract Documents;

6.30.2.4. use or occupancy of the Work or any part thereof by OWNER;

6.30.2.5. any acceptance by OWNER or any failure to do so;

6.30.2.6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13;

6.30.2.7. any inspection, test or approval by others; or

6.30.2.8. any correction of *defective* Work by OWNER.

Indemnification:

6.31. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) caused by, arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage: (i) is 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, and (ii) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity.

6.32. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.31 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.33. The indemnification obligations of CONTRACTOR under paragraph 6.31 shall not extend to the liability of ENGINEER and ENGINEER's Consultants, officers, directors, employees or agents caused by the professional negligence, errors or omissions of any of them.

Survival of Obligations:

6.34. All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with

the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Agreement.

ARTICLE 7—OTHER WORK

Related Work at Site:

7.1. OWNER may perform other work related to the Project at the site by OWNER's own forces, or let other direct contracts therefor which shall contain General Conditions similar to these, or have other work performed by utility owners. If the fact that such other work is to be performed was not noted in the Contract Documents, then: (i) written notice thereof will be given to CONTRACTOR prior to starting any such other work, and (ii) CONTRACTOR may make a claim therefor as provided in Articles 11 and 12 if CONTRACTOR believes that such performance will involve additional expense to CONTRACTOR or requires additional time and the parties are unable to agree as to the amount or extent thereof.

7.2. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall 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 ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

7.3. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure so to report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent or nonapparent defects and deficiencies in such other work.

Coordination:

7.4. If OWNER contracts with others for the performance of other work on the Project at the site, the following will be set forth in Supplementary Conditions:

7.4.1. the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;

7.4.2. the specific matters to be covered by such authority and responsibility will be itemized; and

7.4.3. the extent of such authority and responsibilities will be provided.

Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility in respect of such coordination.

ARTICLE 8—OWNER'S RESPONSIBILITIES

8.1. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

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

8.3. OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.4 and 14.13.

8.4. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the site and drawings of physical conditions in existing structures at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents.

8.5. OWNER's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.10.

8.6. OWNER is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7. OWNER's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8. In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with OWNER's right to terminate services of CONTRACTOR under certain circumstances.

8.9. The OWNER shall not supervise, direct or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

8.10. OWNER'S responsibility in respect of undisclosed Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Materials uncovered or revealed at the site is set forth in paragraph 4.5.

8.11. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9—ENGINEER'S STATUS DURING CONSTRUCTION

OWNER's Representative:

9.1. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of OWNER and ENGINEER.

Visits to Site:

9.2. ENGINEER will make visits to the site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER will endeavor for the benefit of OWNER to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and on-site observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work. ENGINEER's visits and on-site observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.13, and particularly, but without limitation, during or as a result of ENGINEER's on-site visits or

observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work.

Project Representative:

9.3. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more continuous observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.13 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other person will be as provided in the Supplementary Conditions.

Clarifications and Interpretations:

9.4. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree to the amount or extent thereof, if any, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or Article 12.

Authorized Variations in Work:

9.5. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR who shall perform the Work involved promptly. If OWNER or CONTRACTOR believes that a Field Order justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree as to the amount or extent thereof, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or 12.

Rejecting Defective Work:

9.6. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or

that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.7. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraphs 6.24 through 6.28 inclusive.

9.8. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

9.9. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

Determinations for Unit Prices:

9.10. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding upon OWNER and CONTRACTOR, unless, within ten days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other and to ENGINEER written notice of intention to appeal from ENGINEER's decision and: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in Exhibit GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to ENGINEER's decision, unless otherwise agreed in writing by OWNER and CONTRACTOR. Such appeal will not be subject to the procedures of paragraph 9.11.

Decisions on Disputes:

9.11. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and Claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant

to ENGINEER and the other party to the Agreement promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within sixty days after the start of such occurrence or event unless ENGINEER allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to ENGINEER and the claimant within thirty days after receipt of the claimant's last submittal (unless ENGINEER allows additional time). ENGINEER will render a formal decision in writing within thirty days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. ENGINEER's written decision on such claim, dispute or other matter will be final and binding upon OWNER and CONTRACTOR unless: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in EXHIBIT GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within thirty days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to such claim, dispute or other matter in accordance with applicable Laws and Regulations within sixty days of the date of such decision, unless otherwise agreed in writing by OWNER and CONTRACTOR.

9.12. When functioning as interpreter and judge under paragraphs 9.10 and 9.11, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to paragraphs 9.10 or 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter pursuant to Article 16.

9.13. Limitations on ENGINEER's Authority and Responsibilities:

9.13.1. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise or performance of any authority or responsibility by ENGINEER shall create, impose or give rise to any duty owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them.

9.13.2. ENGINEER will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

9.13.3. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.13.4. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and Other documentation required to be delivered by paragraph 14.12 will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests and approvals that the results certified indicate compliance with, the Contract Documents.

9.13.5. The limitations upon authority and responsibility set forth in this paragraph 9.13 shall also apply to ENGINEER's Consultants, Resident Project Representative and assistants.

ARTICLE 10—CHANGES IN THE WORK

10.1. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work. Such additions, deletions or revisions will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2. If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Times that should be allowed as a result of a Work Change Directive, a claim may be made therefor as provided in Article 11 or Article 12.

10.3. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.5 and 3.6 except in the case of an emergency as provided in paragraph 6.23 or in the case of uncovering Work as provided in paragraph 13.9.

10.4. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

10.4.1. changes in the Work which are (i) ordered by OWNER pursuant to paragraph 10.1, (ii) required because of acceptance of defective Work under paragraph 13.13 or correcting defective Work under paragraph 13.14, or (iii) agreed to by the parties;

10.4.2. changes in the Contract Price or Contract Times which are agreed to by the parties; and

10.4.3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 9.11;

provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.29.

10.5. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11—CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at CONTRACTOR's expense without change in the Contract Price.

11.2. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any claim for an adjustment in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty days after the start of such occurrence or event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event. All claims for adjustment in the Contract Price shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will

be valid if not submitted in accordance with this paragraph 11.2.

11.3. The value of any Work covered by a Change Order or of any claim for an adjustment in the Contract Price will be determined as follows:

11.3.1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1 through 11.9.3, inclusive);

11.3.2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2);

11.3.3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 11.3.2, on the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 11.6).

Cost of the Work:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5:

11.4.1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen and other personnel employed full-time at the site. Payroll costs for employees not employed full-time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by OWNER.

11.4.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the

cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

11.4.3. Payments made by CONTRACTOR to the Subcontractors for Work performed or furnished by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER who will then determine, with the advice of ENGINEER, which bids, if any, will be accepted. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in paragraphs 11.4, 11.5, 11.6 and 11.7. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work.

11.4.5. Supplemental costs including the following:

11.4.5.1. The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

11.4.5.2. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of CONTRACTOR.

11.4.5.3. Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof—all in accordance with the terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4. Sales, consumer, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

11.4.5.5. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

11.4.5.6. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by OWNER in accordance with paragraph 5.9), provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9. Cost of premiums for additional Bonds and insurance required because of changes in the Work.

11.5. The term Cost of the Work shall not include any of the following:

11.5.1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4—all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

11.5.2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.

11.5.3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

11.5.4. Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6. The CONTRACTOR's fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1. a mutually acceptable fixed fee; or

11.6.2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

11.6.2.1. for costs incurred under paragraphs 11.4.1 and 11.4.2, the CONTRACTOR's fee shall be fifteen percent;

11.6.2.2. for costs incurred under paragraph 11.4.3, the CONTRACTOR's fee shall be five percent;

11.6.2.3. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraphs 11.4.1, 11.4.2, 11.4.3 and 11.6.2 is that the Subcontractor who actually performs or furnishes the Work, at whatever tier, will be paid a fee of fifteen percent of the costs incurred by such Subcontractor under paragraphs 11.4.1 and 11.4.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

11.6.2.4. no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.5. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

11.6.2.5. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 11.6.2.1 through 11.6.2.5, inclusive.

11.7. Whenever the cost of any Work is to be determined pursuant to paragraphs 11.4 and 11.5, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowances:

11.8. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be furnished and performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

11.8.1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

11.8.2. CONTRACTOR's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances and no demand for additional payment on account of any of the foregoing will be valid.

Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.9. Unit Price Work:

11.9.1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER in accordance with paragraph 9.10.

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

11.9.3. OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11 if:

11.9.3.1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

11.9.3.2. there is no corresponding adjustment with respect to any other item of Work; and

11.9.3.3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result

of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12—CHANGE OF CONTRACT TIMES

12.1. The Contract Times (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Times (or Milestones) shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. All time limits stated in the Contract Documents are of the essence of the Agreement.

12.3. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a claim is made therefor as provided in paragraph 12.1. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions or acts of God. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.4. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay. In no event shall OWNER be liable to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of CONTRACTOR, or (ii)

delays beyond the control of both parties including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

ARTICLE 13—TESTS AND INSPECTIONS:
CORRECTION, REMOVAL OR
ACCEPTANCE OF DEFECTIVE WORK

13.1. *Notice of Defects:* Prompt notice of all defective Work of which OWNER or ENGINEER have actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's site safety procedures and programs so that they may comply therewith as applicable.

Tests and Inspections:

13.3. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

13.4. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

13.4.1. for inspections, tests or approvals covered by paragraph 13.5 below;

13.4.2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.9 below shall be paid as provided in said paragraph 13.9; and

13.4.3. as otherwise specifically provided in the Contract Documents.

13.5. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection, or

approval. CONTRACTOR shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work.

13.6. If any Work (or the work of others) that is to be inspected, tested or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

13.7. Uncovering Work as provided in paragraph 13.6 shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

Uncovering Work:

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

13.9. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose or otherwise make available for observation, inspection or testing as 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, CONTRACTOR shall pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 11. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

OWNER May Stop the Work:

13.10. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work

shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any surety or other party.

Correction or Removal of Defective Work:

13.11. If required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all *defective* Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with Work that is not *defective*. CONTRACTOR shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.12. Correction Period:

13.12.1. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be *defective*, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) correct such *defective* Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not *defective*, and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the *defective* Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

13.12.2. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

13.12.3. Where *defective* Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph 13.12, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

Acceptance of Defective Work:

13.13. If, instead of requiring correction or removal and replacement of *defective* Work, OWNER (and, prior to ENGINEER's recommendation of final payment, also ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall

pay all claims, costs, losses and damages attributable to OWNER's evaluation of and determination to accept such *defective* Work (such costs to be approved by ENGINEER as to reasonableness). If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.14. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct *defective* Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.11, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days' written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors and ENGINEER and ENGINEER's Consultants access to the site to enable OWNER to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by OWNER in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's *defective* Work. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14—PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 will serve as the basis for progress payments and

will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

Application for Progress Payment:

14.2. At least twenty days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

14.3. CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

Review of Applications for Progress Payment:

14.4. ENGINEER will, within ten days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER, or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by OWNER to CONTRACTOR.

14.5. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's on-site observations of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

14.5.1. the Work has progressed to the point indicated,

14.5.2. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10, and to any other qualifications stated in the recommendation), and

14.5.3. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

However, by recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

14.6. ENGINEER's recommendation of any payment, including final payment, shall not mean that ENGINEER is responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of Work, or for any failure of CONTRACTOR to perform or furnish Work in accordance with the Contract Documents.

14.7. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.5. ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

14.7.1. the Work is *defective*, or completed Work has been damaged requiring correction or replacement,

14.7.2. the Contract Price has been reduced by Written Amendment or Change Order,

14.7.3. OWNER has been required to correct *defective* Work or complete Work in accordance with paragraph 13.14, or

14.7.4. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.4 inclusive.

OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

14.7.5. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work.

14.7.6. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens,

14.7.7. there are other items entitling OWNER to a set-off against the amount recommended, or

14.7.8. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.7.1 through 14.7.3 or paragraphs 15.2.1 through 15.2.4 inclusive;

but OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

Substantial Completion:

14.8. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Within a reasonable time thereafter, OWNER, CONTRACTOR and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within fourteen days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said fourteen days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform

ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

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

Partial Utilization:

14.10. Use by OWNER at OWNER's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) OWNER, ENGINEER and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraphs 14.8 and 14.9 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.10.2. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of property insurance.

Final Inspection:

14.11. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all

particulars in which this inspection reveals that the Work is incomplete or *defective*. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

Final Application for Payment:

14.12. After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by paragraph 5.4, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.4.13, (ii) consent of the surety, if any, to final payment, and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work. In lieu of such releases or waivers of Liens and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and (ii) all payrolls, material and equipment bills and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

Final Payment and Acceptance:

14.13. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.15. Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. Thirty days after the presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to

CONTRACTOR.

14.14. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of 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 to be held by OWNER 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 paragraph 5.1, 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 CONTRACTOR to ENGINEER with the Application for 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.

Waiver of Claims:

14.15. The making and acceptance of final payment will constitute:

14.15.1. a waiver of all claims by OWNER against CONTRACTOR, except claims arising from unsettled Liens, from *defective* Work appearing after final inspection pursuant to paragraph 14.11, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

14.15.2. a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15—SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work:

15.1. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes an approved claim therefor as provided in Articles 11 and 12.

OWNER May Terminate:

15.2. Upon the occurrence of any one or more of the following events:

15.2.1. if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as adjusted from time to time pursuant to paragraph 6.6);

15.2.2. if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

15.2.2. if CONTRACTOR disregards the authority of ENGINEER; or

15.2.4. if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if any,) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by OWNER arising out of or resulting from completing the Work such excess will be paid to CONTRACTOR. If such claims, costs, losses and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and when so approved by ENGINEER incorporated in a Change Order, provided that when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

15.3. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.4. Upon seven days' written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Agreement. In such case, CONTRACTOR shall be paid (without duplication of any items):

15.4.1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

15.4.2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

15.4.3. for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and

15.4.4. for reasonable expenses directly attributable to termination.

CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

CONTRACTOR May Stop Work or Terminate:

15.5. If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within thirty days after it is submitted or OWNER fails for thirty days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days' written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Agreement and recover from OWNER payment on the same terms as provided in paragraph 15.4. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within thirty days after it is submitted, or OWNER has failed for thirty days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may upon seven day's written notice to OWNER and ENGINEER stop the Work until payment of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.5 are not intended to preclude CONTRACTOR from making claim under Articles 11 and 12 for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this paragraph.

ARTICLE 16—DISPUTE RESOLUTION

If and to the extent that OWNER and CONTRACTOR have agreed on the method and procedure for resolving disputes between them that may arise under this Agreement, such dispute resolution method and procedure, if any, shall be as set forth in Exhibit GC-A, "Dispute Resolution Agreement," to be attached hereto and made a part hereof. If no such agreement on the method and procedure for resolving such disputes has been reached, and subject to the provisions of paragraphs 9.10, 9.11, and 9.12, OWNER and CONTRACTOR may exercise

~~such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.~~

ARTICLE 17—MISCELLANEOUS

Giving Notice:

17.1. Whenever any provision of the Contract Documents requires the giving of written notice, it will 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 the giver of the notice.

Computation of Times:

17.2.1. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.2.2. A calendar day of twenty-four hours measured from midnight to the next midnight will constitute a day.

Notice of Claim:

17.3. Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or

act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

Cumulative Remedies:

17.4. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.12, 6.16, 6.30, 6.31, 6.32, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to OWNER and ENGINEER thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

Professional Fees and Court Costs Included:

17.5. Whenever reference is made to "claims, costs, losses and damages," it shall include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs.

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SECTION 00232

SPECIAL CONDITIONS

SC-1 These Special Conditions serve to supplement the contract documents and shall be binding upon the parties hereto.

SC-2 Permits, Laws and Regulations: The Contractor shall keep himself fully informed of all Federal and State laws, all local laws, ordinances and regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority which in any manner affect those engaged or employed in the work, or which in any manner affect the conduct of the work. He shall at all times comply with all such laws, ordinances, regulations, orders and decrees to the extent that such requirements do not conflict with Federal laws; and shall protect and indemnify the Owner and his representatives against any claim or liability arising from or based on the violation of any law, ordinances, regulations, order, or decree, whether by himself or his employees.

- a. The Contractor shall pay all charges, fees, and taxes and give all notes necessary and incident to the due and lawful prosecution of the work. The Owner will provide the necessary permits required.
- b. Work on State Highway Right-of-Way: The construction of the site entrances as shown on the site plan shall comply with the driveway permit attached to the Contract Document at the end of this section.
- c. Work on Railroad Right-of-Way: No contract work is to take place within NC DOT rights-of-way.

SC-3 Replacement of Bonds: Whenever the surety or sureties on the bond so furnished shall be deemed by the Owner to be insufficient or unsatisfactory, the Contractor, within 10 days after notice to that effect, shall furnish and deliver a new bond to the Owner in the same penalty and on the same conditions with surety satisfactory to the Owner and this duty shall continue on the part of the Contractor whenever and so often as the Owner shall require a new bond with a satisfactory surety or sureties. If the Contractor shall fail to furnish such bond within 10 days after said notice is mailed to his address, the Owner, through its proper agent or agents, may stop all further work under said contract and relet the unfinished work at the expense of the Contractor. Should the Bonding Agency or Insurer find it necessary to change the terms of a bond or insurance policy required by the Contract Documents during the construction of this project, the Agency or Insurer shall give 10 days written notice to the Owner prior to the enforcement of such change. Standard insurance or bonding language stating the Agency or Insurer will endeavor to give 10 days prior written notice shall not be sufficient.

SC-4 Owner/Engineer/Architect:

Owner: Owner is the County of Edgecombe acting through its and their duly authorized agents. All notices, letters, and other communications directed to Owner shall be addressed and delivered to 201 St. Andrews Street, Tarboro, NC 27886.

Engineer/Architect: All duties and responsibilities assigned to Engineer/ Architect in the Contract Documents, with the corresponding rights and authority, will be assumed by The Wooten Company, 301-B W. Fourteenth Street, Greenville, NC 27834, (919) 757-1096, or their designated representative.

SC-5 Resident Project Representative - Duties and Responsibilities: The duties, responsibilities and limitations of authority of the Resident Project Representative and assistants shall be as hereinafter set forth:

The Resident Project Representative shall be authorized to observe all work done and materials furnished. Such observation may extend to all or any part of the work and to the preparation of the manufacture of the materials to be used. The Representative shall be stationed on the work to report to the Engineer as to the progress of the work and the manner in which it is being performed, also to report whenever it appears that the materials furnished and the work performed by the Contractor fail to fulfill the requirements of the Specifications and Contract, and to call to the attention of the Contractor such failure or other default, but such observation, however, shall not relieve the Contractor from any obligations to perform all the work strictly in accordance with the requirements of the specifications. The Representative shall perform such other duties as are assigned to him. He shall not be authorized to revoke, alter, enlarge upon, relax or release any requirements of these specifications, nor to approve or accept any portion of the work, nor to issue instructions contrary to the plans and specifications. The Representative shall, in no case act as foreman or perform duties for the Contractor, nor interfere with the management of the work by the Contractor. Any instructions which the Representative may give the Contractor in such circumstances shall in no way be construed as binding the Engineer nor the Owner, nor releasing the Contractor from the fulfillment of the terms of the contract.

SC-6 Safety Provisions: During excavation, material suitable for back-filling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading, prevent slides or cave-ins, and to provide adequate access to the work. The Contractor shall comply with the "Rules and Regulations Governing the Construction Industry" as promulgated for the Health, Safety, and General Welfare of Employees by the Commission of Labor under General Statutes of North Carolina, Section 95-131. All adopted standards are included in 13NCAC Subchapter 7 C. The counterpart federal standard is 29 CFR Part 1926 including all revisions and amendments. Scope as follows:

"The Rules and Regulations shall apply to Trenching, Excavation, Demolition, Building Construction Work and all operations pertaining thereto."

a. Particular reference is made to the following paragraphs of Subpart P, entitled "Excavations".

652. In excavations greater than or equal to 5' in depth, the side of the excavations shall be shored or braced in accordance with the applicable regulations unless the sides are sufficiently sloped to eliminate all possibility of a cave-in.

651.i. Where workmen are engaged near the edge of the excavation, undercutting of bank or walls is prohibited unless adequately protected.

651.j. Materials which are excavated shall be placed so that the base of the pile is not less than 2' from the edge of the excavation or by the use of adequate retaining devices or by combing both of the above where necessary.

651.c. Proper and adequate means of egress requiring lateral movements of no more than 25 feet shall be provided at all times from excavations and trenches that are 4 feet or more in depth; either by ramps, stairways or ladders. These means of egress shall conform to rules governing ramps, stairways, and ladders and located so as to be accessible to workmen at all times."

651.k. The Contractor shall maintain on the jobsite, a "Competent Person" having had specific training in, and being knowledgeable about, soils analysis, the use of protective systems, and the requirements of standard 1926.650 of the Federal Register, 29 CFR Part 1926.

- b. In addition to the Safety Provisions specified herein, the Contractor shall assume responsibility for and comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-54). Where the requirements of these acts are in excess of those requirements specified, the requirements of these acts shall govern. Should the plans and/or specifications require materials or methods in conflict with the Safety and Health Regulations, it shall be the responsibility of the Contractor to request of the Engineer any changes which may be necessary.
- c. Where work is adjacent to street and highways, the Contractor shall conduct the work in a manner which will avoid the accumulation of earth from his operations on the traffic areas of the adjacent streets or roadways. He shall continuously remove such accumulations and where necessary broom or wet down traffic areas to prevent dust.
- d. The General Contractor shall be responsible for overall on-site project safety.

SC-7 Use of Explosives: The use of explosives shall not be allowed.

SC-8 Location of existing lines have been taken from utility records, supplemented by field inspection and should indicate, in general, the type of underground facilities now in service. However, locations shown are not guaranteed and the Contractor should not only make his own investigations, but should also allow for contingencies which might arise by reason of encountering unrecorded lines or of lines being in different locations than indicated on the plans.

The site is undeveloped and there are no known utilities within the work limits except where new drive entrance construction enters NC DOT Rights-of-Way. It is suspected that utilities ie. phone or electric (there are no water or sewer lines at present) do exist along the Right-of-Way of SR 1601.

The Contractor shall notify Utilities Locating Co., Inc. (ULOCO). Greensboro, North Carolina, at least 48 hours prior to commencing construction of the drive entrance connections or storm drainage adjacent to SR 1601 in order that existing utilities in the area may be flagged or staked. The toll free number is 1-800-632-4949. Utilities location by ULOCO is not valid after the expiration of a ten (10) day period beginning on the date of such location. This service will in no way relieve the contractor of his responsibility to protect and maintain all existing utilities in an operational manner.

The Owner will not assume nor accept any responsibility for charges assessed by public or private utility companies or governmental agencies for damages sustained by the utility to their property by virtue of action on the part of the contractor making this installation, nor for such charges as may be imposed by the utility for personnel to furnish field location of the facility. All such costs are to be borne by the Contractor within the price or prices stated in his Bid.

SC-9 Conflict with Surface Obstructions: The Owner will furnish the Contractor with all necessary rights-of-way for the prosecution of the work. The rights-of-way herein referred to are understood to mean only the permission to use and pass through the location or space in any access road, or through any public or private property in which the Contractor is to construct the work.

- a. The Engineer reserves the right to forbid the use of any machine or any method of work that, in his opinion, is likely to cause damage to vegetation or soil cover of that portion of the existing landfill which is not to be disturbed under this contract.
- b. The Contractor shall be responsible for all poles, posts, fences, monitoring wells, gas vents, piezometer or any other structures or objects existing along the lines of his work within or without the limits of the excavation. He shall shore or otherwise support them when necessary and shall repair and make good any damage caused thereto by his work. All culverts, bridges, curbs and gutters, railroad crossings, road ditches or other structures or objects destroyed or disturbed in the execution of the contract shall be properly repaired or replaced by the Contractor as part of his obligations under the contract with no direct payment therefore.

SC-10 Conflict with Subsurface Obstructions: Care shall be taken not to injure any gas or water pipe or sewer or drain or service pipes connected therewith or electric or communication conduits or other underground structures. The Contractor shall repair or have repaired at once, at his own cost, any public or private structure damaged by or in the course of his work. The Owner reserves the right to repair any damage done to sewers, water mains, drain pipes, connections thereto, hydrants, valves or other structures belonging to the Owner. If the Owner exercises this right, it will make all necessary repairs, allowing the Contractor full opportunity for inspecting and checking the cost of the work, and will deduct the actual cost thereof from any money due or to become due the Contractor. These repairs, whether accomplished by the Contractor or the Owner, shall include everything necessary to restore the damaged structure to as good condition in all respects as prior to the Contractor's work. This may include the use of foundation material where none had been used before or different materials or types of construction from the original if these should be necessary to provide a new structure as stable and substantial as the one damaged.

- a. In case any pipe or other obstruction so located as to interfere with the work is unexpectedly encountered, the Contractor shall immediately notify the Engineer of the locality and circumstances and the place shall be passed over until satisfactory arrangements for avoiding the conflicts are made without any claim for damages arising from the delay.
- b. The Engineer will, in all cases, be the judge of the necessity or expedience of any change or rearrangement of any underground structures which may interfere with the construction of the work.
- c. The Contractor shall take all risks and be responsible for all expense and damage attending the presence or proximity of any gas or water pipes, sewers, drains, conduits or other underground structures where such pipes or other structures cross or appear in the excavation in such a manner as not to demand their rearrangement or realignment. It shall be the responsibility of the Contractor to notify all appropriate utilities prior to the commencement of construction in the proximity of those utilities.
- d. Neither the Owner nor the Engineer are under any obligation to inform the Contractor or to show on the drawings the presence or the location of any obstacles either on the surface or underground. Every effort has been made to indicate the location of all existing utilities on the contract drawings. The Contractor shall, however, be fully responsible for making his own investigation. Such information shown on the drawings or furnished otherwise to the Contractor shall not be construed as a waiver of the Contractor's liability but rather as an attempt on the part of the Engineer or the Owner to minimize the Contractor's hazards.

SC-11 Protection of Property: The Contractor shall not enter upon private property for any purpose without first obtaining permission. He shall use suitable precautions to prevent damage to pipes, conduits, and other underground structures. The Contractor shall, at his own risk and expense, protect roads, fences, walls, and other structures and objects legally existing along the line of or adjacent to the work. In the event that any injury results to any public or private property whatsoever by reason of, or consequent upon the execution of the work, or a failure to execute the work in a timely fashion, the Contractor shall, at his own cost and expense, make all such repairs as may be necessary as a result of such damage or injury. The Contractor shall indemnify and save harmless the Owner 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, or to satisfy any legal demand or liability, shall confer upon the Owner the right to make, or have made, such repairs and discharge any such liability and demand. The cost and expense thereof shall be deducted from any monies due, or to become due, the Contractor under the terms of the Contract and the Specifications.

SC-12 Barricades and Warning Signs: The Contractor shall provide and maintain all necessary barricades, suitable and sufficient red lights, danger signals, detour, and other signs, provide a sufficient number of watchmen and flagmen, and take all necessary precautions for the protection of the work and the safety of the public. Highways, street and pedestrian walks closed to the traffic shall be protected by effective barricades and obstructions shall be illuminated at night. Suitable warning signs, illuminated at night by lanterns or flares, shall be provided to mark the places where surfacing has been disturbed and work has not been completed. All lights for this purpose shall be kept burning from sunset to sunrise. Signs for protection of the work and the safety of the public shall conform to requirements contained in the railroad encroachment agreement. The Contractor will be held responsible for all damages to the project due to failure of the signs and barricades to properly protect the work from traffic, pedestrians, animals, and from other sources. The Contractor shall finally remove all barricades, danger, and detour signs as directed by the Engineer. The Contractor shall provide site staking on a 100' by 100' grid on that portion of the landfill requiring a cap for the purpose of controlling the fill depth of the various soil layers. The Engineer shall provide survey for the borrow pit for purpose of payment.

SC-13 Omit

SC-14 Replacement of Grassed Areas: All existing grassed or seeded areas damaged by the Contractor shall be replaced with the same type of grass as the adjoining area without additional cost to the Owner. The Contractor, at his option, may seed such areas and maintain them until a satisfactory stand of grass is obtained or may sprig or sod the areas to obtain the same result. A repaired area shall be considered satisfactory when a stand of grass is obtained and is growing vigorously. The Contractor shall provide lime and fertilizer as may be required and water for maintaining the areas until accepted by the Engineer.

SC-15 Surveys, Lines, and Grades: The Owner, through his Engineer, will provide a base line and three vertical control monuments for locating the principal components of the work. From the information provided by the Engineer, the Contractor shall develop all construction staking required. The Contractor shall carefully preserve all bench marks and reference points provided by the Engineer and in case of willful or careless destruction thereof, the Contractor shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance. The Contractor shall provide:

- A. Vertical and horizontal location of the buildings as shown on the plans.
- B. Stakes for vertical and horizontal control of sewer lines, tanks and manholes
- C. Stakes for vertical and horizontal control of trench drains, inlets, and storm drainage pipes.

SC-16 Omit

SC-17 Protection of Land Resources: It is intended that the land resources outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, the Contractor shall confine his construction activities to areas defined by the plans or specifications and to areas to be cleared for other operations indicated on the plans. The following additional requirements are intended to supplement and clarify the requirements of the technical sections of these specifications.

Except in areas marked on the plans to be cut or filled, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without special authority. No ropes, cables, or guys shall be fastened to or attached to any existing trees for anchorages unless specifically authorized by the Engineer and Owner. Where such special emergency use permitted, the Contractor shall first adequately wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.

Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and legally disposed of by the Contractor.

The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Engineer.

SC-18 Protection of Water Resources: During and after construction or upon crossing or paralleling any water course or water body with a pipeline, surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation ponds or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as silt fences, hay bales, berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any one time by construction operations should be held to a minimum and all vegetation that can be left in place shall remain unharmed. All disturbed areas must be seeded and mulched within 30 calendar days after disturbing activity has ceased.

All rules and regulations of the Sedimentation Pollution Control Act of 1973, if not exceeded by these specifications, will be adhered to during and after construction.

All cost of erosion and sediment control measures shall be included in the unit price bid.

SC-19 North Carolina State Sales Tax: The N.C. State Sales Tax shall be included in the contract price. The Contractor shall maintain and shall be responsible for seeing that his subcontractors maintain accurate records of all payments of N.C. State Sales Taxes on materials, supplies, fixtures, and equipment which become a part of or are annexed to pipe lines provided under this contract. The Contractor shall submit with his monthly estimates for payment a certified statement showing such payments by himself and all subcontractors listing invoices from various suppliers showing invoice number, amount paid, date and county paid. Sales tax records and certified statements shall be in such form shown on page sales tax bound in these documents and meet the requirements of the NC State Department of Revenue to permit the Owner to obtain a refund from the State of North Carolina.

SC-20 Due to the environmental concerns for this site and for the protection of the Owner and Contractor, the use of any pesticides, herbicides or other chemical is strictly prohibited on this job site. Equipment service involving the possible release or changing of vehicle fluids shall be carried out at a protected area designated by the Owner.

SC-21 Disposal of Surplus Material: Upon completion of backfilling operations, all excess earth, broken pavement, rock, shoring and other materials and debris resulting from the operations shall be removed from the work areas and legally disposed of by the Contractor. He shall find his own disposal areas and bear all costs arising from the legal disposal of this excess material and debris.

SC-22 Final Inspection and Tests: When construction is completed and prior to final acceptance, the Contractor shall provide all required concrete cylinder test reports, soils test reports, operation and maintenance manuals and other required data (See Section 01300) prior to requesting scheduling final inspection.

SC-23 List of Drawings: See cover sheet of drawings for a list of drawings designated for this project.

SC-24 Contractor's Insurance: Insurance shall be provided as required of the General Conditions of the Specifications at the limits specified herein:

Indemnity: The Contractor shall indemnify and save harmless the Owner from and against all claims, demands and liabilities of every nature and description whatsoever which may be presented to or asserted against the Owner by virtue or on account of any act or omission of the Contractor, his agents, employees, subcontractors or anyone for whose acts the Contractor may be liable, including the Owner's expenses of defending suits on account of any such claims or liability. The Contractor shall insure this indemnification clause with insurance in limits of not less than the limits specified in the General Conditions. The certificate of insurance provided shall specifically indicate that contractual liability insurance insuring this indemnification paragraph is included.

- a. Each subcontractor shall indemnify and save harmless the Owner and the Contractor from and against all claims, demands, and liabilities of every nature and description whatsoever which may be presented to or asserted against the Owner or Contractor by virtue or on account of any act or omission of the subcontractor, his agent, employees or anyone for whose acts the subcontractor shall insure this indemnification clause with insurance in limits of not less than the limits specified in the General Conditions. The certificate of insurance provided shall specifically indicate that contractual liability insurance involving insuring this indemnification paragraph is included.
- b. Copies of all policies shall be furnished by the Contractor and shall be attached to the respective pages of each signed copy of the Contract Agreement.
- c. It shall be understood that the above required insurance shall not be canceled or changed until ten (10) days after written notice of such termination or alteration has been sent by registered mail to the Certificate Holder.
- d. The limits of liability for the insurance required of the Contractor shall provide coverage for not less than the following amount or greater where required by Laws and Regulations:

Worker's Compensation:

Per the Workers' Compensation Laws of the State of North Carolina

Employers Liability:

Bodily Injury by Accident:	\$100,000	Each Accident
Bodily Injury by Disease:	\$500,000	Policy Limit
Bodily Injury by Disease:	\$100,000	Each Employee

General Liability:

General Aggregate	\$2,000,000
Products & Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$1,000,000
Each Occurrence	\$1,000,000
Fire Damage (Any One Fire)	\$300,000
Medical Expense (Any One Person)	\$5,000

This shall include premises and operations; independent contractors; products and completed operations; broad form property damage XCU coverage and contractual liability. Coverage shall be written on an occurrence basis.

Automobile Liability

Combined Single Limit	\$1,000,000
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Coverage shall have minimum limits of per occurrence, combined single limit for bodily injury liability and property damage liability. This shall include: owned vehicles, hired and non-owned vehicles and employee non-ownership.

Commercial Umbrella Policy	\$1,000,000
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The Owner and Engineer is to be included as an additional insured on both the comprehensive general liability and business auto liability policies.

- e. Builder's Risk Insurance shall be in such amounts as shall protect the Contractor, any subcontractor performing work covered by this contract, and the Owner from loss by fire, wind or other damage and shall be in such form, substance and amount as approved by the Owner's attorney.

SC-25 Time for Completion and Liquidated Damages: The Contractor shall commence work to be performed under this Agreement on a date to be specified in a written order from the Engineer and shall fully complete all work hereunder within the number of days specified on the Notice to Proceed from said date. For each calendar day in excess of the contract time several Contractors shall pay to the Owner the sum shown on the Bid Form as liquidated damages, not as a penalty, as reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor to complete the work within the time specified, such time being the essence of this Contract and a material consideration thereof.

Any requests for additional time as a result of delays shall be made in writing prior to the expiration of Contract Time such request must include a written justification for the delay. Delay for inclement weather cannot be approved for days prior to commencement of work by the Contractor.

If requests for additional time are not made in accordance with these aforementioned requirements, the contractor thereby waives any and all claims for additional time.

The Owner shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to Contractor, or to sue for and recover compensation for damages for nonperformance of this contract within the time stipulated.

SC-26 Cost of Excess Engineering: When the construction time exceeds the time stated in the Bid, the Contractor shall be liable for any and all additional costs incurred by the Owner for additional engineering and project representative fees which occur as a result of the contract time being exceeded beyond any approved contract time extension.

SC-27 Record Drawings: The completed project shall not be accepted until after the as-built plans are reviewed and accepted. The as-built shall include all construction combined on each drawing. The Contractor shall submit two (2) prints of the record drawings with the final pay estimate to the Owner's engineer.

The Owner shall require at least two (2) weeks from date of receipt to complete its review and a reasonable time for review of any record drawing resubmittals.

The scale for as-built plans shall be the same as that of the construction plans.

SC-28 Warranty:

The Contractor shall warrant the project work to be free of defects in materials or workmanship for a period of one (1) year from the date of execution of the Certificate of Satisfactory Completion.

SC-29 Unless exceeded by these specifications, the project shall conform to NC Solid Waste Section standards and specifications as a minimum.

SC-30 Railway Encroachment Agreement: Omit.

SC-31 Erosion of Sedimentation Control Plan: All provisions of the attached N.C. Division of Land Resources "Letter of Approval with Conditions" shall be adhered to by the Contractor and shall form a part of these Special Conditions. Whenever there is a conflict between the specifications and the requirements of the "Letter of Approval", the requirements of the "Letter of Approval" shall govern in all cases.

SC-32 Method of Award: If the total bid should be within the Owner's budget, then award will be made to lowest responsible bidder for the total project bid. Should the total project bid exceed the Owner's budget, then the Owner reserves the right to negotiate with the low bidder to delete any items or parts in their entirety in order to bring the project within the budget and award will be made for the lesser negotiated amount or all bids may be rejected and the project redesigned and rebid.

Should the Owner elect to construct any or all of the bid alternates, award will be made based upon the total bid with the selected bid alternates added to the base bid.

---END OF SECTION---

The
Wooten
Company

Engineering

Planning

Architecture

October 25, 1996

Mr. Joseph K. Durham
County Manager
County of Edgecombe
P.O. Box 10
Tarboro, NC 27886

Re: Edgecombe County MSW Landfill
Erosion Control Plan - Borrow Area

Dear Mr. Durham:

The erosion control plan for the proposed borrow area east of SR 1601 and the modifications to the existing sediment basin in the northwest corner of the landfill site are now approved. This plan approval also includes the regrading of the large perimeter ditch on the south and west landfill boundaries which Mr. Hathaway has been working to have laid back and seeded.

You will note that the approval references an NPDES permit. The Land Quality Section now cooperates with the Division of Water Quality to issue an NPDES permit. This project has already been operating under an NPDES permit and the landfill staff has received training from S&ME as to proper sampling of stormwater to comply with the NPDES permit.

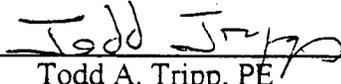
Enclosed for your use and for Mr. Hathaway's use are three sets of the approved erosion control plan. Please let us know if you wish us to help the County receive bids to do any of the work required by the plan rather than perform it in house. We will be glad to meet with you or Mr. Hathaway to go over the construction details of the plans if you desire.

Please call us if we can answer any questions.

Sincerely,

THE WOOTEN COMPANY

By


Todd A. Tripp, PE

Since 1936

TAT/hw

Enclosures

c: Mr. Larry Hathaway

State of North Carolina
Department of Environment,
Health and Natural Resources
Raleigh Regional Office

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary



DIVISION OF LAND RESOURCES
October 16, 1996

Edgecombe County
PO Box 10
Tarboro, NC 27886
ATTN: Joseph K. Durham

RE: Letter of Approval
Project Name: Edgecombe Co. MSW Landfill
Location: Edgecombe County
Submitted by: The Wooten Co.
Date Received: 9-23-96
Date Processing Initiated: 9-23-96
Watershed: Tar-Pamlico #1/03-03-03
New Submittal (X) Revised ()

Dear Mr. Durham:

This office has reviewed the subject Erosion and Sedimentation Control Plan. We find the plan to be acceptable and hereby issue this letter of approval. If any modifications, performance reservations, or recommendations are applicable, a list is enclosed and is incorporated as a part of this letter of approval. If any modifications are not incorporated into the plan and implemented in the field, the site will be in violation of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statute, hereinafter NCGS, 113A-61.1). In addition, it should be noted that this plan approval shall expire three (3) years following the date of approval in accordance with Title 15A, North Carolina Administrative Code (NCAC) 4B.0029, if no land-disturbing activity has been undertaken.

The land-disturbing activity described in the plan for this site may be subject to the approval of other Local, State or Federal agencies. This could include the Division of Water Quality under stormwater or other water quality regulations, the

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Raleigh, North Carolina 27609
Voice 919-571-4700



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Mr. Durham
October 16, 1996
page 2

U.S. Army Corps of Engineers under Article 404 jurisdiction, county, city or town agencies under other local ordinances, or other approvals that may be required. The approval issued in this letter cannot supersede any other required permit or approval.

Since this project will disturb five or more acres, one such required approval relates to the stormwater that will discharge from your project. This runoff is permitted pursuant to the National Pollutant Discharge Elimination System (NPDES) administered in North Carolina by the Division of Water Quality (DWQ). Attached is the General Stormwater NPDES Permit, NCG010000, as revised July 1, 1995, covering your activity. You are responsible for complying with the General Permit requirements and are subject to enforcement by DWQ for any violations of the General Permit.

Please be advised that Title 15A, North Carolina Administrative Code, 4B .0018(a) requires that a copy of the approved plan be on file at the job site. Also, please consider this letter as notice in accordance with the requirements of NCGS 113A-61.1 concerning our right to perform periodic inspections to ensure compliance with the approved plan.

North Carolina's sedimentation pollution control program is performance oriented, requiring protection of the natural resources and adjoining properties. If at any time during this project it is determined that the Erosion and Sedimentation Control Plan is inadequate to meet the requirements of the Sedimentation Pollution Control Act of 1973 (NCGS 113A-51 through 66), this office may require revisions in the plan and its implementation to ensure compliance with the Act.

Please note that this approval is based in part on the accuracy of the information provided concerning financial responsibility. You are requested to file an amended Financial Responsibility Form if any changes become necessary. In addition, it would be helpful if you would notify this office of the proposed starting date for the activity at the subject site.

Our department is currently conducting a survey of permit customers. A self-addressed, postage paid form is included with this approval letter. Please take a few moments and complete the form; your feedback is important to us. Please note that the completed form should be folded along the dashed lines, sealed with a piece of tape, and returned to this department's Environmental Permit Information Center for processing.

Mr. Durham
October 16, 1996
page 3

Your cooperation is appreciated and we look forward to working with you on this project. If there are any questions, please do not hesitate to contact this office.

Sincerely,



Wyatt Brown, CPESC
Assistant Regional Engineer
Land Quality Section
Raleigh Regional Office

WB/gb
cc: Todd A. Tripp, P.E.
Judy Garrett

PLAN REVIEW COMMENTS

<i>PROJECT NAME: Edgewcombe Co. MSW Landfill</i>	<i>DATE RECEIVED: 9-23-96</i>
<i>LOCATION: Edgewcombe County</i>	<i>REVIEWED BY: JD/WB</i>
<i>New Submittal (X) Revised ()</i>	<i>Approved (X) Disapproved ()</i>
<i>Reasons for Disapproval ()</i>	<i>Modifications (X) Performance Reservations ()</i>

Class B stone must have a minimum in place thickness of 22".

RECOMMENDATIONS AND/OR COMMENTS:

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work described in this Project Manual includes the provision of all labor, materials, equipment, and services required to complete the Municipal Solid Waste Transfer Station for Edgecombe County, North Carolina.

1.02 CONTRACTS

- A. The project construction will be let under the following Prime Contract with the construction including, but not limited to, the following major work items:
 - 1. Provision of a new 11,000 SF waste transfer building including the provision of a new office with rooms and plumbing roughed in.
 - 2. Provision of a new gravel access roads and parking areas.
 - 3. Provision of all site grading conforming to the construction plans including approximately 30,000 CY of cut and fill as shown on the site plan.
 - 4. Provision of new asphalt paving including bid alternates if selected.
 - 5. Relocation of existing scales shall be by the owner.
 - 6. Provision of new scales for the transfer building truck loading bay if the bid alternate for this item is selected.
 - 7. Provision of new wastewater holding and treatment facilities.
 - 8. Provision of new wash water piping storage and pumping system.
 - 9. Provision of new security fencing.
 - 10. Provision of new electrical systems area lighting and equipment.

1.04 WORK SEQUENCE

- 1. Construct erosion control measures and fencing.
- 2. Construct drainage features.
- 3. Perform the required site grading and complete soil testing.
- 4. Layout new buildings and structures and provide the required cut sheets and notes.
- 5. Construct water and wastewater piping and underground electrical distribution lines.
- 6. Construct gravel roadways.
- 7. Construct building foundations and concrete pads, ramps and retaining walls.
- 8. Erect prefabricated metal buildings and fencing.
- 9. Conduct prefinal and final inspections with the Owner and Engineer as necessary for building acceptance.

1.05 OWNER OCCUPANCY

- A. Owner will occupy site during entire period of construction.
- B. Contractors shall cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
 - 1. Convenience center is to remain open at all times during construction.

2. Coordinate entrance road work with landfill closure contractor to permit access to borrow area east of the transfer building site.
3. All staging areas and storage are to be on the east side of SR 1601.

---END OF SECTION---

SECTION 01030

ALTERNATES

PART 1 - GENERAL

1.01 SCOPE

- A. This Section specifies administrative and procedural requirements for Alternates.

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all Work:

- 1. Section 13200 Transfer Station Building
- 2. Section 2500 Pavement, Sidewalks, and Curb and Gutter

1.03 DEFINITIONS

- A. Alternate: An Alternate is an item of work or equipment that the Owner is requesting separate bids for as indicated on the Bid Form and defined in the Contract Documents. The Alternates may be "Added To" or "Deducted From" the Base Bid as indicated on the Bid Form.

1.04 QUALITY ASSURANCE

- A. Coordinate related Work and modify adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.
- B. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to and required for a complete installation as part of the Alternate.

1.05 SELECTION AND AWARD OF ALTERNATES

- A. Bid award will be evaluated on the total of the base bid and any of the alternates as selected by the Owner to the extent that project funds are available.

- A. Contract I, General

- 1. Bid Alternate No. 1 - Entrance Roadway Paving
- 2. Bid Alternate No. 2 - Truck Loading Bay Weigh Scales
- 3. Bid Alternate No. 3 - Long-Life Tipping Floor Surface

---END OF SECTION---

SECTION 01040
PROJECT COORDINATION

PART 1 - GENERAL

1.01 SCOPE

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
1. Coordination.
 2. Administrative and supervisory personnel.
 3. General installation provisions.
 4. Cleaning and protection.

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section.
1. Section 01010 Summary of Work
 2. Section 01050 Coordination of Electrical Work
 3. Section 01070 Cutting and Patching
 4. Section 01500 Construction Facilities and Temporary Controls

1.03 GENERAL COORDINATION REQUIREMENTS

- A. Responsibilities of Contractor:
1. Coordinate construction activities for the Project to assure efficient and proper installation of each part of the Work.
 2. Where availability of space is limited, coordinate installation of components to assure maximum accessibility for maintenance. Make adequate provisions to accommodate components scheduled for later installation.
 3. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. A copy of all memoranda shall be submitted to the Engineer.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of schedules.
 2. Installation and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project Close-out activities.
- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require Installer of each major component to inspect conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
- B. Manufacturer's Instructions: Comply with manufacturer's recommendations, to the extent that they are more explicit or stringent than requirements contained in Contract Documents.
- C. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- D. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Engineer for final decision.
- E. Check dimensions before starting each installation.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Engineer for final decision.

3.02 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration.
- B. Clean and maintain completed construction as frequently as necessary through the construction period. Adjust and lubricate components as required to ensure proper operation.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the

construction, completed or in progress, is subject to harmful, or dangerous exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Air contamination or pollution.
6. Water or ice.
7. Abrasion.
8. Heavy traffic.
9. Misalignment.
10. Improper shipping or handling.
11. Theft.
12. Vandalism.

3.03 SPECIAL REQUIREMENTS

---END OF SECTION---

SECTION 01090
ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 REFERENCE TO APPLICABLE STANDARDS

- A. Whenever reference is made to codes, standard specifications, or other data published by regulating agencies or accepted organizations, it shall be understood that such reference is made to the latest edition of that standard published prior to the bidding date, unless otherwise indicated.

1.02 ABBREVIATIONS

AA	Aluminum Association
AASHO	American Association of State Highway Officials
ACI	American Concrete Institute
ACSR	Aluminum Cable Steel Reinforced
AFBMA	Anti Friction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated Gear Manufacturers Association
AGMA	American Gear Manufacturers Association
AHDGA	American Hot Dip Galvanized Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute (formerly "USASI" - United States of American Standards Institute)
API	American Petroleum Institute
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers

ASSCBC	American Standard Safety Code for Building Construction
ASTM	American Society for Testing Materials
ANI	Architectural Woodwork Institute
ANPA	American Wood Preservers Association
AWS	American Welding Society
AWNA	American Water Works Association
CBM	Certified Ballast Manufacturers
CBRA	Copper and Brass Research Association
CRSI	Concrete Reinforcing Steel Institute
CS	United States Department of Commerce Commercial Standards
DEMA	Diesel Engine Manufacturers Association
FS	Federal Specifications
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
MIL	Military Specifications
MRDTI	Metal Roof Deck Technical Institute
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
NScF	National Science Foundation
NWMA	National Woodwork Manufacturers Association
NCDOT	North Carolina Department of Transportation - Standard Specifications for Roads and Structures
NCBC	North Carolina State Building Code
OSHA	U.S. Department of Labor, Occupational Safety and Health Administration
PCA	Portland Cement Association

PCI	Prestressed Concrete Institute
PS	United States Department of Commerce Voluntary Products Standards
SAE	Society of Automotive Engineers
SDI	Steel Deck Institute
SJI	Steel Joist Institute
SSPC	Steel Structures Painting Council
UL	Underwriters` Laboratories, Inc.
USDA	United States Department of Agriculture

---END OF SECTION---

SECTION 01150

BASIS FOR MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SCOPE

- A. Section includes delineation of measurement and payment criteria applicable to Work performed under this Contract by the unit price payment method.
- B. Payment for the unit price contract shall be for all labor, materials, equipment, and services required or reasonably implied by the Contract Documents.
- C. Cost for mobilization, bonds, insurance, construction trailers, and all other administrative items for the Project construction shall be included in the unit price payments.
- D. Where submittals including Engineer's sealed drawings are required for items, the cost of the submittals are to be included in the bid price.

1.02 FIELD MEASUREMENT

- A. Contractor shall take all measurements and compute quantities for submittal of the monthly pay requests unless otherwise specified in the measurement paragraphs as indicated in this Section. The Engineer will verify measurements and quantities as necessary.

B. ITEMS 10, 11, 12, 13 AND 15

Refer to Erosion Control of the transfer station site only. The cost of all erosion control measures for the borrow site are to be included in the lump sum Bid Price For Borrow Area Erosion, Item 3.

1.03 CHANGE IN QUANTITIES

- A. An increase in the total quantities for each bid item as indicated in the Bid Form shall only be made by a Change Order as required by the Contract Documents.

1.04 ITEM 1 - UNCLASSIFIED EARTHWORK

This item shall be paid for at the lump sum bid price. The work for this pay item shall include the removal of existing soils and materials and compaction of finished subgrades for foundations and slabs, general cutting and filling as necessary to provide the elevations shown on the site plan, transport of spoils resulting from this work to the borrow area shown on the plans, excavation of required fill materials from the borrow site and transport of the materials to the construction site, placement of fill as directed in the specifications, compaction testing as specified in Section 02100 and 01400, and soil penetrometer testing for the 11,000 SF building foot print per Section 02100, Article 3.11F, other soils testing described in Article 3.11, Section 2100 except payment for stone testing shall be as described for Item 4, general erosion control, seeding and mulching excepting work with separate pay items, preparation of the roadway parking area, subgrades and all other materials and labor required to bring the site to the grades shown on the site plan and in readiness to accept the new roadways, slabs, and foundations shown on the plans.

1.05 ITEM 2 - UNDERCUT EXCAVATION WITH SELECT BACKFILL

This item shall be paid for at the unit bid price per cubic yard of material removed from native soils in order to construct foundations slabs and roadways where, in the opinion of the Engineer, the native material will not adequately support the new construction. Excavation which is required for typical construction shall be excluded from this item and shall be paid for under unclassified excavation. Excavations to be included under this item are as follows:

- 1) Roadways - Authorized (by the Engineer) excavations in native soils (not fills) deeper than the depth of the surface course, base course and stone base as measured from the finished pavement surface.
- 2) Concrete Slabs - Authorized excavations in native soils deeper than the depth of the slab and stone base as measured from the finished slab top surface.
- 3) Foundations - Authorized excavations in native soils deeper than the bottom of the foundation minus the required stone leveling base.

Payment at the unit bid price for this item shall include the cost of excavation, removal of spoils to the borrow area, excavation and transport of new select backfill from the borrow area and placement and compaction of the material in the manner specified as required to return the undercut area to the finished subgrade elevations as specified for fill materials supporting the proposed structure(s). Measurement for payment shall be in accordance with the area excavated times the nominal authorized depth of the excavation converted to the nearest cubic yard. Thus payment for both the removal and the backfill shall be based upon the volume of authorized cut.

1.06 ITEM 3 - BORROW AREA EROSION CONTROL

This item shall be paid for at the lump sum bid price for erosion and sedimentation control of the borrow area as necessary to comply with the requirements of the sedimentation and erosion control plan approval. Payment at the lump sum bid price shall include the provision of the sediment traps with riser barrels, diversion berms or ditches, erosion control stone, cleanup, grading the site to drain, and seeding and mulching of any disturbed areas. Note: Should the Contractor wish to minimize his costs he may limit land disturbance and only seed and mulch and construct diversion berms for the disturbed areas; however, payment of this item shall include the construction of both sediment traps shown on Sheet 2. Payment shall also include maintenance and repair of items as long as the site is disturbed by Contract work and until such time as the borrow site is stabilized. Payment shall be in accordance with percentage completion based upon a schedule of values of the major items of work to be submitted by the Contractor in accordance with Section 01300.

1.07 ITEM 4 - 10" AGGREGATE BASE COURSE

This item shall be paid for in accordance with the unit bid price per square yard of 10" aggregate base course actually placed. Payment at the unit bid price shall include the costs of provision, transport, placement, and compaction of the aggregate base course on excavated native soil or engineered fill as required by the specifications. Should the Owner desire, the Owner will arrange for and pay for stone density tests for the completed base course. Should tested areas fail, the Engineer shall direct the failing areas to be further compacted then retested. The cost of such remedial compaction and retesting shall be at the cost of the Contractor

1.08 ITEM 5 - 3" HB BASE COURSE WITH 2" HEAVY DUTY SURFACE COURSE

This item shall be paid for in accordance with the unit bid price per square yard of base course and

surface course actually placed. Payment at the unit bid price shall include the costs of provision, transport, placement, and compaction of the asphalt pavement on the 10" ABC as required by the specifications. The Owner shall pay for any thickness testing desired except when testing reveals the pavement fails to conform to the specified thickness. In the case that pavement is thinner than specified, the Contractor shall pay for repairs, remedial work, the original failing test and follow up tests. Should tested areas fail, the Engineer shall direct the failing areas to be further repaired then retested.

1.09 ITEMS 6, 7 AND 8 - 15" RCP

These items shall be paid for in accordance with the lump sum unit price per lineal foot for storm sewer pipe installed as shown and detailed on the drawings. Payment for these items shall be for the installation complete including any necessary crushed stone for trench stabilization and select backfill material for trench compaction. Measurement for payment shall be along the centerline of the pipe on the horizontal for the actual length of pipe placed. Payment will also include all excavation, installation, and compaction complete. Payment for storm sewer items which specifically call for stone bedding and haunching shall include the cost of placement and compaction of NCDOT No. 57 stone for the full trench width extending vertically from 4" below the pipe invert to the pipe springline.

1.10 ITEM 9 - ENDWALLS FOR 18" AND 15" RCP INCLUDING STONE OUTLET APRONS

In accordance with NCDOT specifications, this item shall be paid for in accordance with the unit bid price for each endwall installed. Payment for this item shall be for the installation complete including the stone outlet aprons. Payment at the unit bid price shall include the materials, excavating placement submittals, grout sealing to the pipe and all other required items for a complete installation.

1.11 ITEM 10 - DROP INLETS

This item shall be paid for in accordance with the unit bid price per each installed. Payment for this item shall be for all labor and materials required for a complete installation including connection to existing storm sewer piping where required for satisfactory drainage. Payment for this item shall also include the cost of all connection to new pipes as shown on the plans. Trench inlets are an integral part of the transfer station floor slab and truck loading bay slab and shall be included in the applicable bid items in Part III of the bid form.

1.12 ITEMS 11 AND 12 - LEVEL SPREADER AND SEDIMENT TRAPS

Payment for these items shall be at the unit bid price for each item actually installed. Payment at the unit bid price shall include all earthwork stone and piping and include repairs, maintenance and sediment removal as necessary to maintain the function of the item until the site is stabilized and accepted. Payment shall also include the leveling of sediment traps after acceptance of the site.

1.13 ITEMS 13 - EROSION CONTROL FABRIC

Payment for this item shall be at the unit bid price per square yard of fabric actually installed in accordance with the contract documents as directed by the Engineer. Payment at the unit bid price shall include the costs of provision of the fabric, staples, installation and repair as necessary to maintain performance until stabilization of the new ditch or slope.

1.14 ITEM 14 - 6" CURB FOR THE APPROACH SLAB

This item shall be paid for in accordance with the unit bid price per lineal foot of curb constructed around the approach slab as shown on the plans and details. Undercutting the subgrade shall be paid for under the applicable bid item. Compaction and conditioning of borrow material shall be paid for under the cost of undercutting.

1.15 ITEM 15 - SEEDING AND MULCHING

This item shall be paid for the unit bid price per acre for seeding, mulching, fertilizing, and liming within the limits of construction, completed and accepted. Should the permanent seeding and mulching not produce a stand of grass in accordance with these specifications, then the Contractor shall re-seed and re-mulch such areas at his own cost until a satisfactory stand of grass is produced. Seeding and mulching will only be paid for one time in accordance with the unit bid price. Seeding and mulching of the borrow area is excluded from this item and included in Item 3.

1.16 ITEM 16 - CHAIN LINK FENCING

This item shall be paid for at the unit bid price per lineal foot of chain link constructed as specified and shown on the plans and details. Payment at the unit bid price shall include the posts, concrete footings, brace rods, wire mesh, post caps, barbed wire brackets and barbed wire and all other incidental materials and labor for a completed fence.

1.17 ITEM 17 - DOUBLE HUNG CHAIN LINK GATES

This item shall be paid for at the unit bid price for each gate installed. Payment at the unit bid price shall include the cost of the gate, hinges, latch, lock (lock for each gate to be keyed alike) and all labor and incidental materials necessary for a completed gate as specified.

1.18 ITEMS 18 AND 19 - 3000 GALLON SAND TRAP AND 8000 GALLON WASTEWATER HOLDING TANK

These items are to be paid for at the lump sum bid price for the item constructed and tested as specified. Payment at the lump sum price shall include the cost of the precast tank or tanks, fittings, grout, connection boots, hardware, 12" No. 57 stone leveling base, excavation and backfill, access covers, product certification and all other materials and labor for a completed structure as specified.

1.19 ITEMS 20, 21 AND 22 - 8", 6" AND 4" SANITARY SEWER

These items shall be paid for in accordance with the unit bid price per lineal foot. Measurements shall be taken from center-to-center of manholes along centerline of pipe on the horizontal. Payment for these items shall be for the pipe, fittings, cleanouts where shown on the plans, and for the excavation suitable for laying, shoring and bracing where needed, clearing where necessary, laying the pipe, jointing, aligning, backfilling, repairing damaged utilities, final grading and connections to new trench drains or piping and for all labor and materials required for a complete installation. The type of pipe used shall be one or more of the alternatives listed in the specifications except as specially indicated elsewhere.

1.20 ITEM 23 - NEW 4" DIAMETER SANITARY MANHOLES

This item shall be paid for in accordance with the unit bid price. Payment for this item shall be for all labor and materials required for a complete installation, including precast units, sealant, steps, invert, pipe connectors, stone leveling base, connection to new sewer pipe and all required materials and labor for a completed and tested manhole.

1.21 ITEM 24 - 1000 GALLON WASH WATER HOLDING TANK

This item shall be paid for at the lump sum bid price. The lump sum price shall include provision of the tank, fittings, hardware, construction of the 6" concrete pad with 4" stone leveling base and connection of service piping, site tube and valves and all other items as specified in the plans and specifications.

1.22 ITEM 25 - WASH WATER BOOSTER PUMP

This item shall be paid for at the lump sum bid price for a completed booster pump as specified, including the pump, fittings, motor, controls and anchoring hardware and all miscellaneous items required for a complete operable installation. Set-up of the controls and control installation and control and power wiring shall be included in the bid for electrical work.

1.23 ITEM 26 - WATER SERVICE VAULT

This item shall be paid for at the lump sum bid price for a complete installation. Payment at the lump sum bid price shall include the vault, internal piping, access hatch, gate valve and check valve, access hatch, grouting and all other materials required for a complete installation as specified.

1.24 ITEMS 27 AND 28 - 3" AND 2" PVC WATER LINE

These items shall be paid for in accordance with the unit bid price per lineal foot. Measurements shall be made horizontally from center to center of fitting to end of line. Payment for these items shall include the cost of excavation, dewatering, backfilling laying, jointing, flushing, disinfecting, testing, pipe, fittings, repair to damaged utilities, connection to existing piping, blocking, and for all labor, materials and accessories required for a complete installation.

1.25 ITEM 29 - MISCELLANEOUS WATER PLUMBING INCLUDING 1/2" PIPING TEES, VALVES, PLUGS AND APPURTENANCE REQUIRED FOR ROUGHED-IN WATER SERVICE

Payment for this item shall be in accordance with the lump sum bid price. Payment for this item shall cover the cost of 1/2" piping, shut-offs, pipe hangers, fittings and other items necessary to install and test the piping for a completed system as specified and as shown on the utility plan.

1.26 ITEM 30 - ELECTRICAL WORK

This item shall be paid for in accordance with the lump sum bid price. Payment at the lump sum price shall include the costs of all electrical wiring, panel boxes, electrical controls and switches, lighting, ventilation fans, and disconnects and all other items specified in Section 16001 and shown on Sheets 14 and 15 of the plans. Payment shall be in accordance with a schedule of values to be submitted by the Contractor in accordance with Section 01300.

1.27 ITEM 31 - 3" HEAVY DUTY BASE COURSE WITH 2" HEAVY DUTY SURFACE COURSE

If this alternative is selected, payment for this item shall be on identical basis with payment for Item 5.

1.28 ITEMS 32, 33 AND 34 - PRE-ENGINEERED TIPPING FLOOR SLAB AND APPROACH SLAB INCLUDING 4" STONE LEVELING BED AND RETAINING WALLS

Payment for these items shall be in accordance with the unit bid price per square yard of concrete slab actually constructed. Payment at the unit bid price shall include the stone leveling bed, formwork preparation, reinforcement, steel tying, provision of concrete, screed work, finishing, curing and all items as required by the specifications.

1.29 ITEM 35 - PRE-ENGINEERED RETAINING WALLS

Payment for this item shall be identical to that for pay Item 32 through 34 except payment for this work shall be at the lump sum bid price and shall include the truck bay and stairwell retaining walls and the spread footings for walls.

1.30 ITEMS 36 AND 38 - PRE-ENGINEERED BUILDINGS

Payment for these items shall be at the lump sum bid price for specified metal building including the steel frame, connections, fasteners, bracing, sheeting, windows, painting, doors, skylights, louvers, push walls(transfer building only), steel snaps, plating, insulation, refuse deflectors (transfer building only), and all other items required by the specifications for these buildings.

1.31 ITEM 37 - TRUCK BAY AND MISCELLANEOUS PRE-ENGINEERED BUILDING FOUNDATIONS

Payment for this items shall be identical to that for pay Items 32 through 34 except payment for this work shall be at the lump sum bid price for the truck loading bay slab, truck loading bay ramps, trench drain, transfer building and office building column footings and all other miscellaneous concrete not included in other items.

1.32 ITEM 39 - PRE-ENGINEERED TRUCK LOADING BAY ACCESS STAIRS

Payment for this item shall be at the lump sum bid price for the new stairways as shown on the floor plan for the new transfer station. Payment at the lump sum price shall include the cost of the steel stairs, steel platforms, columns connections, fastener, painting, and all other required items for the stairs shown at the northeast and northwest corners of the transfer building.

1.33 ITEM 40 - GUARDRAIL

This item shall be paid for at the unit bid price per linear foot of guardrail actually installed along stairways and on the truck loading bay retaining walls. Payment at the unit bid price shall include the cost of the piping welding, shop work connection to concrete, certifications and installations as specified.

1.34 ITEM 41 - BID ALTERNATE NO. 2 - TRUCK LOADING BAY WEIGHT SCALES

This item, if selected, shall be paid for at the lump sum bid price. Payment at the lump sum price shall include the difference in the cost of installing and anchoring adequate sheet steel over the scale recesses and the cost of procuring, installing, testing and certifying the specified truck loading scales.

1.35 ITEM 42 - BID ALTERNATE NO. 3 - LONG-LIFE TIPPING FLOOR

Payment for this item shall be at the lump sum bid price. Payment at the lump sum price shall include the difference in the cost of the specified 10" slab and the provision of a 9" slab with 1" of the special metallic aggregate topping as specified for the bid alternate in Section 03100 for the transfer building tipping floor.

---END OF SECTION---

SECTION 01200
PROJECT MEETINGS

PART I - GENERAL

1.01 MEETINGS

- A. A pre-construction conference shall be held prior to the beginning of the Work.
- B. Construction progress meetings shall be held monthly.
- C. A project close-out conference shall be held during the final phases of the Work.
- D. Additional meetings may be scheduled by the Engineer.
- E. Meetings scheduled by the Engineer shall be held at the current Edgecombe Municipal Solid Waste Landfill Office.
- F. The Contractor's project superintendent shall attend all meetings.
 - 1. Notify suppliers and subcontractors to attend meetings as appropriate or as required by Engineer.
- G. The Contractor shall schedule pre-installation conferences as required in the individual specification sections.
- H. The Engineer shall be notified of project meetings scheduled by the Contractor.
- I. Engineer will schedule and administer meetings throughout the progress of the Work, except for meetings held by the Contractor for normal coordination of the Work.
- J. The meeting agenda shall include, but not be limited to, the following: Project Administration, Submittals, Construction Schedules and Methods, Safety and Health Regulations, Project Coordination, Payment Application, Change Orders, and Site Inspections.
- K. The Engineer will prepare agenda with copies to participants, preside at meetings, prepare minutes and distribute to participants for meetings scheduled by the Engineer.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

---END OF SECTION---

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 SCOPE

- A. This Section includes, but is not limited to, requirements for the following:
 - 1. Submittal Procedures.
 - 2. Construction Progress Schedule.
 - 3. Schedule of Values.
 - 4. Proposed Product List.
 - 5. Project Record Documents.
 - 6. Certificates of Compliance.
 - 7. Catalog Data.
 - 8. Shop Drawings.
 - 9. Manufacturer's Installation Procedures.
 - 10. Samples.
 - 11. Test Reports.
 - 12. Operation and Maintenance Instructions.
 - 13. Warranties.
 - 14. Spare Parts and Maintenance Materials.

1.02 SUBMITTAL PROCEDURES

- A. Transmit each submittal with cover letter to the Engineer at The Wooten Company, 301-B West 14th Street, Greenville, NC 27834.
- B. Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic suffix (i.e.: 15060,DI,a).
- C. Cover letter for each submittal package shall list the following:
 - 1. Contractors Name:
 - 2. Owners Name: Edgecombe County
 - 3. Project Name: Municipal Solid Waste Station
- D. Individual submittals shall each be listed by the following information:
 - 1. Submittal Reference No.:
 - 2. Equipment:
 - 3. Type Submittal:
 - 4. Supplier:
 - 5. Manufacturer:
- E. Apply Contractor's stamp to each submittal, signed or initialed and dated, certifying that the Contractor has reviewed the submittal for conformance with the requirements of the Contract Documents, and has coordinated the submittal with related work.
- F. Schedule submittals to expedite the Project, and deliver to Coordinate submission of related items. Allow a minimum of twenty (20) working days for Engineer's review.

- G. Identify variations from Contract Documents and Product limitations as they relate to the satisfactory performance of the Project.
- H. Provide space for Contractor and Engineer review stamps.
- I. Revise and resubmit submittals as required; identify changes made since previous submittal.
- J. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- K. Work requiring submittal review by the Engineer shall not be started until review has been obtained.
- L. The Engineer's review of the submittals shall not relieve the Contractor of the responsibility for complete compliance with the Contract Documents.

1.03 ADMINISTRATIVE SUBMITTALS

- A. Construction Progress Schedule
 - 1. Submit five (5) copies of the initial progress schedule 15 days after date of Owner-Contractor Agreement. One copy shall be returned to the Contractor.
 - 2. Progress schedule shall be, as a minimum, a horizontal bar chart with a separate line for each major section of Work. Identify the first work day of each week.
 - 3. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
 - 4. Indicate the expected monthly pay requests.
 - 5. Submit revised schedule with each Application for Payment as required for updating, identifying changes since previous version. Indicate estimated percentage of completion for each item of Work at each submission.
 - 6. Indicate submittal dates required for critical shop drawings, product data, samples, and product delivery dates.
 - 7. Indicate specific work sequences and requirements as indicated in Section 01010, Summary of Work.
- B. Schedule of Values For Lump Sum Items
 - 1. Submit three (3) copies of the schedule of values at least three (3) weeks prior to the first partial payment request. The schedule shall divide the lump sum contract items into major work tasks. Use the table of contents as a guide for itemizing the schedule. The schedule will be used only as a basis for review of the Contractor's request for payment.
 - 2. Engineer may request additional delineation of work tasks and supporting data of the
 - 3. Revise schedule to list approved Change Orders, with each request for payment.
- C. Project Record Documents
 - 1. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 - a. Contract Drawings.
 - b. Project Manual.
 - c. Addenda.
 - d. Change Orders and other Modifications to the Contract.
 - e. Reviewed submittals.

2. Store Record Documents separate from documents used for construction.
3. Record information concurrent with construction progress.
4. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - a. Manufacturer's name and product model and number.
 - b. Product substitutions or alternates utilized.
 - c. Changes made by Addenda and Modifications.
5. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - a. Measure elevations of structures in relation to datum.
 - b. Measure and reference horizontal and vertical locations of underground utilities and appurtenances to permanent surface improvements.
 - c. Measure and reference location of internal utilities and appurtenances concealed in construction to visible and accessible features of the Work.
 - d. Field changes from construction Drawings.
 - e. Details not on original Contract Drawings.
6. Submit documents to Engineer with final Application for Payment.

1.04 TECHNICAL SUBMITTALS

- A. General: Submit the following, in the number indicated, as required by the individual sections of the technical specifications.
- B. Certificates of Compliance
 1. Submit Manufacturer's Certificates of Compliance, in quantities specified for Shop Drawings.
 2. Certificates shall certify that the Products delivered to the project meet the specifications.
 3. Certificates may be recent or previous test results on Product, but must be acceptable to Engineer.
 4. Certification shall not relieve the Contractor of responsibility for complying with all requirements of the specifications.
- C. Catalog Data
 1. Submit copies of manufacturers' standard catalog cuts of Products to be used in the Work.
 2. When shop drawings are not required, the catalog data shall include the following as a minimum:
 - a. Parts schedule that identifies the materials to be used in each of the various parts.
 - b. Sufficient detail to serve as a guide for assembly and disassembly of the product and to serve as guide for ordering parts.
 3. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Work in the Shop Drawing submittal.
 4. Submit the number of copies as follows:
 - a. Products specified by a national standard: Submit three (3) copies. This data is for the general information of the Engineer and for use by the Owner for operation and maintenance and will not be returned to the Contractor.
 - b. All other Products: Submit the number of copies specified for the Shop Drawing.
- D. Shop Drawing
 1. Submit the number of copies that Contractor requires, plus three (3) copies that will

be retained by Engineer.

2. Shop drawings shall consist of drawings, diagrams, illustrations, schedules, performance charts, brochures and other data, prepared specifically for a portion of the Work. Shop drawings shall indicate the type, size, quantity, arrangement, location, mode of operation, component materials, utility connections, wiring and control diagrams, anchorage's, supports, factory-applied coatings, and all other information necessary to ensure satisfactory fabrication, installation and operation of the completed Work. Shop drawings shall establish the actual detail of all manufactured or fabricated items, indicate proper relation to adjoining work, amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure, and incorporate minor changes to design and construction to suit actual requirements.

E. Manufacturer's Installation Procedures

1. Submit manufacturers' installation procedures to Engineer for review, in quantities specified for Shop Drawings.

F. Samples

1. Submit samples as required by the individual specification sections. Samples shall be physical examples to illustrate the materials and workmanship. They shall be submitted in sufficient size and quantity to clearly illustrate the functional characteristics of the Product, with integrally related parts and attachment devices, and the full range of color to be provided.

G. Test Reports

1. Submit three (3) copies of test reports to the Engineer within seven (7) days of performing the test.
2. The test reports shall include the following as a minimum:
 - a. Owners name: Edgecombe County
 - b. Project name: Municipal Solid Waste Landfill
 - c. Wooten job number:
 - d. Testing firm:
 - e. Individual performing test:
 - f. Specification section no.:
 - g. Product tested:
 - h. Date and time of test:
 - i. Type of test:
 - j. Specific location in the Project: (i.e. Structure name and location within the structure by a rough sketch.)
 - k. Test results:
 1. Opinion of testing firm as to the test begin in compliance with the Contract Documents.
3. When requested by Engineer, the testing laboratory engineer shall provide additional interpretation of test results.

H. Operation and Maintenance Instructions

1. Submit three (3) copies of operation and maintenance instructions within 45 days after approval of the shop drawings.
2. The instructions shall be submitted in a navy blue vinyl, loose leaf binder containing the name of the equipment covered on the front and the spine of the binder.
3. As a minimum, the submittal shall contain complete operation and maintenance instructions, drawings, and complete parts list.

4. In addition, for equipment requiring periodic lubrication, provide two (2) lubrication charts; one shall be included in the binder, and the other shall be provided in weatherproof 10 mil. laminated plastic and shall be Permanently affixed to the equipment. The charts shall contain all pertinent information concerning the lubricating requirements including manufacturer's name, name of equipment, recommended service interval, recommended lubricant, location of each of the points of lubrication.

I. Warranties

1. Provide copies of Product warranties as required by the individual sections of the specifications.
2. Provide duplicate notarized copies.
3. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
4. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
5. Submit prior to final Application for Payment.
6. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

J. Spare Parts and Maintenance Materials

1. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual specification Sections.
2. Deliver to Project site and place in location as directed by the Owner. Obtain Owner's signature and date bill of materials as delivered to the site as required by this paragraph. Provide a copy of signed bill of materials to Engineer with request for payment.

1.05 SUBMITTAL MASTER LIST

- A. The Project Master Submittal List is attached to the end of this Section. The Contractor shall follow this list for making the required submittals and refer to individual sections for requirements as well. The master list is intended to alert the Contractor to potential submittal requirements and is not exhaustive. Refer to individual sections for actual requirements.
- B. The column numbers indicate the following submittals:

Item	Submittal Type	Spec. Section
Water and Sewer Piping	Certificate of Compliance	15060
Valves	Certificate of Compliance and Catalog Data	15100
Septic Tank and Grease Traps	Shop Drawings and Certificate of Compliance	3400 3100
Pre-Engineered Building	Certificate of Compliance Engineering Calculations Shop Drawings	13200

Item	Submittal Type	Spec. Section
Building Foundations	Engineering Calculations Reinforcement Details	13200
Water Storage Tank and Booster Pumps	Certificate of Compliance Shop Drawings Catalog Data O & M Manuals	15080
Water Storage Tank Slab	Shop Drawings	15080 03100
Electrical Panels, Lighting and Controls, and Switches	Certificate of Compliance, Catalog Data and O & M Manuals	16001
Electrical Wiring	Shop Drawings	16001
Concrete and Asphalt Paving	Test Reports, Mix Data and Certificate of Compliance	2600 3100
Scales	Certificate of Compliance, Shop Drawings, Controls Data and O & M Manual	3200
Site Work	Soils Compaction Data	2100
Stairs	Shop Drawings Engineering Calculations	13200

PART 2 - PRODUCTS

Not Used

---END OF SECTION---

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 SCOPE

- A. Quality assurance and control of installation.
- B. Inspection and testing laboratory services.
- C. References.
- D. Field samples.
- E. Manufacturers' field services and reports.

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Manufacturer shall have the minimum number of years of proven successful experience, as specified in each section, in the design, manufacture, and servicing of Products as specified.
- B. In lieu of the required experience, the manufacturer may provide a cash deposit or bond equal to the cost of the product, but pro-rated to the number of years of actual experience.
- C. Products, from a manufacturer who does not meet the experience requirements, must meet all technical requirements.
- D. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- E. Comply fully with manufacturers' instructions, including each step in sequence.
- F. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- G. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- H. Perform work by persons qualified to produce workmanship of specified quality.
- I. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 INSPECTION AND TESTING LABORATORY SERVICES

- A. Contractor shall employ the services of an independent firm to perform soil and material inspections, testing and other services specified in the individual specification sections of this Contract Document. The cost for all required testing shall be included in the Contract

Bid.

- B. Testing laboratory shall be authorized to operate in the state in which Project is located.
- C. Testing laboratory shall have a full-time registered Engineer on staff to review services.
- D. Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) Standards or accepted values of natural physical constants.
- E. Prior to start of Work, submit testing laboratory name, address, and telephone number, names of full-time registered engineer, field inspector, and responsible project manager. Laboratory subject to the approval of the Engineer.
- F. Retesting shall be performed by the same independent firm. Retesting required by the failure of the initial test to meet the requirements of the specifications shall be paid for by the Contractor.

1.04 LABORATORY RESPONSIBILITIES

- A. The Testing Laboratory shall have the following responsibilities for the Project:
 - 1. Attend pre-construction conferences and progress meetings as required by the Engineer.
 - 2. Test samples of mixes submitted by Contractor.
 - 3. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
 - 4. Perform specified inspection, sampling, and testing of Soil and Materials in accordance with Contract Documents and specified standards.
 - 5. Ascertain compliance of soil compaction and material mixes with requirements of Contract Documents.
 - 6. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or Products.
 - 7. Perform additional inspections and tests required by Engineer when specified tests have failed.

1.05 LIMITS ON TESTING LABORATORY AUTHORITY

- A. The authority of the Testing Laboratory is limited as follows:
 - 1. May not alter requirements of Contract Documents.
 - 2. May not approve or accept any portion of the Work.
 - 3. May not assume duties of Contractor.
 - 4. Has no authority to stop the Work.

1.06 LABORATORY REPORTS

- A. After each inspection and test, the independent testing firm shall submit report(s) as specified in Section 01300, Submittals.

1.07 CONTRACTOR RESPONSIBILITIES

- A. Deliver to laboratory at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
- B. Cooperate with laboratory personnel, and provide access to the Work and to

manufacturer's facilities as specified.

- C. Provide incidental labor and facilities to provide access to Work to be tested, to obtain and handle samples at the site and at source of products to be tested, to facilitate tests and inspections, storage, and curing of test samples.
- D. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

1.08 REFERENCES

- A. Conform to reference standard by date of issue current to date of Contract Documents.
- B. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.09 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications Sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Field samples shall be completely removed and the area cleaned up prior to final inspection unless specified otherwise in the individual specification sections.

1.10 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. Require suppliers and manufacturers to provide a qualified technician to provide the services as outlined by the individual equipment and material specification Sections.
- B. Submit qualifications of technician to Engineer 30 days in advance of required work. Technician subject to approval of Engineer.
- C. Technicians shall report observations, site decisions, and instructions given to Contractor, installers, and Owner's staff, that are supplemental or contrary to manufacturers' written instructions, directly to the Engineer.
- D. Submit site report as specified in Section 01300, Submittals.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used.

---END OF SECTION---

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, telephone service, water, and sanitary facilities.
- B. Work on public right-of-way.
- C. Temporary Controls: Barriers, enclosures and fencing, water control, dust control, erosion and sediment control, and protection of the work.
- D. Construction Facilities: Access roads, parking, progress cleaning, project signage, and field offices.

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
 - 1. Section 01700 Contract Close-out

1.03 TEMPORARY UTILITIES

- A. Electricity
 - 1. Contractor shall make arrangements for and provide all equipment necessary for the temporary electrical service to the Office and Weigh Station Building and to the Waste Transfer Building for the use of his forces and those of his subcontractors.
 - 2. Contractor shall pay the monthly cost for the temporary electrical service, which will include the electrical usage by all contractors, Owner and Engineer at the site.
- B. Lighting
 - 1. Provide and maintain lighting for construction operations as required by Contractor.
 - 2. Provide and maintain lighting to exterior staging and storage areas after dark for security purposes as required by Contractor.
- C. Telephone Service
 - 1. Provide, maintain and pay for telephone service to field office as required by Contractor.
- D. Water
 - 1. Provide, maintain, and pay for suitable quality water service required for construction operations. The Owner currently obtains bottled water for the use of its employees. It is expected that the Contractor will be required to obtain drinking water offsite. Water for construction use is available from an existing pond west of SR 1601 near the existing maintenance facility. There will be no charge for this water. Contractor will provide temporary water storage and hauling as necessary for his work.
- E. Sanitary Facilities

1. Provide and maintain required facilities and enclosures as necessary to comply with the laws and ordinances of the authority having jurisdiction and the State of North Carolina.
2. Contractor shall provide the above sanitary facilities for all contractors, sub-contractors at the Project Site.
3. Existing facilities shall not be used.

1.04 WORK ON PUBLIC RIGHT-OF-WAY

- A. The Work for this Project is under the jurisdiction of the following N.C. Department of Transportation (NC DOT) office
 1. All Work in Edgecombe County:
Division 4, District 1 - Halifax, NC
Andy Mills, District Engineer
P.O. Box 98
Halifax, NC 27839
(919) 583-5861
- B. Work on the entrances shall comply with requirements of the Driveway Permit as attached to Section 00800, Project Supplementary Conditions.
- C. Post Bonds if required by the Driveway Permit.
- D. Prior to start of Work notify the Office of the N.C. Department of Transportation as indicated in the encroachment agreement and driveway permit.
- E. Work shall conform to the requirements and be subject to the approval of the above agency.
- F. Contractor shall be responsible to the Owner for the cost of all DOT inspection that is billed to the Owner by the NC DOT as indicated in the Special Provisions of the Encroachment Agreement. Such cost shall be deducted from the Contractor's pay request.
- G. Submit letter to the above District Engineer when all work is complete if required by the Driveway Permit.
- H. Submit letter of approval for completed Work from the above agency with Final Payment Request.
- I. Clean rights-of-way as work progresses and daily.
- J. Power broom existing pavement as work progresses.
- K. Work shall be in accordance with the latest edition of the N.C. Division of Highways, "Policies and Procedures for Accommodating Utilities on Highway Right-of Way."
- L. Provide traffic control signals, cones, drums, flares, warning lights, and flagman equipment as required and approved by the above agency to control traffic at approaches to the Work Site from NCDOT ROW when work in ROW is in progress in conformance with the current "Manual on Uniform Traffic Control Devices for Streets and Highways" and amendment or supplements thereto.
- M. Provide trained and equipped flagmen to regulate traffic when construction operations or

- traffic encroaches on public right-of-way.
- N. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- O. Consult with the above agency in establishing public thoroughfares to be used for haul routes and site access.
- P. Confine construction traffic to designated haul routes.
- Q. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public.
- R. Provide and maintain access to fire hydrants, free of obstructions.

1.05 TEMPORARY CONTROLS

- A. General
 - 1. The temporary controls shall be the responsibility of each Contractor for their respective work unless noted otherwise.
- B. Barriers
 - 1. Provide barriers to prevent unauthorized entry to construction areas for the safety of the public, the protection of the work, and to protect existing facilities and adjacent properties from damage from construction operations.
 - 2. Provide barricades required by agency in 1.4.A for public rights-of-way and for public access to existing building.
 - 3. Provide protection for plant life designated to remain. Replace damaged plant life.
 - 4. Protect all vehicular traffic, stored materials, site, and structures from damage.
- C. Water Control
 - 1. Grade site to drain. Provide, operate, and maintain pumping equipment to maintain excavations free of water.
 - 2. Protect site from running water.
- D. Dust Control
 - 1. Execute Work by methods designed to minimize raising dust from construction operations.
 - 2. Provide positive means to prevent airborne dust from dispersing into atmosphere.
- E. Erosion and Sediment Control
 - 1. Provide Erosion and Sediment Control as indicated on the Drawings and as specified in Section 02270, Erosion Control.
- F. Protection of Installed Work
 - 1. Protect installed Work and provide special protection where specified in individual specification Sections.
 - 2. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
 - 3. Prohibit traffic from landscaped areas.

1.06 CONSTRUCTION FACILITIES

- A. General
 - 1. The construction facilities shall be the responsibility of each Contractor for their

respective work unless noted otherwise.

- B. Access Roads
 - 1. The existing site entrance may serve as the Contractor's temporary construction entrance. The Contractor shall maintain temporary drives as necessary to access public thoroughfares and existing drives to serve the construction area.
 - 2. Provide means of removing mud from vehicle wheels before entering streets.
- C. Parking
 - 1. When site space is not adequate arrange for temporary off-site surface parking areas to accommodate construction personnel.
 - 2. Do not allow vehicle parking in existing right-of-way and to block existing drives.
 - 3. Do not allow vehicle parking on private property without prior approval.
- D. Progress Cleaning
 - 1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - 2. Remove waste materials, debris, and rubbish from site periodically and dispose off-site.
- F. Field Offices
 - 1. Contractor's will be allowed to locate a temporary office trailer at the Project Site. Each office shall be equipped with a phone for use by the Contractor's Superintendent.
 - 2. The Contractor shall provide office facilities for the Engineer and his representative. The office shall have minimum floor area dimensions of 8' x 10', contain windows, cylinder locked door and raised floor. Heating and air conditioning equipment shall be provided. Lighting shall provide a minimum of 50 foot-candles. Provide a minimum of three receptacles. Furniture shall consist of a desk, chair, legal-size four-drawer file cabinet, and drafting board.
 - 3. Office shall include a phone with answering machine.
 - 4. Locate field office as approved by Engineer.

1.07 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, and materials, prior to Final Inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

---END OF SECTION---

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

1.02 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components specified in the Contract Documents for reuse.

1.03 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Fabricated assemblies shall be shipped in the largest sections permitted by carrier regulations and properly marked for ease of field erection.
- C. Promptly inspect shipments to assure that Products comply with specified requirements, quantities are correct, and products are undamaged. Damaged materials shall be segregated from sound goods and tagged and removed from the work site as soon as practicable.
- D. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

- A. Keep on-site storage of material to a minimum.
- B. Store and protect Products in accordance with manufacturer's instructions in unopened original packages, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate-controlled enclosures.
- C. For exterior storage of fabricated Products, place on sloped supports, above ground.
- D. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

- E. Store loose granular Products on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Arrange storage of Products to permit access for inspection. Periodically inspect to assure Products are maintained under specified conditions.
- G. The Contractor shall be responsible for the security of stored materials.

1.05 DAMAGED PRODUCTS

- A. Remove damaged Products from Project site.

1.06 PRODUCT OPTIONS

- A. Products Specified by Reference Standards: Any product meeting those standards.
- B. Products Specified by Naming Three Manufacturers with an "or equal" Provision for Substitutions: Submit a request for substitution for any manufacturer not named as outlined below.
- C. Engineer is the sole judge of equality for proposed "Or Equal" equipment. Should an "Or Equal" item be rejected by the Engineer, the Contractor is responsible for providing the specified equipment without an increase in the Contract Price or Time.
- D. Substitutions will not be considered without separate written request, or when acceptance will require revision to the Contract Documents.

1.07 SUBSTITUTIONS

- A. Engineer will consider requests for Substitutions only within 30 days after date of Owner-Contractor Agreement; however, substitutions cannot be considered prior to or as apart of a bid. A conditional bid must be rejected.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the Substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents. For the preengineered building this may be accomplished by an itemization of requested substitutions with each substitution referencing the applicable specification.

E. Substitution Submittal Procedure:

1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 - PRODUCTS

Not Used

---END OF SECTION---

SECTION 01700
CONTRACT CLOSE-OUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Close-out procedures.
- B. Final cleaning.
- C. Adjusting.

1.02 CLOSE-OUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit set of Record Documents indicating changes during construction as required in Section 01300, Submittals.
- D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and final amount due.
- E. Submit the following with final Application for Payment:
 - 1. Affidavit of Release of Liens
 - 2. Consent of Surety for Final Payment
 - 3. Affidavit of Payment of Debts and Claims
 - 4. Final Certified Payroll Information
- F. Submit warranties as required by individual equipment specifications.

1.03 FINAL CLEANING

- A. Clean Project prior to final inspection. Project clean up shall include, but not be limited to, the following:
 - 1. Clean glass.
 - 2. Clean surfaces exposed to view as recommended by manufacturer.
 - 3. Remove temporary labels.
 - 4. Vacuum carpeted areas.
 - 5. Clean fixtures to a sanitary condition.
 - 6. Clean debris from roofs, gutters, down spouts, and drainage systems.
 - 7. Sweep paved areas
 - 8. Rake clean landscaped surfaces.
 - 9. Remove waste, and surplus materials
 - 10. Remove temporary construction facilities.

1.04 FINAL INSPECTION AND TESTS

- A. When construction is completed and prior to final acceptance, Contractor, in coordination with manufacturer's representatives, shall place equipment in operation and make all necessary adjustments and corrections for proper operation in the presence of the Engineer. Tests shall be made under conditions simulating as nearly as practicable those which will be obtained in operation and shall show conclusively that requirements of the specifications have been fulfilled.
- B. Punch list items must be completed within 30 days of written receipt of list from Engineer or Owner may have the Work performed by others with the cost deducted from Contractor's final payment. Additional engineering and inspection services required as a result of Contractor not completing the punch list within 30 days shall be at the contractor's expense.

1.05 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.
- B. Provide proper fluids in equipment.
- C. Provide proper filters in equipment.

---END OF SECTION---

SECTION 02100
SITE PREPARATION AND EARTHWORK

PART 1 - GENERAL

1.01 SCOPE

- A. Provide all labor, equipment, and material to perform all site preparation and earthwork as specified herein and indicated on the Drawings. The work shall include, but is not limited to, the following:
 - 1. Clearing and grubbing.
 - 2. Topsoil.
 - 3. Excavation for structures.
 - 4. Dewatering for structures.
 - 5. Use of explosives. - Not allowed.
 - 6. Protection of existing service lines and utility structures.
 - 7. Filling and backfilling.
 - 8. Borrow material.
 - 9. Soil Testing.
 - 10. Maintenance and Stability.
 - 11. Grading.
 - 12. Disposal of surplus material.

- B. The Contractor shall examine the site to determine the extent of clearing, grubbing, excavating, rough grading, and related items necessary to complete the work.

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
 - 1. Section 01400 Quality Control
 - 2. Section 02270 Erosion Control

1.03 REFERENCED STANDARDS

- A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
 - 4. American Society of Testing Materials (ASTM)
 - a. D1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-inch Drop.

1.04 DEFINITIONS

1.05 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals:
 - 1. Test Reports: Submit for the following:
 - a. Compaction

PART 2 - PRODUCTS

2.01 MATERIAL

- A. Soil used for structural fill shall be inorganic, cohesive soils having a liquid limit of 40 or less and a plasticity index of at least 7 or granular, cohesionless soil. The material shall not include any rocks larger than 4-inch in diameter or any significant amounts of organics or debris.
- B. Stone Base: Stone base or gravel fill where indicated shall be crushed granite graded from 1-1/2" mesh to 1/2" mesh.

PART 3 - EXECUTION

3.01 GENERAL

- A. Obtain copy of the erosion control plan approved and permit and post at the site.
- B. Locate and protect property corners and survey control stakes prior to start of clearing operations.
- C. Protect existing improvements, vegetation indicated to remain. Repair or replace damaged improvements and vegetation to remain to the satisfaction of the Engineer.
- D. Dispose of excavated material in such a manner that it will not obstruct the water flow, endanger existing improvements and Work in progress, impair the efficiency and appearance of facilities, and be detrimental to the completed work.
- E. Remove excess material from the site.

3.02 PROTECTION OF EXISTING UTILITIES

- A. The approximate location of existing utilities at the site are indicated on the Drawings according to the information available to the Engineer. The Engineer and Owner do not take responsibility for the accuracy of the underground utility information.
- B. The Contractor shall be responsible for investigating the utilities location prior the start of construction.
- C. All damage to existing utilities shall be repaired by the Contractor at no additional cost to the Owner.
- D. A change in conditions may be considered due to the location of the existing utilities as allowed in the General Conditions. This does not include the cost for repair of damaged utilities not properly located by the Contractor in advance of his construction.

3.03 CLEARING AND GRUBBING

- A. The entire area within the construction limit and easements, unless otherwise noted, shall be cleared and grubbed of all trees, stumps, shrubs, debris, and brush.
- B. Grubbing shall consist of the removal of Roots over 2-inches in diameter, matted roots, stumps, and other vegetable matter to 12" below existing ground.

- C. In foundation subgrade areas, the grubbed material shall be removed to 12" below the subgrade.
- D. The cleared and grubbed material shall be removed from the site and properly disposed of by the Contractor at his expense.
- E. Burning of combustible materials is permitted providing the Contractor obtains such permits and approvals required by local authorities. Location of burning shall prevent damage to vegetation or improvements to remain. Attend materials until fire has been extinguished.

3.04 WATER CONTROL

- A. Control surface water which may accumulate in open excavations, unfinished fills, or other low areas.
- B. Prior to excavating beneath the ground water table a dewatering system shall be installed to maintain the water table approximately 2 feet below the bottom of the excavation.
- C. Dewatering shall be maintained until backfilling has proceeded above the natural ground water level and the structural weight is sufficient to prevent "floating" of the structure. The Contractor shall have a man experienced in dewatering work on the job.
- D. When a well point system is to be used, the well point system and well point foreman shall be approved by the Engineer.
- E. Water from dewatering operations must be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.

3.05 USE OF EXPLOSIVES - NOT ALLOWED

3.06 TOPSOIL

- A. Remove topsoil from the areas to be disturbed to an average depth of 6-inches and stockpile separate from other excavated material. Locate topsoil so that the material can be used readily for the finished grading. Protect to prevent sedimentation and maintain topsoil until needed.
- B. After completion of filling, backfilling, and grading, spread topsoil uniformly to a minimum depth of 4-inches over disturbed areas. The topsoil shall be compacted lightly in an approved manner. The finished surface shall conform to the grades, and cross sections indicated on the Drawings and free from dips, bumps, and irregularities in alignment.
- C. The Contractor shall maintain the finished surfaces by protecting, and replacing topsoil as necessary until the area is accepted under the contract.

3.07 EXCAVATION FOR STRUCTURES

- A. Remove rubbish and unsuitable soils from proposed pavement and structure areas.
- B. Excavation carried below the depths indicated, without specific directions, shall be backfilled and compacted as specified herein to the proper grade. In excavations for footings the concrete shall be extended to the bottom of the over excavation. All

additional work caused by the over excavation shall be at the Contractor's expense.

- C. Excavations for Embankments and Under Pavements and Concrete Footings - and Slabs: The entire area of the original ground under embankments and under pavements and concrete footings and slabs shall be excavated to remove all vegetable matter, sod, muck, rubbish, and other unsuitable materials to a depth of 12 inches below the existing subgrade elevation. In the event that it is required to remove unsuitable material to a greater depth than specified, an adjustment in the contract price may be made in accordance with applicable provisions of the General Conditions or the contract unit prices from the Bid Schedule.
- D. Excavations for Embankments, Pavements and Structures: Unsuitable materials shall be excavated to a depth of 12 inches below the existing ground elevations for embankments and the proposed subgrade elevation for pavement, footings and concrete slab areas. In the event that it is required to remove unsuitable material to a greater depth than specified, an adjustment in the contract price may be made in accordance with applicable provisions of the General Conditions of the contract unit prices from the Bid Schedule.
- E. Excavation Below Structures in Which Rock is Encountered: Not Applicable
- F. All excavation shall be made as close to the actual finished lines as possible. Excavation shall be suitably shored, braced, or side sloped in order to prevent danger to persons or structures, injurious slides or cave ins, or erosion. Shoring, bracing, and sheeting, except as otherwise noted, shall be removed as the excavations are backfilled in a manner such as to prevent injurious caving.
- G. Excavation shall be kept free from water while construction therein is in progress.
- H. Furnish, erect, and maintain the required guards and railing at all exposed boundaries of excavation.
- I. The subgrade at the foundation construction level of the new facilities in undisturbed soil (cut sections) should be rolled using a vibratory roller weighing a minimum of 20 tons until settlement from four complete passes does not exceed 1/8 inch. Any soft, uncompactible or unacceptable soils encountered in the subgrade should be replaced with structural fill placed and compacted in accordance with Section 3.09 Filling and Backfilling.

3.08 DEMOLITION AND REMOVAL OF EXISTING STRUCTURES - NOT APPLICABLE

- A. Existing structures indicated on the plans to be removed, at the Contractor's option, may be removed in their entirety or be demolished as follows:
 - 1. Remove all concrete within 2 feet of new finished grade.
 - 2. Remove the existing structure in its entirety.
- B. Fill basins caused by structure removal in accordance with 3.09 Filling and Backfilling.

3.09 FILLING AND BACKFILLING

- A. General: All fill and backfill shall be free from roots, wood scrap material, and other vegetable matter and refuse. Fill and backfill shall be placed in layers not more than 8 inches thick loose or 6 inches thick compacted layers, except as specified otherwise herein, and each layer shall be compacted thoroughly and evenly.

- B. Stone Base: All structures shall have a compacted crushed stone subgrade to the depth of 12-inches, except the Slabs which shall have a stone subgrade of 4-inches unless otherwise noted.
- C. Structures, Embankments and Asphalt and Gravel Roadways: Backfill about structures shall be placed, as far as practicable, as the work of construction progresses. Backfilling against concrete shall be done only when directed. Compaction shall be not less than 95% of maximum density Standard Proctor Method as described by ASTM D698.
- D. Concrete Slabs and Pavements: Fill and/or backfill under pavement and under concrete floor slabs shall be compacted to not less than 98% of the maximum density at optimum moisture content as determined by ASTM Method D-698 Standard Proctor Method, except where otherwise indicated.
- E. Other Fill: All other fill and backfill unless otherwise noted shall be compacted to at least 90% of the maximum density at optimum moisture content Standard Proctor Method.
- F. Stone Base: Stone base or gravel fill where indicated shall be Aggregate Base Course.

3.10 BORROW MATERIAL

- A. Fill will be required to construct the work shown on the plans and to bring the fill areas to the elevation shown. The borrow material site shall be as shown on the plans. The Contractor shall transport borrow materials to the construction site and provide testing to insure a suitable material is used.
- B. The borrow area shall be stripped of all topsoil which shall be stored for respreading after borrow activities are complete. The borrow pit shall be left in a neat condition as approved by the Engineer, with bottom approximately level. Borrow area shall be graded to drain.
- C. Soil samples shall be obtained from proposed borrow pits and the analysis of same delivered to the Engineer for his approval prior to placing borrow material. The Contractor shall do all necessary work to bring the borrow material to within plus or minus 1-1/2% of the optimum moisture content. A minimum of one sample per structure shall be obtained for analysis.
- D. All cost of this work shall be included in the lump sum price bid.

3.11 SOIL TESTING

- A. Provide the services of a soil testing firm as specified in Section 01400. Quality Control.
- B. The testing laboratory soil specialist, as a minimum, shall be at the project site for the following:
 1. Monitor excavation for the separation and wasting of unacceptable soils.
 2. Provide a minimum of one (1) in-place density test for every 500 sq ft of subgrade area underneath the proposed floor slabs of the tipping floor, truck loading bay scale areas, and office building for each structure prior to the start of the structure foundation.
 3. At all times while filling activities are in progress for structures and roads. Provide a minimum of one (1) in-place density test for every 1,200 sq ft of lift with a minimum of one (1) test for every lift for the turning slab and the roadways both gravel and asphalt.

4. Monitor for settlement due to construction activities during excavation work adjacent to existing [filter and control] building.]
- C. All compaction tests shall be made in accordance with ASTM D-698, Standard Proctor Method.
- D. All test reports and soil specialist daily logs shall be submitted in accordance with Section 01400, Quality Control.
- E. Based on test results, the Contractor shall make corrections, adjustments, and modifications of methods, materials, and moisture content for proper construction of the fills and embankments.
- F. The Contractor shall be responsible for verifying the soil bearing capacity for structure foundations where proof rolling is not possible. He shall arrange and pay for a minimum of one (1), three foot deep penetrometer test and subsequent bearing capacity evaluation per 500 sf of structure footprint by the soil testing firm.

3.12 MAINTENANCE AND STABILITY

- A. The Contractor shall be responsible until final acceptance of the entire project for the stability of all embankments made under the contract and shall replace at his own expense any portion which has become displaced or damaged. Embankments shall be maintained to the grade and cross section indicated until the final completion and acceptance of the project.

3.13 GRADING

- A. The Contractor shall perform all grading in the areas so indicated. Fill shall be brought to finished grades indicated and shall be graded to drain water away from structures. The entire area within the new construction and the existing plant area shall be graded to provide proper drainage and to provide surfaces suitable for the proper use of mowing machines.

3.14 DISPOSAL OF SURPLUS MATERIAL

- A. Surplus material not required or unsuitable for filling, backfilling, or grading shall be disposed of at the Contractor's expense in an approved spoil area in accordance with local ordinances.

---END OF SECTION---

SECTION 02221

EXCAVATING, BACKFILLING & COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.01 SCOPE

- A. Provide all labor, equipment, and material to perform all excavating, backfilling, and compacting for utilities and related structures as specified herein and indicated on the Drawings. The work shall include, but is not limited to, the following:
 - 1. Clearing.
 - 2. Excavating.
 - 3. Dewatering.
 - 4. Use of explosives.
 - 5. Protection of existing improvements.
 - 6. Filling and backfilling.
 - 7. Borrow material.
 - 8. Soil Testing.
 - 9. Maintenance and Stability.
 - 10. Disposal of surplus material.
- B. The Contractor shall examine the site to determine the extent of clearing, excavating, and related items necessary to complete the work.

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
 - 1. Section 01400 Quality Control
 - 1. Section 02270 Erosion Control
 - 2. Section 15130 Pipe Installation

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 GENERAL

- A. Obtain copy of the grading permit and post at the site.
- B. Locate and protect property corners and survey control stakes prior to start of clearing operations.
- C. Protect existing improvements, trees and other vegetation indicated to remain and outside of the utility/construction easement. Repair or replace damaged improvements and vegetation to remain to the satisfaction of the Engineer.

- D. Dispose of excavated material in such a manner that it will not obstruct the flow of runoff, streams, endanger a partly finished structure, impair the efficiency or appearance of existing facilities, or be detrimental to the completed work.
- E. Remove excess material from the site.

3.02 PROTECTION OF EXISTING UTILITIES

- A. No known utilities exist at the work site except the new access road connections to SR 1601.
- B. The Contractor shall be responsible for investigating the utilities location prior the start of construction. Prior to excavating in proximity of existing utilities, notify the appropriate utilities.
- C. All damage to existing utilities shall be repaired by the Contractor at no additional cost to the Owner.
- D. A change in conditions may be considered due to the location of the existing utilities as allowed in the General Conditions. This does not include the cost for repair of damaged utilities not properly located by the Contractor in advance of his construction.
- E. Separation distances shall be in accordance with utilities requirements.

3.03 CLEARING AND GRUBBING

- A. Disturb only those areas required to install the erosion control devices and piping as indicated on the Drawings and specified in Section 02270.
- B. The entire area within the permanent easements and as necessary within the construction easement and right-of-ways, unless otherwise noted, shall be cleared of all trees, stumps, shrubs, debris, and brush.
- C. The cleared material shall be removed from the site and properly disposed of by the Contractor at his expense.
- D. Burning shall not be permitted at the site.
- E. Restore all disturbed areas to a neat and clean condition and produce a stand of grass prior to final acceptance of the work.

3.04 PROTECTION

3.05 WATER CONTROL

- A. Prevent surface water from flowing into trenches.
- B. Prior to excavating beneath the ground water table a dewatering system shall be installed to maintain the water table approximately 1 foot below the bottom of the trench.
- C. Dewatering shall be maintained until backfilling has proceeded above the natural ground water level. The Contractor shall have a man experienced in dewatering work on the job. All costs of dewatering of trenches shall be included in the bid price for the Work.

- D. When a well point system is to be used, the well point system and well point foreman shall be approved by the Engineer.
- E. Water from dewatering operations must be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.

3.06 USE OF EXPLOSIVES

- A. Explosives are not allowed on this project.

3.07 TRENCH EXCAVATION

- A. Pipe lines are shown as near as possible to where they should be constructed. The Engineer will cooperate with the Contractor in changing the alignment where the effect on the Owner will be negligible.
- B. Unless otherwise indicated on the Drawings or specified, excavation shall be by open cut except that short sections of a trench may be tunneled if, in the opinion of the Engineer, the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections. Trenches shall be of the depths and widths indicated on the Drawings and specified.
- C. Accurately grade trench bottom to provide uniform bearing for the full length of each pipe section on undisturbed soil or prepared bedding, where appropriate. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and only of such length, depth, and width as required for properly making the particular type of joint.
- D. Do not over excavate. All excavation below grade without authorization from the Engineer shall be refilled with crushed rock at the Contractor's expense.
- E. The maximum trench clear width at the top of the pipe shall be not more than three feet greater than the pipe outside diameter, except by approval of the Engineer. The banks of the trench, above the top of the pipe, should be as nearly vertical as practicable. The trench walls shall be suitably shored, braced, or laid back to a stable slope in order to prevent danger to persons or structures from slides or cave-ins. Shoring, bracing, and sheeting except as otherwise noted shall be removed as the trench is backfilled. The Engineer shall have the authority to require that the sheeting be left in place at no cost to the Owner.
- F. All excavated material shall be piled in a manner that will not endanger the work.
- G. Excavation of trenches shall not advance more than 300 feet ahead of the completed utility installation except as approved by the Engineer. In no case should the excavation extend beyond that which can be backfilled by the end of the work day.
- H. If unstable soil conditions are encountered, this condition shall be corrected by one of the following methods:
 - 1. Excavate below grade as directed by the Engineer and refill with coarse sand, fine gravel or crushed rock, or other suitable approved material at unit price bid or the cost to be included in pipe unit bid price as indicated in Section 01150, Basis for Measurement and Payment.
 - 2. Provide piling and/or timber cradles in a manner approved by the Engineer. This will be paid for as extra work.

I. Rock Excavation - Not Applicable

1. Wherever excavation is in rock, the rock shall be removed to a depth of at least 4" below the pipe for pipes smaller than 30" diameter and 6" for pipes of 30" diameter and larger. Before laying the pipe, the trench shall be refilled to grade with coarse sand thoroughly compacted to provide proper bedding for the pipe. Loose earth or other material may be used in lieu of the sand for bedding with the Engineer's approval.

J. Trench Excavations for Pressure Lines:

1. Excavate trenches to provide vertical curve chords which will not exceed the permissible deflection of each pipe joint, as recommended by the pipe manufacturer.
2. Provide concrete thrust blocks having a compressive strength of 2500 psi at 28 days at each change in horizontal and vertical direction and reduction in the pipe size. Cut the trench sides vertical and square to receive the concrete as indicated. The bearing area against the trench wall shall be as indicated.
3. The profiles, where shown on the plans, are plotted to straight grades.

K. Trench Excavation for Gravity Lines:

1. Excavate trenches in straight lines between structures.
2. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe line. The exterior of the pipe for not less than 17% of its circumference shall be bedded in an earth foundation of uniform density. The material used for bedding of pipe shall be suitable selected material, as approved by the Engineer.

3.08 SHORING AND SHEETING

- A. All shored trenches shall be braced at intervals as close as necessary for safety but in no case more than 5 feet. Shoring and sheeting for trenches under 8 feet deep shall be full two inches thick and three inches thick for deeper trenches.

3.09 CRUSHED ROCK

- A. Crushed rock as called for shall be pea gravel, bank run gravel, crushed stone or similar material. Ninety percent shall be retained on No. 8 sieve and 100% shall pass a 1/2 min. sieve, well graded between those limits.
- B. Compaction shall be to 95% of maximum dry density.

3.10 EXCAVATION FOR MANHOLES

- A. General: Manhole excavation shall be taken a minimum of 6 inches below the subgrade required and backfilled with crushed rock compacted to 95% maximum density. If the soil conditions are found to be unsuitable for structural stability of the manhole, the Engineer may require more depth to the stone.

3.11 BACKFILL AND COMPACTING

A. General:

1. Backfill shall not be made without the approval of the Engineer. Trenches shall be

- backfilled for the full trench width promptly after the pipe installation has been inspected and the installation accepted.
2. Trenches shall be backfilled to the ground surface with selected excavated material or other material suitable for the specified compaction and as hereinafter specified. If the material from the excavation is not suitable to obtain the desired compaction, the Contractor shall be responsible to obtain suitable off-site borrow material to be used for backfill at his own expense.
 3. Trenches improperly backfilled shall be re-opened to the depth required for proper compaction, then refilled and compacted as specified, or the condition shall be otherwise corrected as permitted by the Engineer.
 4. Backfilling shall be kept within a reasonable distance of the pipe laying, but in no case, greater than 400 feet from the laying operation.
 5. Contractor shall provide all necessary tamping equipment, and water as necessary for raising the moisture content of the backfill to provide the specified compaction.
 6. Backfill in pipe zones:
 - a. Backfill in the pipe zone, around and over the pipe, shall be with material approved by the Engineer. The material shall consist of earth, sandy clay, sand and gravel, soft shale or other materials, and free from material larger than 2-inches in any dimension.
 - b. The pipe zone backfill shall be placed in 6-inch maximum layers and compacted with suitable tampers to 95% density until there is cover of not less than 1-1/2 feet over the top of the pipe.
 - c. Backfill under the haunches of the pipe shall be placed in such a manner as to avoid injury to the pipe or alignment.
 7. Backfill in remainder of trench:
 - a. The remainder of the trench shall be backfilled with materials free of stones and debris larger than 6-inches in any dimension. Backfill material shall be deposited in layers not exceeding the thickness and compacted to the minimum density specified below.
 - b. Trench backfilled with non-cohesive materials may be compacted with water flooding; except under roadways, shoulders of roadways, and other areas subject to vehicular movement, provided the method of compaction is approved by the Engineer and provides the degree of compaction required.
 - c. The operation of heavy equipment above the pipe installation shall be conducted so that no damage to the pipe will result.
 8. Lifts and density required from 1-1/2 feet above the top of the pipe:
 - a. Undeveloped areas (i.e., forests, fields, and, croplands): The trench may be filled with bulldozer blade provided there is no rock, clods or other material that might injure the pipe. The earth shall be mounded over the trench area sufficiently to settle level over time. Degree of compaction shall be 85%.
 - b. Lawns: The trench shall be filled in 12-inch layers and compacted to 90%. The top 12" shall be free of all material with a dimension over 2-inches.
 - c. Roads (including all the area within the Right-of-way), drives, parking areas (including all areas within 20 feet), and adjacent to existing utilities: The trench shall be filled in 6-inch layers compacted 95% of ASTM 698 maximum density.
 - d. Within 20 feet of foundations: The trench shall be filled in 6-inch layers compacted 95% of ASTM 698 maximum density.

3.12 CUTTING AND REPLACEMENT OF PAVEMENT

- A. General: All pavement structures damaged during the conduct of this contract shall be repaired as specified.

- B. Cutting: Existing pavements cut for the installation of pipe lines shall be removed to neat lines and disposed of at the Contractor's expense.
- C. Flexible Pavements: Replacement of flexible pavements shall be made with a base course and bituminous surface course similar in all respects to that removed and as detailed on the drawings, and the finished pavement patch shall be equal to the adjoining pavements.
- D. Rigid Pavements: Where open excavations cross existing rigid surfacing, the surfacing shall be removed for the trench width of the anticipated plans one foot on each side to allow the replacement pavement to bear on a minimum of 12" undisturbed soil. The pavement shall be saw cut to ensure a straight joint. The surface replacement shall match the existing surfacing except where otherwise indicated.
- E. Curbs, Gutters, and Sidewalks: Curbs and gutters removed or damaged shall be replaced with similar sections to match the adjoining. No separate payment will be made for this work. All costs involved shall be included in the price for installation of the particular pipe line.
- F. Private Drives: Private driveways cut by the Contractor shall be replaced with the same type surface as the existing and shall be graded to match and tie into the existing in every respect.

3.13 SOIL TESTING

- A. Should the Owner elect to have density tests performed, the initial tests will be paid for by the Owner subsequent remedial testing shall be paid for by the Contractor. The Contractor shall arrange both initial and follow-up remedial testing at the Engineer's request using the same Geotechnical Consultant who performed density tests for foundations.
- B. All density tests shall be made in accordance with ASTM D-698, Standard Proctor Method.
- C. All test reports and soil specialist daily logs shall be submitted in accordance with Section 01400, Quality Control.
- D. All compaction tests shall be made field controlled and reported in accordance with ASTM D-2167, Modified Proctor Method.
- E. Based on test results, the Contractor shall make corrections, adjustments, and modifications of methods, materials, and moisture content for proper trench compaction.

3.14 GRADING AND CLEAN-UP

- A. General:
 1. Provide for testing and clean-up as soon as practicable, so these operations do not lag far behind the pipe installation. Perform preliminary clean-up and grading as soon as backfilling operations are complete.
 2. All finished surfaces are to provide adequate drainage. The finished surface shall be reasonably smooth, compacted, free from irregular surface changes and comparable to the smoothness of the adjacent surfaces.
 3. Surfaces shall be sloped to drain away from structures.
 4. All existing grassed or seeded areas damaged by the Contractor shall be replaced with the same type of grass as the adjoining area without additional cost to the

Owner. The Contractor at his option may seed such areas and maintain them until a satisfactory stand of grass is obtained or may sprig or sod the areas to obtain the same result. A repaired area shall be considered satisfactory when a stand of grass has been obtained and is growing vigorously. The Contractor shall provide lime and fertilizer as may be required and water for maintaining the areas until accepted by the Engineer.

5. Upon completion of backfilling operations, all excess earth, broken pavement, rock, shoring and other materials and debris resulting from the operations shall be removed from the work areas and disposed of by the Contractor. Contractor shall find his own disposal areas and bear all costs arising from the disposal of this excess material and debris.

---END OF SECTION---

SECTION 02250
STORM DRAINAGE PIPING

1.01 GENERAL REQUIREMENTS

The work hereunder includes provision of storm sewer piping as may be required to provide a complete storm drainage system as indicated and specified herein.

1.02 REFERENCE SPECIFICATIONS

Except as indicated and specified other-wise herein, the following sections of the N.C. D.O.T. "Standard Specifications for Roads and Structures" shall govern the work.

<u>Section No.</u>	<u>Title</u>
300	Pipe Installation
310	Concrete Pipe Culverts
810	Pipe Removal
825	Incidental Concrete Construction - General
1032	Culvert Pipe

1.03 PIPE INSTALLATION

Pipe installation shall be to the lines and grades indicated and complete with the inlets and outlets indicated in accordance with Section 300 of N.C. D.O.T. Standard Specifications and the manufacturer's recommendation.

1.04 STORM DRAINAGE PIPE AND STRUCTURE REMOVAL

Existing storm drainage pipe and related structures, as shown on the plans, shall be removed and disposed of by the Contractor. Suitable backfill material shall be placed and compacted properly in the void created by the removal of the existing pipe or structures. The provisions of any off-site borrow material necessary for backfilling removed pipes and related structures shall be included in the unit bid price for the removed pipe or structure. Storm drainage removal shall be in accordance with Section 810 of the N.C. D.O.T. Standard Specifications. Existing storm drainage piping shall be removed in a manner to minimize damage to the pipe. Pipe removal if needed for the new entrance road construction shall be included in the lump sum price for Unclassified Excavation.

1.05 STORM DRAINAGE PIPE

Reinforced Concrete Pipe:

1. Reinforced concrete pipe and reinforced concrete flared end sections shall be in accordance with Section 1032, part 1, of the N.C. D.O.T. Standard Specifications.
2. Joints shall be either N.C. D.O.T. Standard tongue and groove mortar-type or Revlor gasket at Contractor's option.
3. Reinforced concrete pipe shall be manufactured by N.C. Products, Hydro Conduit, or an approved equal.

4. Certificate of Compliance: The Contractor shall furnish to the Engineer a certificate from the pipe manufacturer that the pipe and accessories comply with all requirements of the specifications.

---END OF SECTION---

SECTION 02270
EROSION CONTROL

PART 1 - GENERAL

1.01 SCOPE

- A. Provide all labor, and materials to perform the erosion control work indicated on the Drawings and specified herein.
- B. Work Included in This Section:
 - 1. Soil erosion and sedimentation control shall be provided by the Contractor for all areas of the sites that are disturbed.
 - 2. Contractor shall provide temporary ground cover as soon as possible, and no later than 30 working days after completion of the construction phase of any specific area. This shall include (but shall not be limited to) temporary grass seeding,
 - 3. Contractor shall have full responsibility for construction, maintenance, and removal of sedimentation control facilities.
 - 4. Make necessary arrangements to ensure adequate water supply to meet needs of work of this section. Furnish necessary hose equipment, pumps, attachments, and accessories for adequate irrigation of seeded areas.

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
 - 1. Section 02930 Seeding

1.03 REFERENCED STANDARDS

- A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. References: Some products and execution are specified in this section by reference to published specifications or standards of the following (with respective abbreviations used).
 - 1. American Association of State Highway Officials (AASHO).
 - 2. The American Society for Testing and Materials (ASTM).
 - 3. Association of Official Agricultural Chemists (AOAC).
 - 4. North Carolina Department of Transportation (NCDOT).
 - 5. U.S. Department of Agriculture (USDA).
- C. Standard Guides:
 - 1. "Guide for Sediment Control on Construction Sites in North Carolina", issued by USDA, Soil Conservation Service.
 - 2. "Standard Specifications for Roads and Structures", (latest Edition), as published by the NC Dept. of Transportation. These standard specifications are referred to hereinafter as SSRS.

1.04 QUALITY ASSURANCE

- A. The erosion control shall conform with the rules and regulations of the Erosion Control Laws of the State of North Carolina, specifically the Sedimentation Pollution Control Act of 1973 (G.S. 113A) as amended, and the local jurisdiction where the project is located.
- B. Post a copy of the grading permit at the site prior to starting work. Grading permit to be furnished by Owner. Maintain a copy of the approved erosion control plan at the site.
- C. After installing the soil erosion control devices as indicated on the Drawings and specified herein, the Contractor shall assure himself that all reasonable measures possible have been taken to prevent the sedimentation of nearby water courses, existing and new facilities, and adjacent property.

Note: Specifier shall choose one of the following paragraphs.

- D. Should the Contractor believe additional measures are necessary, he shall be responsible for the construction of the additional measures, and all costs shall be at the expense of the Contractor.
OR
- D. Should the Contractor believe additional measures are necessary, he shall immediately notify the Owner and Engineer. If rain is predicted before the Owner and Engineer can be notified, the Contractor shall take measures as he deems necessary to prevent the siltation of nearby water courses and will be paid for such work as provided in the General Conditions of this contract.
- E. The Contractor shall be liable for all damages to public and private property and fines as may be placed on the project by the governing agencies due to failure to provide adequate erosion control devices.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. The equipment and material shall be handled in accordance with Section 01600 Material and Equipment.
- B. Seed packages shall bear a guaranteed analysis by a recognized authority. Packages for soil conditioners and plant foods shall bear manufacturer's guaranteed analysis.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Water: Water shall be free from oil, acid, alkali, salt, and other substances harmful to growth of grass.
- B. Seed: Variety of grass for temporary grassing shall conform to Section 02930, SEEDING.
- C. Mulch: Threshed straw of oats, wheat, or rye; free from seed of obnoxious weeds; or clean salt hay. Straw which is fresh and excessively brittle or straw which is in such an advanced stage of decomposition as to smother or retard growth of grass will not be acceptable.
- D. Matting/Erosion Control Fabric (ECF): Matting and/or ECF shall be heavy jute mesh over

mulch held in place by staples. Commercially available ECFs may be used upon approval of the engineer. Approval of fabrics will require manufacturer's design data regarding velocity, ditch slopes, method of installation, decay cycle, repair techniques, and grass growth enhancement characteristics.

- E. Hay Bales: Well bound straw or hay conforming to requirements of mulch herein before.
- F. Wire Staples: 16 gauge steel wire, with minimum of 3" top and 4" long legs.
- G. Gravel for Stone Filters: Crushed stone, graded so that all stone will pass a 1-1/2" screen, and will be retained on a 3/4" mesh screen.
- H. Silt Filter: 7-1/2 oz. burlap fabric or other silt filtering fabric.
- I. Tack: Asphaltic spray as required to hold mulch.

PART 3 - EXECUTION

3.01 GENERAL

- A. Standards: Work shall conform to requirements of the Contract Documents and the Guide issued by the USDA as referenced.

Note: The following paragraph is required by State Revolving Fund (SRF) checklist.

- B. Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
- C. Clear only those areas required to install the soil erosion control devices, which shall be in place and operational prior to all other land disturbing activity. Additional measures shall be constructed as required during the construction.
- D. Construct temporary and permanent erosion control measures as indicated on the Drawings and specified herein. All permanent erosion control work shall be incorporated into the project at the earliest practicable time. Temporary erosion control measures shall be coordinated with permanent erosion control measures and all other work on the project to assure effective and continuous erosion control throughout the construction and post construction period.
- E. After installation of the erosion control devices, request an inspection by the local agency having a jurisdiction and the Engineer.
- F. All erosion control devices shall be maintained during construction until the disturbed areas are stabilized and the agency having jurisdiction and the Engineer has approved the removal of the erosion control devices.

3.02 PROTECTIVE MEASURES

- A. The following measures are listed as a guide for the protection of existing structures and facilities and for the protection of subsequent disturbed earth areas.
 - 1. Construction and devices for sedimentation and erosion control are shown on the

- drawings.
2. Silt Check Fence: Hog wire or wire mesh stapled to posts and covered with burlap or other silt filtering fabric.
 3. Mulching: Mulching shall be used to prevent erosion and to hold soil and seed in place during the establishment of vegetation.
 4. Matting: Matting shall be used for temporary stabilization during the establishment of permanent cover on problem areas such as future grassed ditches, channels, long slopes, and steep banks.
 5. Tack: Tack shall be used to prevent disruption of mulch where required.

3.03 MAINTENANCE

- A. Inspect all erosion control devices after each rainfall. Make all required repairs immediately. Remove sediment deposits when deposits reach approximately one-half of the capacity of the erosion control device.
- B. Respread accumulated sediments on the project site in a manner that will not adversely affect erosion control facilities and permanent ground cover.
- C. Silt Fence: Should the filter fabric decompose or become ineffective before approval of its removal by the Engineer, the fabric shall be replaced immediately at no additional cost to the owner.
- D. Temporary Construction Entrance: The entrance shall be maintained in a condition which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with 2-inches of stone, as conditions require, at no additional cost to the Owner.

3.04 TEMPORARY SEEDING

- A. Variety of seed, rate of application, and time for use of specified variety shall comply with Section 02930, SEEDING.
- B. Prepare soil by disking lightly to establish approximate permanent grade. Remove large roots, debris, and stones 1-1/2" in diameter or larger.
- C. After rough grading has been completed and before topsoil is spread, apply soil conditioner as specified in Section 02930, SEEDING.
- D. Scarify ground thoroughly to a minimum depth of 4". Mix materials thoroughly with rototiller in two directions, at right angles.
- E. Where required, apply topsoil. Rake topsoil to a uniform grade so that all areas will drain properly. Compact tightly with a cultipacker before distributing grass seed.
- F. Sow seed evenly with a mechanical spreader at the rate required for the specific variety in Section 02930, SEEDING. Roll with a cultipacker to cover seed, and water with a fine spray. Method of seeding and rate may be varied at the discretion of Contractor on his own responsibility to establish a smooth, uniformly grassed area.

3.05 MULCHING AND MATTING

- A. Apply mulch or matting as required to retain soil and grass, but no less than the following:

1. Slopes from 5% to 20% by spreading a light cover of mulch over seeded area at the rate of not less than 85 lbs. per 1000 sq. ft.
2. Slopes greater than 20% mulch with matting. Pin matting to the ground with wire staples at 5-foot intervals, immediately after seeding.

3.06 SILT FENCE

- A. Install as shown on the "Standard Detail."

3.07 STABILIZATION AND CLEAN-UP

- A. Remove all erosion control devices upon the approval of the permanent stabilization of this site by the agency having jurisdiction of the area and the Engineer. All sediment deposits remaining in place after the erosion control devices are removed shall be dressed to conform with the existing grade, prepared and seeded. The cost of removal and cleanup shall be included in the cost of the installation of the device.

---END OF SECTION---

SECTION 02500
PAVEMENT AND CURB

PART 1 - GENERAL

1.01 SCOPE

- A. Provide pavement, curb and gutter, and sidewalk sections as indicated on the Drawings and specified herein. Construction shall conform with the lines, grades, thickness, and typical cross-section indicated on the Drawings.

1.02 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
 - 1. Section 02100 - Site Preparation and Earthwork

1.03 REFERENCED STANDARDS

- A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
 - 1. N. C. Department of Transportation - Standard Specifications for Roads and Structures (NC DOT).
- B. In all cases references to Basis for Payment in the NCDOT Specifications shall be deleted in favor of the Basis for Payment in Section 01150. Refer to the bid and Section 01150 for Basis for Payment.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals:
 - 1. Certificates of Compliance: Certificates shall attest that supplied products conform to the referenced standard and this specification. That all tests set forth in each applicable referenced publication have been performed and that all test requirements have been met. Submit for each of the following materials:
 - a. Bituminous Concrete
 - b. Aggregate Base Course

1.05 PROTECTION OF EXISTING PAVEMENT, CURB AND GUTTER, AND SIDEWALK

- A. The existing pavement, curb and gutter, and sidewalks at the site are in good condition. Contractor, Owner, and Engineer shall inspect the entire site prior to the start of construction and mark existing damaged areas and note areas on Contractor's plan set to be used for the As-Built drawings.
- B. Protect existing pavement, curb and gutter, and sidewalks during construction.

- C. Remove areas of existing curb and gutter, and sidewalks damaged during construction. Removal shall include to the nearest existing joint. Replace damaged areas with new curb and gutter, and sidewalks to match the existing section.
- E. Remove areas of existing pavement damaged during construction. New pavement patch shall consist of re-stabilizing the subgrade, and providing 10-inches of ABC, 3-inches of HB, and 2-inches of HDS asphalt to match existing pavement surface.
- F. Cost of repairing damaged pavement and curb shall be at the Contractor's cost.

PART 2 - PRODUCTS

2.01 MATERIALS AND MIXES

- A. Bituminous Concrete Base Course - Type HB: The Type HB base course shall comply with NC DOT specification Section 630, Bituminous Concrete Base Course, Type HB.
- B. Tack Coat: Conforming to materials and compositions required in NC DOT specifications Section 605, Bituminous Tack Coat.
- C. Bituminous Concrete Surface Course - Type HDS: Conforming to materials and composition required in NC DOT specifications Section 645, Bituminous Concrete Surface Course, Types I-1 and I-2, and HDS.
- D. Concrete for Curb: Conforming to materials and composition required in NC DOT specifications Section 846, Concrete Curb, Curb and Gutter, and Gutter, and Section 848, Concrete Sidewalks and Driveways.
- E. Base Course: Aggregate base course shall comply with requirements of NC DOT Section 520, Aggregate Base Course.

PART 3 - EXECUTION

3.01 PREPARATION OF SUBGRADE

- A. Refer to applicable portions of Section 02100.
- B. Compaction shall be to at least 95% maximum density Standard Proctor Method.
- C. Remove unsuitable material to a depth of one foot and replace with an approved material. Loosen exceptionally hard spots and re-compact. Finish subgrade to provide uniform bearing surface.
- D. Maintain subgrade in satisfactory condition and properly drain until surface courses are placed.
- E. Preparation, shaping, and compaction shall be in accordance with NC DOT specifications Section 500, Fine Grading Subgrade, Shoulders, and Ditches.

3.02 AGGREGATE BASE COURSE

- A. This applies to both the aggregate base course as indicated on the Drawings for paved and unpaved roads.
- B. The stone base shall be constructed in accordance with the applicable paragraphs of NC DOT specifications, Section 520.
- C. Compacted base shall be of the thickness indicated on the Drawings.

3.03 BITUMINOUS CONCRETE BASE COURSE - TYPE HDS

- A. Spreading, compaction, and finishing shall comply with the requirements of NC DOT specifications Sections 610, Bituminous Plant Mix - General, and Section 630.

- B. Compacted thickness shall be no less than the thickness indicated on the Drawings and Bid Form.

3.04 BITUMINOUS CONCRETE SURFACE COURSE

- A. Spreading, compaction, and finishing shall comply with the requirements of NC DOT specifications Sections 610 Bituminous Plant Mix - General, and Section 645.
- B. Compacted thickness shall be as indicated on the drawings.

3.05 TACK COAT

- A. Application rates, method of application, and curing shall be in accordance with the requirements of NC DOT specification Section 605.

3.06 CONCRETE CURB

- A. Provide concrete curb where indicated on the Drawings. Curb shall conform to the section indicated on the Drawings.
- B. Curb and Gutter shall be installed in accordance with NC DOT specifications. Section 846.

---END OF SECTION---

SECTION 02930

SEEDING

PART 1 - GENERAL

1.01 SCOPE

- A. All disturbed areas of exposed earth shall be filled, leveled, disked, fertilized, and seeded to produce a stand of permanent grass.
- B. A grassed area shall be considered established when it presents a green appearance from eye level 50 feet away and the grass is vigorous and growing well in each square foot of seeded area. It is not required that the seeded area be thick and heavy as an old established lawn.

1.02 REFERENCED STANDARDS

- A. N.C. Department of Agriculture - NCDA
- B. U.S. Department of Agriculture - USDA

1.03 QUALITY ASSURANCE

- A. The quality of all fertilizer, lime, and seed, and all operations in connection with the furnishing of this material, shall comply with the requirements of the N.C. Fertilizer, Lime and Seed Law; and with the requirements of the rules and regulations adopted by the NC Department of Agriculture in accordance with the provisions of the said law.
- B. All seed containers shall bear an official "Certified Seed" label as inspected by the N.C. Crop Improvement Association.

1.04 SUBMITTALS AND TESTS

- A. Not less than 6 weeks prior to seeding, the Contractor shall obtain representative soil samples from the areas to be seeded and deliver the properly packaged samples with an information sheet for each sample properly filled out to the Soils Division of the NC Department of Agriculture or a private laboratory. Based on the test results, the Contractor shall submit to the Engineer a recommendation as to the quantity and type of lime, fertilizer and seed for the area covered by the test.

1.05 METHOD OF PAYMENT

- A. The Contractor shall estimate his costs and base his bid for the work on the quantities of lime, fertilizer, and seed specified herein. After the specified soil tests have been made, the Engineer may vary the specified quantities. Should the actual quantities applied in the field vary appreciably from those specified, an adjustment in the contract price may be made.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lime: Ground Dolomitic agricultural limestone, not less than 85% total carbonates, ground so that 50% passes 100 mesh sieve and 90% passes 30 mesh sieve. Coarser material will be acceptable, provided the specified rates of application are increased proportionately on the basis of quantities passing No. 100 mesh sieve, and at no additional cost to the Owner.
- B. Fertilizer: Mixed, commercial, fertilizer containing 10-10-10 percentages of available nitrogen, phosphoric acid, and potash respectively, plus superphosphate with 20% P₂O₅ content. Fertilizer shall be dry, in granular (pellet) form, shall be delivered to the site in the manufacturer's original bag or container which shall be plainly marked as to formula.
- C. Seed: Fresh seed guaranteed 95% pure with a minimum germination rate of 85% within one year of tests. The mixture of seed in all disturbed areas including NCDOT Rights-of-Way shall be the following:
 - 1. Temporary Seeding

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
Feb. 15 - May 15	Rye (Grass)	120
	Korean Lespedeza	50
May 15 - Aug. 15	German Millet	40
	or Sudangrass	50
Aug. 15 - Dec. 15	Rye (Grass)	120
	Lime	3,000
	Fertilizer	800
	Mulch	4,000

2. Permanent Seeding

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
July 25 - Sep. 15 & Mar. 1 - May 10	Tall Fescue	100
	Sericea Lespedeza	20
Mar. 1 - May 10	Korean Lespedeza	10
	Red Top	5
	Kentucky Bluegrass	5
Lime Fertilizer Mulch		4,000
	10-10-10	1,000
	Straw	5,000

Note: The following seeding is for the Piedmont Region on gentle slope with average soils for low maintenance.

1. Temporary Seeding

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
Jan. 1 - May 1	Rye (Grass)	120
	Korean Lespedeza	50
May 1 - Aug. 15	German Millet	40

	or	
	Sudangrass	50
Aug.15 - Dec. 30	Rye (Grass)	120
Lime		3,000
Fertilizer	10-10-10	800
Mulch	Straw	4,000

2. Permanent Seeding

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
Aug. 25 - Sep. 15	Tall Fescue	80
&	Kobe Lespedeza	40
Feb. 1 -Mar.21		
Lime		4,000
Fertilizer	10-10-10	1,000
Mulch	Straw	4,000

Note: The following seeding is based on the seeding schedule required by Wake County.

1. Permanent Seeding (Maximum slope 3:1)

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
Aug. 15 - Nov. 1	Tall Fescue	300
Nov. 1 -Mar. 1	Tall Fescue	300
&	Abruzzi Rye	25
Mar. 1 - Apr. 15	Tall Fescue	300
Apr. 15 - Jun. 30	Hulled Common	25
	Bermudagrass	
Jul. 1 - Aug. 15**	Tall Fescue	120
&	Browntop Millet	35
&	Sorghum-Sudan Hybrids	30
Lime		4,000
Fertilizer	10-10-10	1,000
Mulch	Straw	4,000

** Temporary seeding, reseed according to optimum season for permanent seeding.

2. Permanent Seeding (Slopes from 3:1 to 2:1)

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
Mar 1 - June 1	Sericea Lespedeza	50
	&	
Mar. 1 - Apr. 15	Add Tall Fescue	120
Mar. 1 - Jun. 30	or Add Weeping Lovegrass	10
Mar. 1 - Jun. 30	or Add Hulled Common	25
	Bermudagrass	
Jun. 1 - Sept. 1**	Tall Fescue	120
&	Browntop Millet	35
&	Sorghum-Sudan Hybrids	30

Sept. 1 - Mar. 1	Sericea Lespedeza (unhulled-unscarified)	70
&	Tall Fescue	120
Nov. 1 - Mar. 1	& <u>Add</u> Abruzzi Rye	25
Lime		4,000
Fertilizer	10-10-10	1,000
Mulch	Straw	4,000

Note: ** Temporary seeding, reseed according to optimum season for permanent seeding.
The following seeding is for the Middle Coastal Plain Region for low maintenance.

1. Temporary Seeding

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
Dec. 1 - Apr. 15	Rye (Grain)	120
	Kobe Lespedeza	50
Apr. 15 - Aug. 15	German Millet	40
Aug. 15 - Dec. 1	Rye (Grain)	120
Lime		3,000
Fertilizer	10-10-10	800
Mulch	Straw	4,000

2. Permanent Seeding

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds/Acre</u>
Feb. 15 - Apr. 30	Tall Fescue	100
&	Pensacola Bahiagrass	50
Sept. 1 - Oct. 31	Kobe Lespedeza	40
Lime		4,000
Fertilizer	10-10-10	1,000
Mulch	Straw	4,000

- D. Mulch: Threshed straw of oats, wheat, or rye; free from seed of obnoxious weeds; or clean salt hay. Straw which is fresh and excessively brittle or straw which is in such an advanced stage of decomposition as to smother or retard growth of grass will not be acceptable.
- E. Water: Water shall be free from oil, acid, alkali, salt, and other substances harmful to growth of grass.
- F. All seeded areas shall be cultipacked to firm seed bed and cover seed. Should the permanent seed not germinate and produce a stand of grass, the areas so effected shall be reseeded until a permanent stand is established.

PART 3 - EXECUTION

3.01 GENERAL

- A. Before fertilizing and seeding, the Contractor shall have completed all operations in the area to be seeded and shall have brought the finish surface to the grade indicated on the Drawings. Immediately prior to spreading fertilizer, all irregularities in the surface shall be corrected to prevent the formation of low places where water will stand.
- B. No lime, fertilizer or seed shall be applied when the wind is strong or when the soil is extremely wet or otherwise unworkable. No rolling shall be done if precipitation after seeding would make the operation detrimental to the seed bed.

3.02 LIMING

- A. Liming shall be done immediately after grading has reached the final "smoothing" stage, even though actual seeding may not be done until several months later. Lime shall be spread evenly by means of approved mechanical spreaders or distributors. When lime is distributed by commercial liming dealers, sales slips showing the tonnage delivered shall be filed with the Engineer and shall show the full tonnage required for the acres treated. Lime shall be incorporated in the top 2 to 3 inches of soil by harrowing, disking, or other approved means.

3.03 FERTILIZER

- A. Fertilizer shall be spread not more than 2 weeks in advance of seeding. Fertilizer shall be of a formula and rate specified. To assure full application rate, the acreage in an area to be fertilized during the day shall be determined, and the required fertilizer delivered to the area. All such fertilizer shall be protected from damage by weather or otherwise until used. Lump fertilizer shall be thoroughly pulverized before placing in the distributor. Even distribution shall be accomplished with approved mechanical spreaders, by spreading half of the rate in one general direction, and the other half at right angles to the first. Within 24 hours after spreading, the fertilizer shall be incorporated into the top 2 to 3 inches of soil by disking, harrowing or other approved methods.

3.04 SEEDING

- A. Seeding shall be accomplished by means of an approved power-drawn seed drill, combination corrugated roller-seeder, approved hand operated mechanical seeder, or other approved methods resulting in even distribution of the seed. Seeding rates and the seed mixture shall be as specified above. Seeding shall not be done when ground is excessively wet or excessively dry. After the area is sown, it shall be rolled with an approved roller, not less than 18 inches in diameter, weighing not more than 210 pounds per foot of width. Upon completion of rolling, the planted area shall be watered with a fine spray.

3.05 IRRIGATION

- A. Areas seeded between May 1 and July 15 shall be watered at such intervals as to maintain the seeded area in a moist condition until the grass is established and accepted by the Engineer. The Contractor shall provide at his own expense all equipment necessary to transport and distribute the water on to the seed bed. Areas seeded between September 1 and November 1 need not be irrigated beyond the initial watering specified above except that the Contractor may apply water at his own discretion.

3.06 PROTECTION

- A. All seeded areas shall be protected from damage by barricades, signs, and other

appropriate means. Slopes shall be maintained and protected from weather damage.

- B. Where anchoring or tacking of mulch is required, an asphalt tie-down of emulsified asphalt grade AE-3 or cut-back asphalt grade RC-2 or other approved method shall be used. An approved jute mesh or net may be used in lieu of anchored or tacked straw mulch.
- C. Other types of mulch and anchoring methods may be used upon approval by the Engineer.
- D. On NC DOT Rights-of-Way all seeded areas shall be mulched and tacked with asphalt sufficient to hold straw in place.
- E. Ditch treatment shall be used in areas where steep grades could cause ditch erosion. Use of jute mesh, excelsior matting, or fiberglass roving is acceptable. Ditch treatment shall be installed before mulching operation.

---END OF SECTION---

SECTION 03100
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE

- A. Provide all labor, materials, and equipment required for the provision of the cast-in-place concrete as indicated on the Drawings and specified herein.
- B. The work included under this section includes, but is not limited to, the following:
 - 1. Concrete materials
 - 2. Concrete
 - 3. Reinforcement
 - 4. Form work
 - 5. Grout
 - 6. Mixing, placing and curing
 - 7. Finishing concrete

1.02 REFERENCED STANDARDS

- A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
 - 1. American Concrete Institute (ACI)
 - 2. 318 Building Code Requirements of Reinforced Concrete
 - 3. American Society of Testing Materials (ASTM)
 - a. C-31 Standard Method of Making and Curing Concrete Test Specimens in the Field
 - b. C-39 Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens
 - c. C-42 Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - d. C-150 Standard Specifications for Portland Cement.
 - e. C-615 Standard Specification for Deformed Billet-Steel Bars for Concrete Reinforcement.
 - f. Other Applicable ASTM Standards
 - 4. N.C. Department of Transportation - Standard Specifications for Roads and Structures (NCDOT).

1.03 QUALITY ASSURANCE

- A. All concrete work shall conform to the requirements of ACI 318 as a minimum.
- B. Methods and materials of work shall conform to the requirements of the standards and codes and recommended practices as referred to within this section. In case of conflict between standards, and these specifications, or between these specifications and local building codes, the more stringent requirement shall govern.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals:
1. Shop Drawings: Submit project specific shop drawings for the following:
 - a. Reinforcing Steel: Shop drawings shall show dimensions, size, shape, and location of the bars and ties, bending details, bar schedules, stirrup spacing, accessories, and other information necessary for the proper fabrication and placement of the steel reinforcement. Details, bar bends and hooks shall be in accordance with ACI 318. Shop drawings for two-way reinforced concrete slabs and for tank bottom slabs shall have the top slab bars and bottom bars shown on separate plans drawn to a scale of 1/4" = 1'0" or larger. Where necessary for clear delineation, complicated wall steel shall be shown on inside and outside elevations. The bars shall be clearly shown, accurately located, and dimensioned on the plans, elevations, and sections. The approval of shop drawings will be for size and arrangement of members and reinforcing only, and shall not relieve the Contractor from placing the reinforcing in accordance with the plans. All errors in dimensions or bar quantities shown on the shop drawings will be the responsibility of the Contractor.
 2. Test Reports: Submit for the following:
 - a. Laboratory Mix Design: Submit at least 10 days prior to the anticipated start of concrete placing operations. Mix design shall be in accordance with ACI 318, Section 4.3 (FIELD EXPERIENCE AND/OR TRIAL MIXTURES). The design mixes shall be accompanied by test results from an independent commercial testing laboratory, attesting that the proportions selected will produce concrete of the qualities specified.
 - b. Concrete Tests
 3. Certificates of Compliance: Certificates shall attest that supplied products conform to the referenced standard and this specification and that all tests set forth in each applicable referenced publication have been performed and that all test requirements have been met. Submit for each of the following materials:
 - A. Transfer Station Floor Slab
 - B. Turning Slab
 - C. Truck Loading Bay Slab and Retaining Walls
 - D. Delivery Tickets: Submit copy of delivery tickets to the Engineer for each batch of ready mixed concrete in accordance with ASTM C-94. Indicate total water content.
 4. The Contractor shall supply detailed drawings within 14 days of Contract Notice of Award showing detailed design and reinforcement details of all slabs and retaining walls required by the project. The drawings shall be sealed by a North Carolina Professional Engineer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. The Product shall be handled in accordance with Section 01600, Material and Equipment.
- B. Reinforcement Steel: Reinforcement shall be stored in a manner that will avoid excessive rusting or coating by grease, oil, dirt, and other objectionable materials. Storage shall be in separate piles or racks so as to avoid confusion or loss of identification after bundles are broken.

PART 2 - MATERIALS

2.01 CEMENT

- A. Portland cement used in the work covered by these specifications shall comply with ASTM C-150 and shall be Type I unless otherwise specified.
 - 1. Different brands of cement, different types of cement, or the same brand of cement from different mills shall not be mixed, nor shall they be used alternately, except when authorized by the Engineer.
 - 2. The cement shall be measured by the bag as packaged by the manufacturer, or by weight; one bag of cement shall be considered to contain 94 pounds net. A barrel is equivalent to 4 bags or 376 pounds net.
 - 3. When bulk cement is used, the weighing and handling shall be inspected by the Engineer prior to use. Cement shall be fully protected from contamination or damage during handling. Cement which has been damaged, which is partially set, or which is lumpy or caked shall not be used. If the damaged cement is in bags, the entire contents of the bag shall be rejected. Cement salvaged from discarded or used bags or reclaimed from cleaning bags shall not be used.
 - 4. Pozzolans or fly ash conforming to ASTM C618 may be blended with the cement. The maximum pozzolan or fly ash content shall not exceed 25 percent by weight of the total cement material.

2.02 ADMIXTURES

- A. Air-entraining admixtures shall conform to ASTM C-260. Testing in accordance with ASTM C-233 will be waived provided the admixture has been tested and accepted by the Bureau of Public Roads, U.S. Department of Transportation, or provided a statement is submitted by the manufacturer that the admixture to be furnished for the project has been tested and conforms to ASTM C-260.
- B. Water-reducing admixture shall conform to ASTM C-494, Type A or Type D and shall be chloride free.
- C. Non-corrosive accelerator shall be "Accelguard" by the Euclid Chemical Company, "Darex Set Accelerator" by W. R. Grace and Company, or equal. The admixture shall conform to ASTM C-494, Type C or E, and have long term test data proving its non-corrosive effect on metal deck and reinforcing steel.

2.03 AGGREGATES

- A. Fine aggregate for use in all classes of concrete (except lightweight concrete) and Portland cement mortars, except mortars for masonry work, shall conform with ASTM C33 and shall be as specified in accordance with NCDOT Section 1014, "Aggregate for Portland Cement Concrete", Para. 1014-1, "Fine Aggregate", and shall be graded as specified in Table 1005-1 of Section 1005. Fine aggregate for lightweight concrete shall be as specified above or lightweight sand as necessary to meet the required density and compressive strength.
- B. Coarse aggregate for normal concrete, except as specified otherwise herein, shall be in accordance with ASTM C33 and shall be graded as specified in NCDOT Table 1005-1 of Section 1005. Coarse aggregate for lightweight concrete shall be as specified in ASTM C-330 as required to meet the density and compressive strength requirements.

2.04 HIGH EARLY STRENGTH CONCRETE

- A. High early cement (Type III), the non-corrosive accelerator added to the normal cement (Type I) or high strength concrete shall be used only where specified or in an emergency when authorized specifically. In such cases, the requirements for proportioning and mixing shall be the same as specified herein.

2.05 REINFORCEMENT

- A. Metal reinforcement shall be Grade 60 and conform to ASTM A615(S1). Bars shall be deformed except 1/4-inch round bars which may be plain. Bars shall be formed to the dimensions indicated and approved on the shop drawings. The fabrication and details on the reinforcement shall conform to the requirements of the ACI 318, Chapter 7, "Details of Reinforcement". Heating for bending shall be employed only when authorized specifically in advance by the Engineer.
- B. Where the size and weight of welded wire fabric is not indicated or specified, it shall be 6 x 6 inch mesh of 0.192 inch nominal-diameter wire and shall weigh approximately 42 pounds per 100 square feet.
- C. Metal bar supports, ties, spacers shall be of steel, of an approved design, and adequate to ensure against displacement of the reinforcement during the course of construction. Chairs for supporting steel in exposed concrete ceilings shall be plastic or plastic coated to prevent rust.

2.06 FORMS

- A. Forms except as otherwise specified shall be of plywood, steel or other approved material. Plywood shall be concrete form plywood, not less than 5/8" thick. Surfaces of steel forms shall be free from irregularities, dents, and sags.

2.07 NON-SHRINK GROUT

- A. All column base plates, equipment bases, non-vibrating equipment or other locations noted on the structural drawings, shall be grouted with the factory premixed non-shrink, non-metallic grout, "Euco N-S" by The Euclid Chemical Company, "Masterflow 713" by Master Builders, sonogROUT by Sonneborn Company, or equal. Minimum compressive strength shall be as follows: 5000 PSI at 24 hours; 9000 PSI at 28 days.

2.08 STRUCTURAL REPAIRS

A structural repair, with prior approval of the Engineer, shall conform to ACI 301, Chapter 9. Bonding compounds, patching compounds and compounds for structural repairs, shall be by the Euclid Chemical Company, "Colma Dur Mortar", "Sikadur Hi-Mod" by Sika Chemical Corporation, or equal.

2.09 WATERSTOP

- A. Waterstops of vinyl meeting U.S. Corps of Engineers' Specification CFD-C572-71, 6" minimum width and 3/8-inch thickness, of the rib-center bulb or dumbbell type will be acceptable. They shall be installed in accordance with the manufacturer's printed instruction and shall be securely anchored to the reinforcing bars or forms to prevent displacement during the placing of the concrete.

PART 3 - EXECUTION

3.01 PROPORTIONING CONCRETE

- A. General: All concrete employed shall be normal weight, air-entrained concrete except where specified or shown on the drawings to be lightweight concrete. All interior slabs, subject to abrasion, shall have a maximum air content of 3%. All concrete shall contain the specified water-reducing admixture. All thin slabs (less than 8" thick) placed below 50°F shall contain the non-corrosive accelerator. Each mix shall be proportioned in accordance with the requirements given herein and using the aggregate and cement proposed for use on the project. Proportions shall be by weight. Mix designs shall be in accordance with ACI 318, Section 4.3 (FIELD EXPERIENCE AND/OR TRIAL MIXTURES).
- B. Normal weight, air entrained concrete for liquid retaining structures shall have a minimum compressive strength of 4,500 psi at 28 days age; a minimum cement factor of 564 lb per cubic yard; a maximum water-cement ratio of 0.45 by weight; a slump of 1 to 4 inches; and an air content of 4% to 5%. Accelerating admixtures shall not be used in water-retaining structures.
- C. Normal weight, air entrained concrete for slabs on grade shall have a minimum compressive strength of 4000 psi at 28 days age; a minimum cement factor of 540 lb per cubic yard; a maximum water-cement ratio of 0.40 by weight; a slump of 2 to 3 inches; and an air content of 5% to 7% for exterior work, and 3% maximum for interior work.
- D. Normal weight, air entrained concrete for all concrete not specified in para. "B" or "C" above shall have a minimum compressive strength of 3000 psi at 28 days age; a maximum water-cement ratio of 0.45 by weight; a slump of 3 to 4 inches; and an air content of 5% to 7%.
- E. Lightweight concrete shall have a minimum compressive strength at 28 days of age of 4000 psi; a minimum cement factor of 600 lbs. per cubic yard; and slump of 2-3 inches. The maximum air content shall not be more than 6 percent. The air-dry unit weight of the concrete shall be not less than 115 pcf nor more than 120 pcf.

3.02 MEASUREMENT OF MATERIALS, MIXING AND EQUIPMENT

- A. All concrete shall be machine mixed except that in emergencies the mixing shall be by hand as directed. Except when ready-mixed concrete is used, the Contractor shall provide at the site an approved type of batch mixer equipped with an accurate water measuring and control device and capable of producing a homogeneous concrete mixture of uniform color. The apparatus provided for weighing the aggregate and cement shall be designed especially for this purpose. The fine and coarse aggregate and cement shall each be weighed separately. Cement in standard packages needs not be weighed, but bulk cement or fractional packages shall be weighed. The accuracy of all measuring devices shall be such that successive quantities can be measured to within one percent (1%) of the desired amount. All measuring devices shall be subject to approval. The mixer's rated capacity shall not be exceeded. The time of mixing after all cement and aggregates are in the mixer drum shall not be less than one minute for mixers of one cubic yard or less and shall be increased 15 seconds for each additional cubic yard or fraction thereof in capacity. All water shall be in the drum before one-fourth of the mixing time has elapsed. The mixer drum shall rotate at a peripheral speed of about 200 feet per minute throughout the mixing period. The entire contents of the mixer drum shall be discharged before recharging. The Contractor shall furnish the necessary equipment and shall establish accurate procedures

subject to approval for determining the quantities of free moisture in the aggregates. Moisture determination shall be made at intervals as directed. The retempering of concrete which has partially hardened, i.e., mixing with or without additional cement, aggregate, or water, will not be permitted.

3.03 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall be used provided that the plant is equipped properly in all respects for the accurate proportioning and proper mixing and delivery of the concrete, including the proper water measurements and controls, all as specified above. The plant shall have sufficient capacity and transportation equipment to deliver the concrete at the rate desired. The plant shall be subject to inspection and approval of the Engineer.
- B. Ready-mixed concrete shall be mixed and handled according to ASTM C-94.

3.04 CONVEYING

- A. Concrete shall be conveyed from the mixer to its final position as rapidly as practicable by approved methods which will not cause segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position to avoid rehandling. At any point in conveying, the free vertical drop of the concrete shall not exceed 3 feet. Chuting will be permitted only where the concrete is deposited into a hopper before it is placed in the forms. Conveying equipment shall be cleaned thoroughly before each run. All concrete shall be deposited as soon as practicable after the forms have been coated and the reinforcement placed. It shall be placed before the initial set and in any event not later than 30 minutes after mixing or agitating. Concrete which has segregated in conveying shall not be used.

3.05 PLACING

- A. Concrete shall be placed in accordance with ACI 318, Section 5.4.
- B. Compaction shall be accomplished by use of a mechanical vibrator having a frequency of not less than 8000 cps. Vibration shall not be used to flow concrete horizontally more than 2 feet.

3.06 PLACEMENT IN EXTREME WEATHER

- A. **Placing Concrete in Cold Weather:** Except on specific authorization, concrete shall not be placed when the atmospheric temperature is below 40°F, or when, in the opinion of the Engineer, the concrete is likely to be subjected to freezing temperatures within 24 hours after it has been deposited. In any event, the concrete materials shall be heated, when necessary, so that the temperature of the concrete when deposited shall be between 60°F to 80°F. Lumps of frozen material and ice shall be removed from the aggregates before placing them in the mixer.
- B. **Placing Concrete in Hot Weather:** In hot weather, extra care shall be taken to reduce the temperature of the concrete being placed and to prevent rapid drying of newly placed concrete. When the outdoor ambient temperature is more than 90°F and when so directed, the temperature of the concrete as placed shall not exceed 90°F; the fresh concrete shall be shaded as soon as possible after placing; and curing shall be started as soon as the surface of the fresh concrete is sufficiently hard to permit it without damage. Except as specified herein, the control of hot weather concreting and the methods employed to control the

temperature of the material both during placing operations and curing periods shall be in accordance with ACI Standard 305R-77 (Revised 1982) "Hot Weather Concreting".

3.07 CURING AND PROTECTION

- A. General: Concrete, including that to be given a special finish, shall be protected adequately from injurious action by the sun, rain, flowing water, frost, and mechanical injury, and shall not be allowed to dry out from the time it is placed until at least seven (7) days have elapsed. Water curing shall be accomplished by keeping the surface of the concrete continuously wet by covering with water or with an approved water saturated covering, or by spraying. All water used for curing shall be fresh water. Where water curing is not used, curing shall be accomplished by sealing in the water which is carried by the concrete so that it cannot evaporate. This may be done by leaving the forms in place or by other approved means, such as covering with an approved waterproof curing paper laid with airtight joints or by applying the specified curing compound.
- B. All interior concrete slabs shall be cured and sealed with "Super Floor Coat" or "Super Pliocure" by The Euclid Chemical Company, "Masterseal" by Master Builders, Kure-N-Seal by Sonneborn, an equivalent product by Devoe or equal. The compound shall conform to Federal Specification TT-C-800A, 30% solids content minimum.
- C. All exterior slabs shall be cured with the specified clear, acrylic curing and sealing compound. The curing compound shall conform to ASTM C-309.
- D. The curing compounds must be applied immediately after final finishing.
- E. Where wood forms are left in place for curing, they shall be kept sufficiently damp at all times to prevent opening at the joints and drying out of the concrete.
- F. All portions of the time during which either moisture or warmth is lacking shall not be counted effective for curing. When concrete is placed in cold weather, adequate provisions, subject to approval, shall be made in all cases for maintaining the temperature of the air in contact with the concrete at not less than 50°F for a period of not less than 7 days after placing, or at not less than 70°F for a period of not less than 3 days after placing. Heating of the concrete in place shall be affected by salamanders or steam coils under canvas covers or by other approved means. The temperature within enclosures shall not exceed 100°F, and adequate moisture shall be applied to the concrete surface during the heating period to prevent it from drying out. The rate of cooling after the protection period shall be approximately 1°F per hour for the first 23 hours and 2°F per hour thereafter.

3.08 REMOVAL OF FORMS AND PROTECTION

- A. General: Forms shall be removed in a manner which will prevent injury to the concrete. Forms shall not be removed without approval and before the expiration of the minimum time specified herein, except when specifically authorized:

- | | <u>Days after Placing</u> |
|---|---|
| 1. Side forms on beams, girders, columns, and walls (lifts 15 ft and under) | 24 hours provided all patching and finishing may be completed in 8 hours and the work immediately recovered with approved curing media. |
| 2. Columns and walls (lifts over 15 ft) | 5 |

3. Supporting forms for arches, beams, 14 girders, and slabs
4. Sufficient shoring members to support dead load plus construction loads on beams, girders, slabs, and arches shall be provided for the full curing period.

- B. Special Requirements for High-Early Strength Concrete: The curing periods, minimum periods during which supporting forms and shores shall be left in place, and minimum periods for maintaining curing temperatures shall be not less than one-quarter of those specified herein for concrete using Type 1 cement, but in no case less than 24 hours.

3.09 CONSTRUCTION JOINTS

- A. General: Construction joints shall be provided where indicated on the drawings or as otherwise approved.
- B. Construction joint surfaces shall be prepared for placement of concrete thereon by cleaning thoroughly by compressed air and water. All laitance, coating, stains, debris, and other foreign material shall be removed from the surface and the surface shall be coated with the bonding compound, "Euco Weld" by The Euclid Chemical Company, Darawell-C by W. R. Grace Company, or equal. New concrete shall be placed after the bonding compound has dried. Waterstops shall be supported adequately and protected completely during the progress of the work.
- C. Where new concrete is to be bonded to existing concrete, the existing surface shall be cleaned and roughened thoroughly, all loose particles removed, surface dampened, and the bonding compound, "Euco Weld" by The Euclid Chemical Company, Darawell-C by W. R. Grace Company, or equal, applied. New concrete shall be placed after the bonding compound has dried.
- D. Where construction joints are indicated on the drawings for slabs on grade, the contractor may, at his option, use the control joint shown on the drawings instead. This provision does not apply when the construction joint occurs directly under CMU walls.
1. Control Joints Shall be Constructed As Follows: The slab shall be saw cut after the concrete has hardened sufficiently to prevent dislodging of aggregate and while the temperature of the fresh concrete is still rising. All cutting of slabs shall be completed within twenty four hours of concrete placement. Cut joints shall be flushed immediately after cutting with air or water under pressure to remove the sawing residue.
 2. Joints shall be kept clean and protected from debris, grease, and oil. No earlier than thirty days after concrete placement, joints shall be filled with a flexible epoxy joint filler and compatible back up material intended for this purpose and approved by the Owner. Joint shall be prepared, and joint filler shall be applied, in accordance with manufacturer's recommendations.

3.10 FINISHING CONCRETE

- A. General: As soon as forms are removed, all defective areas shall be patched and all tie holes filled with cement mortar of the same composition as that used in the concrete. Defective areas shall be cut out to solid concrete but to a depth of not less than 1-inch. The edges of the cut shall be perpendicular to the surface of the concrete. The area to be patched and at least 6 inches adjacent thereto shall be dampened and the bonding compound, "Euco Weld" by The Euclid Chemical Company, Darawell-C by W. R. Grace Company, or equal applied. The patching mortar shall be placed after the bonding compound has dried. The mortar shall be mixed approximately one-half hour before

placing and shall be remixed occasionally during this period with trowel without the addition of water. It shall be compacted into place and screeded slightly higher than the surrounding surface. Patches on exposed surfaces shall be finished to match the adjoining surfaces after they have set for a period of an hour or more. Patches shall be cured as specified for concrete. Tie holes shall be wetted with water and filled solid with mortar. Holes extending through the concrete shall be filled by means of a plunger type gun or other suitable device from the exposed face. The excess mortar shall be wiped off the exposed face with a cloth. Finished surfaces shall be protected from stains and abrasions.

- B. Surface Finishes: All exposed concrete surfaces, except floors, bottom slabs, and walking surfaces, shall receive the following finish.
1. As soon as the pointing and patching has set sufficiently to permit it, the entire surface shall be thoroughly wet with a brush and rubbed with a No. 16 carborundum stone or other equally good abrasive, bringing the surface to a paste. The rubbing shall be continued sufficiently to remove all form marks and projections, producing a smooth dense surface without pits or irregularities.
 2. The material, which in the above process has been ground to a paste, shall be carefully spread or brushed uniformly over the entire surface and allowed to take a reset. After the rubbing is complete, the surface shall be thoroughly drenched and kept wet for a period of 7 days, unless otherwise directed. The final finish shall be obtained by a thorough rubbing with a No. 30 carborundum stone or other equally good abrasive. This rubbing shall continue until the entire surface is a smooth texture and uniform in color.
 3. Adjoining or adjacent work which has been disfigured by the above specified work shall be thoroughly cleaned by approved methods so that the complete unit presents the same appearance.
- C. Floor and Roof Slab Finishes:
1. Finished floor and roof slab surfaces shall be true plane surfaces, with a tolerance of 1/8-inch in 10 feet unless otherwise indicated. Surfaces shall be pitched to drains. The dusting of finish surfaces with dry materials will not be permitted.
 2. Monolithic Finish: Floor and roof slabs shall be placed, consolidated, struck off and leveled to the required elevation. When the concrete has stiffened sufficiently to bear a man's weight without deep imprint, it shall be floated, at least twice, to a uniform sandy texture. The surface shall then be steel troweled to a smooth, even, impervious finish, free from trowel marks.
 3. The surface of all interior slabs, except roof slabs, shall be given a second steel-troweling to a burnished finish.
- D. Sidewalk, platform, and wearing surfaces not otherwise specified shall receive a broom finish. The slab shall receive a float finish, as indicated above, and then the surface shall be lightly brushed with a hair broom to leave a slightly rough, non-slip surface. The brooming shall be done in one direction and shall leave a uniform neat pattern.
- E. Bid Alternate for Long Life Floor Surface:
1. Description of Work
Extra heavy-duty processed iron aggregate topping surfaces 1" thick in lieu of final inch of concrete for the 10" tipping floor slab. Work includes providing premixed, processed iron topping, proportioned, blended, packaged at the factory and delivered to the jobsite ready to apply, with the addition of potable water; placing, finishing and curing specified in this section.
 2. References
Comply with the following guides, codes, standards and specifications.

ACI 301-89	"Specification for Structural Concrete for Buildings"
ACI 302.1R-89	"Guide for Concrete Floor and Slab Construction"
ACI 304R-89	"Guide for Measuring, Mixing, Transporting, and Placing Concrete"
ACI 305R-91	"Hot Weather Concreting"
ACI 306R-88	"Cold Weather Concreting"
ACI 503R-80	"Use of Epoxy Compounds with Concrete"
ACI 503.5R-92	"Selection of Polymer Adhesives with Concrete"
ASTM C309-89	"Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete"
ASTM D4259-83	"Standard Practice for Abrading Concrete"
ASTM D4263-83	"Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method"

3. Quality Assurance

- A. Job Mock-Up: In a location, designated by the Architect/Engineer, place a minimum 100 ft² (10 m²) floor mock-up using materials and procedures proposed for use in the project. Revise materials and procedures as directed by the Architect/Engineer to obtain acceptable finish surface.
1. Maintain the same controls and procedures used in the acceptable mock-up throughout the project.
- B. Installer Qualifications: Engage an experienced installer who has specialized in the application of floor finishes similar to that required for this project.
- C. Contractor, applying processed iron aggregate topping, shall have a minimum of five years experience placing heavy-duty metallic floor toppings. Contractor shall provide documentation of jobs, including addresses of projects.

4. Owners Sample

Samples of material and acceptable finish are available for review during bidding and before starting work. Coordinate procurement and selection of materials with owner to obtain acceptable quality of materials and finish in completed work. A minimum of ten days notice shall be given by the Contractor to the Manufacturer to arrange a pre-job conference, related to application procedures, and a minimum of three days notice shall be given prior to initial use of the product.

5. Submittals

Coordinate this work with requirements for submittals specified in section 1300.

6. Manufacturer's Certifications

That the manufacturer has a minimum of 10 years of experience in manufacturing iron aggregate floor toppings, and can document successful use over this period. Material has been formulated and processed under stringent quality control, free from non-ferrous particles, rust and material used to disguise rust.

Material shall consist of specially processed iron aggregate, of optimum gradation to provide a dense wearing surface for maximum toughness, impact and abrasion resistance.

Material shall meet the following performance parameters, when mixed to 5 to 7 inch slump consistence, to reflect field placement conditions:

Compressive Strength, psi

Age	2" (50mm) cubes, ASTM C 109
1 day	6000
7 day	8000
28 day	12050

Abrasion Resistance - ASTM C 779 Procedure "A", 60 minutes of abrasion not to exceed .010 inches at 28 days of age under proper cure conditions.

Impact Resistance - ASTM C 131 Modified Los Angles Rattler Test 2000 cycles, not to exceed 35% material loss (by volume).

Rilem Surface Absorption, Maximum 1.5 percent at 96 hours (28 days) under proper cure conditions.

8. Materials

A. Concrete: Provide concrete materials complying with requirements of Section 03100.

B. Extra Heavy-Duty Iron Aggregate Topping: MASTERTOP 300 ANVIL-TOP, manufactured by Master Builders, Inc. Shall consist of specially processed graded iron aggregate, tested cement and technical components. Material has been formulated and processed under stringent quality control, free from non-ferrous particles, rust and material used to disguise rust.

C. Bonding Agent: ANVIL-BOND™ as manufactured by Master Builders, Inc.

D. Curing Compound: MASTERKURE, MASTERKURE 200W and MB-429 as manufactured by Master Builders, Inc. Apply uniformly at a specified rate of coverage.

E. Control Joint Sealer: MASTERFILL 300, a two component, 100% solids, semi rigid epoxy sealer.

F. Evaporation Retardant and Finishing Aid: CONFILM, a monomolecular film as recommended by ACI 305, used to aid in the maintaining of topping moisture.

9. Bonding over a Fully Cured Concrete Slab

Use a bonding adhesive specially designed to bond fresh concrete to old concrete - Not Applicable

10. Bonding Over a Green Concrete Slab - Preferred Method.

Use a cement slurry mixed with water.

11. Application Over Recently Placed Concrete (less than three days old)

Base concrete should have a minimum design compressive strength of 6000 psi at 28 days (per ACI 302) and be poured at a maximum slump of 4 inches (101 mm).

(Note: Discuss with your Master Builders representative suggestions on concrete compressive strength.)

While plastic, roughen the base concrete by nail raking in one direction to create a mechanical bond for the topping according to the manufacturers recommendations. Alternatively, apply a chemical texturing agent to provide needed profile without dislodging the coarse aggregate in the base slab. (Note: Discuss this application with your Master Builders representative.)

Wet cure and protect the concrete until topping application. Apply topping to concrete at two to three days of age. Install bonding slurry according to manufacturers instructions. If slurry dries before it can be covered by the topping do not re-temper, but reapply fresh slurry.

12. Mixing

Thoroughly mix, according to manufacturers recommendation, to a 5 to 7 inch slump consistency.

13. Placing and Finishing

Discharge topping for immediate placing and screeding according to manufacturers recommendations.

14. Floating

Immediately after screeding, float the surface with a magnesium bullfloat. Obtain a void-free level surface with this operation. As soon as the topping will support an operator and machine without disturbing the level or working up excessive fines, float the surface with a mechanical float machine.

NOTE: For all types of topping installations, evaporation retardant should be used according to manufacturers instructions.

15. **Finishing**
Provide a hard or burnished troweled finish for maximum consolidation of the topping. Use care in regard to the blade angle during early trowelling to avoid blistering.
16. **Curing and Protection**
Wet cure for 7 days, minimum 96 hours, ensuring that the topping is not allowed to dry out with special attention given to the edges of the work area.
Following wet cure, two coats of a liquid membrane forming curing compound shall be applied at manufacturers recommended coverage rate.
17. **Control Joints**
Form or saw cut control joints as soon as the surface permits the weight of the saw and without causing the topping edges to ravel.
Spacing of the control joints should mirror the existing joints of the base concrete slab. The distance between joints shall not exceed twenty feet.
18. **Control Joints, continued**
Seal joints with a two component control joint sealer. This shall be done according to the manufacturers recommendations, once the topping is fully cured.

3.11 FORMS

- A. **General:** All concrete shall be formed unless specified or directed otherwise. Forms shall be true to line and grade within the allowable tolerances specified for finishes and shall be mortar-tight. Forms and form supports shall be subject to approval but responsibility for their adequacy shall rest with the Contractor. Bolts and rods used for internal ties shall be arranged so that when the forms are removed, all metal will have the minimum protection as hereinafter specified.
- B. Where water-tightness is required, bolts or rods which are withdrawn when the forms are removed shall not be used. Wire ties shall not be used where the concrete surface will be exposed to weathering and where discoloration will be objectionable. All form work shall be provided with adequate clean-out openings to permit inspection and easy cleaning after all reinforcement has been placed. In columns, walls, and similar members of small dimensions, the height of forms for each vertical lift shall not exceed 6 feet unless suitable openings are provided at not more than 6-foot vertical intervals to permit proper placing of the concrete. Where forms for continuous surfaces are placed in successive units, the forms shall be fitted over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Panel forms shall be constructed so as to provide tight joints between panels. All forms shall be constructed so that they can be removed without damaging the concrete. All exposed joints, edges, and external corners shall be chamfered. Forms for heavy girders and similar members shall be constructed with a camber, as directed. When placing of concrete in excavations in earth, forms shall be not less than 3 inches outside the concrete lines indicated.
- C. **Coating:** Before placing the concrete, the contact surfaces of forms shall be coated with a non-staining mineral oil or shall be given two coats of nitrocellulose lacquer, except that for unexposed surfaces when the temperature is above 40°F sheathing may be wetted thoroughly with clean water. All excess oil shall be removed by wiping with cloths. Reused forms shall have the contact surfaces cleaned thoroughly; that which has been coated shall be given an additional coat of oil or lacquer.

3.12 REINFORCING STEEL

- A. General: The Contractor shall furnish and place all reinforcement bars, stirrups, hanger bars, wire fabric, and other reinforcing materials as indicated on the drawings or required by the specifications together with all necessary wire ties, chairs, spacers, supports, and other devices necessary to install and secure the reinforcing properly. All reinforcement shall, when placed, be free from rust, scale, grease, clay, or other coatings and foreign substances which would reduce or destroy the bond. Reinforcement which has bands not shown on the project drawings or on approved shop drawings or which is reduced in section by rusting shall not be used.
- B. Bar mats shall be fabricated from bars conforming to the requirements given herein before for reinforcement bars and all intersections shall be fastened securely by approved mechanical ties.
- C. Placing: Reinforcement shall be placed accurately and thoroughly secured. It shall be supported by concrete or metal chairs, or spacers, or by metal hangers. Metal chairs, clips, or supports, the ends of which will be exposed on the concrete surface, will be permitted only where the surface will not be exposed to weathering and where discoloration will not be objectionable; elsewhere concrete or other approved non-corrodible material or other approved means shall be used for support.
- D. Splicing: Where splices in addition to those shown on the project drawings are necessary, bars shall be lapped as scheduled below.

BAR SIZE	LAP, INCHES	BAR SIZE	LAP, INCHES
#3	15 (21)	#7	45 (63)
#4	20 (28)	#8	59 (83)
#5	26 (36)	#9	74 (104)
#6	33 (46)	#10	95 (133)

Figures in parentheses are for top bars (horizontal reinforcement placed such that more than twelve inches of fresh concrete is cast in the member below the reinforcement). Other figures are for all other bars.

Splices in alternate bars shall be staggered. All splices shall be in accordance with ACI 318 and ACI 301.

- E. Protection of Reinforcement: The reinforcement of footings and other principal structural members in which the concrete is deposited on the ground shall have not less than 3 inches of concrete between the reinforcement and the ground contact surface. If concrete surfaces after removal of the forms are to be exposed to the weather or water or be in contact with the ground, the reinforcement shall be protected with not less than 2 inches of concrete for bars greater than 5/8-inch in diameter and 1-1/2 inches for bars 5/8-inch or less in diameter. Protective cover will be measured from the outside edge of the steel.
- F. The concrete protective covering for reinforcement of surfaces not exposed directly to the ground, water, or weather shall be not less than 3/4-inch for slabs and walls and not less than 1-1/2" for beams, girders, and columns.
- G. No heat shall be used to field bend bars.
- H. When required and approved in writing by the Engineer, welding of reinforcing shall conform to "Recommended Practice for Welding Reinforcing Steel, Metal Inserts and

Connections in Reinforced Concrete Construction (ANS D12.1)". No tack welding will be permitted.

3.13 SETTING MISCELLANEOUS MATERIALS

- A. All pipe sleeves, wall castings, anchors and bolts, including those for machine and equipment bases, angle frames or edgings, hangers and inserts, pipe supports, conduits and all other materials in connection with concrete construction, shall, where practicable, be placed and secure in position when the concrete is placed. Anchor bolts for machines and equipment shall be set according to templates, shall be carefully plumbed, checked for location and elevation with an instrument, and be held in position rigidly to prevent displacement while concrete is being placed.

3.14 TESTING

A. Field Poured Specimens:

- 1. The Engineer will require a reasonable number of tests to be made during the progress of the work. Not less than three specimens shall be made for each test, nor less than one test for each 100 cubic yards, or fraction thereof, of each class of concrete, placed each day. Specimens shall be made and cured in accordance with ASTM C31. When in the opinion of the Engineer there is a possibility of the air temperature falling below 40°F, he may require additional specimens to be taken and cured in the field under conditions similar to those of the concrete in the structure. Specimens shall be tested in accordance with ASTM C39.
 - a. The standard age of specimens at test shall be 28 days. Of the three specimens made for each test, two shall be 28-day tests and one shall be 7-day tests.
 - b. The strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength f_c and no individual strength test result falls below the specified strength f_c by more than 500 psi. When the test results do not conform to these requirements, the Engineer shall have the right to require changes in the conditions of temperature and moisture necessary to secure the required strength.
 - c. All tests shall be performed by an independent laboratory as specified in Section 01400, Quality Control.
 - d. All test reports shall be submitted in accordance with Section 01400, Quality Control.

B. Drilled Cores:

- 1. Where there is a question as to the quality of the concrete in the structure, the Engineer may require tests in accordance with ASTM C42 for that portion of the structure where the questionable concrete has been found. If the concrete tests are in accordance with the specifications, the Owner shall pay for the costs of the tests. If the concrete is found not to be in accordance with the specifications, the Contractor shall pay for the tests.

- C. Air Entrainment shall be plus or minus 1.5 percent of amount specified. The air content shall be tested in accordance with AASHTO T152, T121, or T156. Test shall be at the frequency required by the Engineer.

- D. Slump shall be tested plus or minus 1 inch as determined by AASHTO T119. Test shall be made from each delivery before placing concrete. Slump tests shall be made in the presents of the Engineer's representative. Concrete not meeting the slump standards

specified shall be modified, if possible, to meet the standards or shall be rejected by the Contractor and removed from the project.

- E. All water-bearing structures shall be watertight against water pressure which may come upon them prior to backfill. Any imperfections which appear shall be thoroughly repaired in a manner satisfactory to the Engineer. On completion of water-bearing structures, they shall be filled with water to the high water line and allowed to remain filled for forty-eight (48) hours before testing for water-tightness. Leaks which may appear shall be repaired in a manner satisfactory to the Engineer and the structures made water-tight.

---END OF SECTION---

SECTION 03400

PRECAST CONCRETE WASTEWATER HOLDING TANK

PART 1 - GENERAL

1.01 SCOPE

- A. Work under this section consists of supplying all plant, labor, materials, and equipment required for the manufacturer, delivery, and installation of the precast concrete units indicated on the plans and/or specified herein.

1.02 DESCRIPTION

- A. Work covered under this section includes all precast concrete shown on the plans and specified herein. Reinforcing shall be as shown on the plans.
 - 1. Septic Tank:
 - a. Size - 8000 gallon
 - b. Reinforcement - 6 x 6 10/10 wwm minimum
 - c. Wall thickness - 6 inches minimum
 - d. Baffled with access covers as required
 - e. Meeting all applicable codes and standards
 - f. Loading Requirements: H-20 Loading

1.03 ACCEPTABLE ITEMS

- A. Materials, products, patterns, and fabrication methods shall meet the requirements of the specifications and conform to details, and designs indicated will be acceptable.

1.04 WORKMANSHIP

- A. Workmanship shall be in accordance with best practices. Work shall be performed in an approved, workmanlike manner by personnel skilled in fabrication of the type involved.

1.05 REFERENCED STANDARDS

- A. Precast reinforced concrete septic tank shall be preapproved by the North Carolina Department of Environment, Health and Natural Resources, Division of Environmental Health, On-Site Wastewater Section. The unit shall be provided with a state-assigned septic tank serial number cast in the concrete.
- B. ACI
- C. ASTM

1.06 SUBMITTALS

- A. Submit the following in accordance with Section 01300 Submittals:
 - 1. Shop Drawings: Submit project specific shop drawings for the following:
 - a. Complete fabrication, assembly, and installation drawings, together with detailed specifications, and data covering material used, parts, devices, and other accessories forming a part of the equipment furnished, shall be submitted in accordance with the submittals section.

- b. Structural calculations for the specified loading criteria sealed by a professional engineer registered in the State of North Carolina shall also be submitted to the Engineer for the Owner's records.

1.07 QUALITY ASSURANCE

- A. Quality assurance shall be as required in Section 01400, Quality Control and the following requirements:
 1. The precast septic tank shall be manufactured by Stay Right Tank Co., Tindall, Carolina Precast, or equal.
 2. Substitutions shall be as specified in Section 01600, Material and Equipment.
 3. The manufacturer shall supply all connections necessary to provide a complete, operable, and satisfactory system as indicated or specified.

1.08 DELIVERY, STORAGE AND HANDLING

- A. The equipment shall be handled in accordance with Section 01600, Material and Equipment.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portland cement shall conform to ASTM C-150, minimum compressive strength of 3000 psi at 28 days.
- B. Metal reinforcement shall be deformed billet-steel bars grade 40, ASTM 615. Mesh reinforcement shall be welded steel wire fabric, ASTM A-185.
- C. Aggregate shall conform to ASTM C-33 and C-330.
- D. Flexible Joint Sealants shall be butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO M-198, Type B - Butyl Rubber and as follows: maximum of 1% volatile matter and suitable for application temperatures between 10 and 100°F.
- E. Epoxy Gels for interior patching of wall penetrations shall be a 2-component, solvent-free, moisture-insensitive, high modulus, high-strength, structural epoxy paste adhesive meeting ASTM C-881, Type I and II, Grade 3, Class B and C, Epoxy Resin Adhesive.
- F. Access Frames and Covers:
 1. Provide two hatches sized 36" x 42" at either end of the tank. The access frames and cover shall have a 1/4" thick one-piece, mill finish, extruded aluminum channel frame, incorporating a continuous concrete anchor. A 1 1/2" drainage coupling shall be located in the front left corner of the channel frame. A bituminous coating shall be applied to the frame exterior where it will come in contact with concrete. Door panel shall be 1/4" aluminum diamond plate, reinforced to withstand a live load of 300 lbs. PSF. Door shall open to 90° and automatically lock with a stainless steel hold open arm with an aluminum release handle. For ease of operation, the hold open arm shall incorporate an enclosed stainless steel compression spring assist. Door shall close flush with the frame and rest on a built-in neoprene cushion/gasket. Hinges and all fastening hardware shall be stainless steel. Unit

shall lock with a stainless steel slam lock with removable key and have a non-corrosive handle. Unit shall be guaranteed against defects in material and/or workmanship for a period of 10 years. Unit shall be Halliday Series WIS, or equal.

2.02 FABRICATION

- A. The precast units shall be fabricated in forms in which proper alignment is maintained allowing for maximum deviation in any dimension of plus or minus 1/4-inch.
- B. Concrete shall be compacted through internal vibration and shall have a consistency such that complete bond to steel reinforcement is obtained.

PART 3 - EXECUTION

3.01 INSTALLATION AND TESTING

- A. Immediately prior to installation, each unit shall be thoroughly inspected for defects. No unit shall be installed without approval of the Engineer.
- B. Units shall be accurately placed without damage, according to the manufacturer's recommendations and as indicated on the plans. Exact location of installation to be determined in the field by the Engineer.
- C. The Contractor shall use care during the installation of all tanks to insure that all seams and through wall openings are properly sealed. The tanks shall be thoroughly inspected for infiltration, and all signs of infiltration shall be corrected to the satisfaction of the Engineer. Each tank installation shall be tested for leakage as follows:
 - 1. After installation of the tank and before connection of the influent piping, the tank shall be filled with water to the normal operating liquid level (the invert elevation of the effluent piping). The liquid level shall be measured and recorded. The tank shall be covered and allowed to stand a minimum of 24 hours, after which the liquid level shall be checked. The change in liquid level shall not exceed plus or minus 1/2 inch in 24 hours. A change in excess of plus and minus 1/2 inch in 24 hours will be taken to indicate excessive leakage and the tank installation shall not be acceptable. Repairs and/or modifications shall be performed (subject to approval of the Engineer) and testing repeated until the required criteria is met. The cost for all testing to be performed by the Contractor shall be included in the lump sum bid price for septic tank.

3.02 REPAIR OF EXISTING SEPTIC TANK

- A. Repairs shall be limited to the sealing of wall pipe connections, access and inspection covers, and other sources of minor leakage detected. Method and materials used shall be subject to the approval of the Engineer.

---END OF SECTION---

SECTION 03405

PRECAST CONCRETE SAND TRAP

PART 1 - GENERAL

1.01 SCOPE

- A. Work under this section consists of supplying all plant, labor, materials, and equipment required for the manufacturer, delivery, and installation of the precast concrete units indicated on the plans and/or specified herein.

1.02 DESCRIPTION

- A. Work covered under this section includes all precast concrete shown on the plans and specified herein. Reinforcing shall be as shown on the plans.
 - 1. Grease trap:
 - a. Size - 3000 gallon
 - b. Reinforcement - 6 x 6 10/10 wwm minimum
 - c. Wall thickness - 6 inches minimum
 - d. Baffled with access covers as required
 - e. Outlet sanitary tee as shown
 - f. Meeting all applicable codes and standards
 - g. Loading Requirements: H-20 Loading

1.03 ACCEPTABLE ITEMS

- A. Materials, products, patterns, and fabrication methods shall meet the requirements of the specifications and conform to details, and designs indicated will be acceptable.

1.04 WORKMANSHIP

- A. Workmanship shall be in accordance with best practices. Work shall be performed in an approved, workmanlike manner by personnel skilled in fabrication of the type involved.

1.05 REFERENCED STANDARDS

- A. Precast reinforced concrete grease trap shall be preapproved by the North Carolina Department of Environment, Health and Natural Resources.
- B. ACI
- C. ASTM

1.06 SUBMITTALS

- A. Submit the following in accordance with Section 01300 Submittals:
 - 1. Shop Drawings: Submit project specific shop drawings for the following:
 - a. Complete fabrication, assembly, and installation drawings, together with detailed specifications, and data covering material used, parts, devices, and other accessories forming a part of the equipment furnished, shall be submitted in accordance with the submittals section.

- b. Structural calculations for the specified loading criteria sealed by a professional engineer registered in the State of North Carolina shall also be submitted to the Engineer for the Owner's records.

1.07 QUALITY ASSURANCE

- A. Quality assurance shall be as required in Section 01400, Quality Control and the following requirements:
 - 1. The precast grease trap shall be manufactured by Stay Right Tank Co., Tindall, Carolina Precast, or equal.
 - 2. Substitutions shall be as specified in Section 01600, Material and Equipment.
 - 3. The manufacturer shall supply all connections necessary to provide a complete, operable, and satisfactory system as indicated or specified.

1.08 DELIVERY, STORAGE AND HANDLING

- A. The equipment shall be handled in accordance with Section 01600, Material and Equipment.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portland cement shall conform to ASTM C-150, minimum compressive strength of 3000 psi at 28 days.
- B. Metal reinforcement shall be deformed billet-steel bars grade 40, ASTM 615. Mesh reinforcement shall be welded steel wire fabric, ASTM A-185.
- C. Aggregate shall conform to ASTM C-33 and C-330.
- D. Flexible Joint Sealants shall be butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO M-198, Type B - Butyl Rubber and as follows: maximum of 1% volatile matter and suitable for application temperatures between 10 and 100°F.
- E. Epoxy Gels for interior patching of wall penetrations shall be a 2-component, solvent-free, moisture-insensitive, high modulus, high-strength, structural epoxy paste adhesive meeting ASTM C-881, Type I and II, Grade 3, Class B and C, Epoxy Resin Adhesive.

2.02 FABRICATION

- A. The precast units shall be fabricated in forms in which proper alignment is maintained allowing for maximum deviation in any dimension of plus or minus 1/4-inch.
- B. Concrete shall be compacted through internal vibration and shall have a consistency such that complete bond to steel reinforcement is obtained.
- C. Provide two 30" ring and covers meeting the specification for manholes one at either end of the sand trap.

PART 3 - EXECUTION

3.01 INSTALLATION AND TESTING

- A. Immediately prior to installation, each unit shall be thoroughly inspected for defects. No unit shall be installed without approval of the Engineer.
- B. Units shall be accurately placed without damage, according to the manufacturer's recommendations and as indicated on the plans. Exact location of installation to be determined in the field by the Engineer.
- C. The Contractor shall use care during the installation of all tanks to insure that all seams and through wall openings are properly sealed. The tanks shall be thoroughly inspected for infiltration, and all signs of infiltration shall be corrected to the satisfaction of the Engineer. Each tank installation shall be tested for leakage as follows:
 - 1. After installation of the tank and before connection of the influent piping, the tank shall be filled with water to the normal operating liquid level (the invert elevation of the effluent piping). The liquid level shall be measured and recorded. The tank shall be covered and allowed to stand a minimum of 24 hours, after which the liquid level shall be checked. The change in liquid level shall not exceed plus or minus 1/2 inch in 24 hours. A change in excess of plus and minus 1/2 inch in 24 hours will be taken to indicate excessive leakage and the tank installation shall not be acceptable. Repairs and/or modifications shall be performed (subject to approval of the Engineer) and testing repeated until the required criteria is met. The cost for all testing to be performed by the Contractor shall be included in the lump sum bid price.

---END OF SECTION---

SECTION 13200
PREFABRICATED METAL BUILDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pre-engineered and shop fabricated structural steel building frame.
- B. Metal wall and metal sloped roof system including plumbing vents through wall, gutters and downspouts, skylights, gable and eave trim, and flashing.
- C. The building manufacturer shall be regularly engaged in the manufacture of metal building systems and a member of the Metal Building Manufacturers Association.

1.02 RELATED SECTIONS

- A. Division 13 - Concrete
- B. Division 15 - Piping
- C. Division 16 - Electrical

1.03 CODES AND SPECIFICATIONS

The metal buildings shall conform to all applicable local and industry codes including but not limited to the following:

- (a) North Carolina State Building Code, 1991 Edition and Revisions including 1995.
- (b) Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings (AISC).
- (c) Specifications for Design of Cold-Formed Steel Structural Members (AISI)
- (d) Structural Welding Code (AWS)
- (e) Recommended Design Practices Manual (Metal Building Manufacturer's Association).
- (f) Annual Book of ASTM Standards (ASTM).
- (g) Metal building Systems Manual (Metal Building Manufacturer's Association).
- (h) SSPC - Steel Structurals Painting Council.

1.04 SYSTEM DESCRIPTION

The structural system shall be rigid frame with tapered or straight columns and roof beams with a gable roof. A 28' interior clear height shall be maintained. The actual building length shall be structural line to structural line and shall be the same as nominal (100 ft.). Each bay shall be 25 ft. The actual building width shall be structural line to structural line and shall be the same as nominal (100 ft.). The roof shall have a minimum slope of .50" in 12" slope.

Metal buildings and foundation designs shall bear the seal of a professional engineer licensed to practice in North Carolina.

Warrant in writing any materials used in construction having extended warranty as offered by manufacturer such as wall and roof panels.

- A. Single span rigid frame.
- B. Bay spacing. (4 bays at 20' each')
- C. Primary Framing: Rigid frame of roof beams and columns, end wall columns, and wind bracing.
- D. Secondary Framing: Purlins, girts, sill supports, clips, and other items detailed.
- E. Wall System: Factory roll formed panels.
- F. Roof System: Factory roll-formed panels, with concealed clip system. Roof system shall be tested in accordance with UL Class 100 Uplift and Factory Mutual I-100 wind uplift.
- G. Roof Slope: 1 inch in 12 inches.
- H. Skylights: Six (6) skylights, 10'-6" (nominal) long by 24" (nominal) wide.
- I. Doors: Two 3070 steel doors.
- J. Windows: Two 4' wide x 3' high self-flashing horizontal slide aluminum windows.
- K. Floor and foundation.
- L. Rough-in of plumbing as shown on plans and including installation of vent through wall & installation of pedestal mounted safety shower/ eye wash station.
- M. Fans and Shutter/Louvers
- N. Electrical wiring , including weatherhead, meterbase, and provision of luminaries, switches, outlets, service panel, and electrical ground.

1.05 DESIGN REQUIREMENTS

- A. Building design loads and combinations thereof shall be applied in accordance with Chapter 12 of the 1991 Edition of the North Carolina State Building Code and Amendments and the Metal Building Manufacturer's latest edition of "Metal Building System Manual". Loads considered shall be as follows:
 - (a) Roof live load
 - (b) Wind load
 - (c) Dead load
 - (d) Earthquake load (N.A.)
 - (e) Snow load
 - (f) Auxiliary loads - waste deflector connected to north sidewall. See detail 2-4, sheet 4.
- B. Thermal resistance of Wall System: Tested "U" equal to or greater than .09 Btu/Hr/Sq Ft/Deg F.
- C. Thermal Resistance of Roof System: Tested "U" equal to or greater than .054 Btu/Hr/Sq Ft/ Deg F. (Enclosed portion only).
- D. Members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with the North Carolina Building Code.
- E. Exterior wall and roof system to withstand imposed loads with maximum allowable deflection of span: 1/180.
- F. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

- G. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subjected to temperatures ranging as high as 120 ° F.
- H. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

1.06 SUBMITTALS

- A. The plan drawings included in the contract documents are included in order to describe the building as necessary for bid purposes. The building manufacturer shall provide the engineering of the metal building and foundation as necessary to conform to the applicable codes referenced herein.
- B. The Contractor shall submit five (5) copies of all submittals plus the number required for his own purposes.
- C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, loads. The drawings shall be sealed and signed by a Professional Engineer licensed in the State of North Carolina. The shop drawings shall be complete with design loads for the individual members, connections and footings.
- D. Column Footing Design: The Prefabricated Metal Building supplier shall supply drawings, including reinforcing requirements, and including anchor bolt placement for column footings, sealed and signed by a licensed Professional Engineer in the State of North Carolina, to the Owner within fourteen (14) days of Notice of Contract Award. Contractor to base bid price on column footing dimensions and reinforcing shown on plans.
- E. Indicate wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, and method of installation.
- F. Indicate framing anchor bolt settings, sizes, and locations from datum and foundation loads. Loads imposed by metal building structure on the foundation.
- G. Indicate welded connection with AWS A2.0 welding symbols. Indicate net weld lengths.
- H. Product Data: Provide data on profiles, component dimensions, fasteners, and sealants.
- I. Manufacturer's Installation Instructions: Indicate preparation requirements, assembly sequence, and erection schedule.

1.07 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 5 years documented experience.

- B. In lieu of the required experience, the manufacturer may provide a cash deposit or bond equal to the cost of the product, but prorated to the number of years of actual experience.
- C. Design structural components under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of North Carolina.
- D. Design Work under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of North Carolina.

1.09 REGULATORY REQUIREMENTS

- A. Conform to applicable North Carolina Building code and County Authorities for submission of design calculations and reviewed shop drawings and as required for acquiring permit.
- B. Cooperate with regulatory agency or authority and provide data as requested.

1.10 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.11 WARRANTY

- A. Warranties: Manufacturer's standard 20 year Paint Film Extended Life Endorsement. Manufacturer's standard 20 year Roof System Weather Tightness Endorsement.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - BUILDING SYSTEM

- A. Butler - LRF Frame, MR-24 Roof System, Shadowrib Wall System.
- B. Acceptable manufacturers offering equivalent systems are O'Steele, Inc.; Building Technologies Corp., Varco-Pruden, or equal.

2.02 MATERIALS - FRAMING

- A. General: All materials furnished shall be within the standard industry tolerances for that material as specified for the building and the stated design conditions.

Workmanship shall be such that the parts of the building are accurately made and true to dimension so that in erection of same all parts will properly fit together. However, minor alternations of material and the correction of minor misalignments by the moderate use of drift pins and a moderate amount of reaming, chipping, or cutting are part of erection.

The size and weight of the individual building components as packaged and shipped shall be such as to permit transportation by common carrier.

All framing members shall be shop fabricated for field assembly and shall carry an easily identifiable piece part mark.

- B. Primary Structural Framing shall include the transverse frame , wing unit rafter beams and columns, canopy beams, intermediate columns, endwall frames, endwall columns, wind columns, brackets, bracing and lacing; structural setting, base splice and cap plates; and all other miscellaneous primary structural.

HOT-ROLLED SHAPES shall conform to:
ASTM A - 36, 36000 PSI minimum yield.

WELDMENT SHAPES shall conform to:
ASTM A - 529, 42000 PSI minimum yield (for material thickness less than or equal to 1/2")

ASTM A - 572, Grade 42, 42000 PSI minimum yield
(for material thicknesses over 1/2")

- C. Secondary Structural Framing shall include purlins, girts, eave struts, rake channel, joists and bridging; base angel girt or sill bar; eave, rake, brace and adapter angles; roof and wall brace rods and compression struts; fastening clips and other miscellaneous secondary structural parts.

All light gage cold formed sections shall be manufactured by precision roll or break forming. All dimensions shall be true and the formed member shall be free of fluting, buckling, or waviness.

HOT-ROLLED COMPONENTS shall conform to:
ASTM A - 36, 36000 PSI minimum yield

COLD-FORMED COMPONENTS shall conform to:
ASTM A - 570, Grade E, 42000 PSI minimum yield
(for material thicknesses less than or equal to .2299")

BRACE RODS SHALL conform to:
ASTM A -615, Grade 40, smooth reinforcing bar,
4000 PSI minimum yield

- D. Bolts shall be machine bolts conforming to the following:

ASTM A - 307, 5000 PSI minimum tensile strength, for secondary structural members

ASTM A - 325, Type 1 and ASTM A - 449, 12000 PSI minimum tensile strength, for primary structural members

Bolted connections shall be tightened in accordance with the building manufacturer's recommended procedure.

- E. Welding procedure and operator qualifications and welding quality standards shall be in accordance with the American Welding Society structural welding code. Certification of welder qualification shall be supplied when requested.

- F. Structural Painting: Prior to painting, the fabricator shall clean the steel of loose rust, loose mill scale, dirt, and other foreign material. Unless otherwise specified the fabricator shall not sandblast, frame, clean, or pickle prior to painting. The fabricator shall then factory coat all steel with one coat of primer paint formulated to equal or exceed the performance requirements of Federal Specification TT-P-636.

The shop coat of paint is a primer and is intended to protect the steel for a short period of exposure. Subsequent finish painting, if required, is to be performed in the field.

G. Paint: Structural steel:

1. Surface preparation: SSPC SP-6, commercial grade.
2. 1 coat Kop-Coat 340 Gold Primer, Tnemec 77 Chem-Prime, Valspar V13-R-28 Chromox Primer or equal (2.0 mils dry).
3. 2 coats Kop-Coat Hi-Gard Epoxy, Tnemec 66 Series Hi-Build Epololine, Valspar 89 Series H.B. Epoxy or equal (4.0 mils dry).

2.03 MATERIALS - WALL AND ROOF SYSTEM

A. General: Roof and wall panels shall be 3' wide with four major corrugations, 1 1/2" high 12" on center with two minor vee corrugations between each of the major corrugations the entire length of the panel.

B. Roof Panels shall be 26 gage aluminum-zinc alloy coated steel (80,000 PSI yield). The coating shall be composed of approximately 55% aluminum and 45% zinc and shall be applied by the continuous hot-dip method. The coating shall be a minimum of .36 ounces per square foot as determined by the triple spot test per ASTM Spec. A-428. Roof panels shall have no other coating. Panels shall be marked at the upper end for proper location of endlap sealant. The underneath corrugation shall be formed with a continuous length sealant groove.

Panels shall be a maximum length of 38' - 9" so as to minimize endlaps. When required, endlaps shall occur over and be fastened to a secondary structural member. Ridge panels shall be one piece factory curved to match the roof slope.

If it is determined by the building manufacture that expansion and contraction may be a concern for the roof of the buildings in this contract, provisions shall be made to allow for thermal movement without damage.

The roof system shall carry a U.L. wind uplift class 90 rating to ensure structural integrity. (U.L. - Construction No. 81).

C. Wall Panels shall be 26 gage galvanized steel (42,000 psi yield) 1.25 ounce coating (G90) conforming to ASTM Spec. A-525. Panels shall be coated with a fluropolymer containing 70% Kynar 50 resin (Kynar 500 is a registered Trademark of the Penwalt Corporation.)

Panels shall be one piece from base to building eave. The upper end of the panels shall be cut to match corrugations of the roof panels. The bottom end shall be straight cut and sealed at the base with metal closers.

D. Fasteners for connection of panel-to-structural and panel-to-panel shall be made with self-tapping, 3/8" hex head screws with a 5/8" min. OD metal backed neoprene washer. The finish on the screws shall be compatible with panel material. Exposed fasteners shall be prepainted to match color of panel or covered with plastic color caps to match color of panel.

E. Flaring, Trim, and Closures shall be furnished at corners, eaves, gable ends, at connectors to existing building at framed openings and wherever necessary to provide a weather tightness and a finished appearance. Materials for flashing and trim shall be the same material and finished the same as the exterior color as the roof panels or wall

panels as applicable. Solid or closed cell, preformed rubber or neoprene closure strips matching the profile of the panels shall be installed along the eaves and sidewall top and base where required for weather tightness and to discourage bird nesting.

- F. Sealants shall be used to seal the end and sidelaps of roof panels. The material shall consist of a blend of non-toxic, synthetic resin-base ingredients and inert organic extenders. Asphalt or asphalt derivatives will not be permitted. The sealant shall equal or exceed the performance characteristics called for in Military Spec. MIL-C-18969B. The sealant shall prevent the entry of water by capillary action.
- G. Installation of roof and wall panels including panel sidelaps, endlaps, fastener spacing, flashing, trim, closers, and sealants shall be performed in strict accordance with manufacturer's recommendations and the approved shop drawings.

2.04 FABRICATION - FRAMING

- A. Fabricate member in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.
- C. Provide framing for window, door, fan and louver openings.

2.05 FABRICATION - WALL AND ROOF SYSTEMS

- A. Roof Panels: The panel shall be similar to roof panels 24 inches wide with 2 inch locking vertical rib and a minimum of 24 gauge. The interlocking vertical rib shall contain a factory applied sealant. Panels shall be attached to the structure by concealed fasteners clips and thermal spacer over conditioned spaces.
- B. Wall Panels: The panels shall be a Shadowrib type wall system, 36 inches wide with interlocking 1-1/2 inch ribs and be a minimum 24 gauge steel. Panels shall extend from top of masonry to eave at fascia panel. Wall panel fasteners shall be exposed to the outside.
- C. Girts/Purlins: Rolled formed structural shape to receive siding, roofing sheet.
- D. Internal and External Corners: Minimum 26 gauge steel with same finish as adjacent material, profile shop cut and factory mitered to required angles. Back brace mitered internal corners as per manufacturer standards.
- E. Expansion Joints: Same material and finish as adjacent material where exposed, manufacturer's standard brake formed type, of profile to suit system.
- F. Flashings, Closure Pieces, Caps, and Drips: Minimum 26 gauge steel with same finish as adjacent material, profile to suit system.
- G. Fasteners: To maintain load requirements, and weather tight installation, same finish as cladding, non-corrosive type.
- H. Wall Fans and Louvers: Provide as follows:
 - 1. Fans: See **2.10**
 - 2. Louvers - 2 - 60" wide x 96" high shutter/louver combination equipped with insect screen, in removable frame, Vent Products Co., or comparable Ruskin or

Tuttle and Bailey shutter/louwer, or equal. Shutter/louwer to be mounted 6" above finished floor elevation.

2.06 FABRICATION - ACCESSORIES

- A. Translucent Panels shall be installed in the roof system to provide natural daylighting and reduce lighting costs. The panels shall be 10' - 6 1/2" in length, 1/16" nominal thickness and shall be a design compatible with the metal roof panels. Panels shall be fabricated from a thermosetting polyester synthetic resin, reinforced with a fibrous glass mat with a Tedlar film laminate on the exposed surface. (Tedlar is a registered trademark of DuPont). Panel color shall be cool white. Panel design shall include live loads up to 50 psf with standard purlin spacings, a U.L. 20 Flame Spread Rating and U.L. Class 90 Uplift Resistance Rating.

Panels shall be installed to provide a weather tight roof. A total of thirty-two (32) panels shall be installed in the roof evenly spaced between column lines. A total of 0 panels shall be installed in the wall system.

- B. Eave Gutters and Downspouts shall be minimum 26 gauge galvanized steel factory finished to match the color of the wall panels.

Gutters shall have a cross-sectional area of not less than 33 square inches. The gutter apron shall extend under the roof panels to provide positive counter flashing. The outside face of the gutter shall be supported with 12 gauge minimum, galvanized steel straps to the eave member at a maximum spacing of 3 feet.

Downspouts shall be of rectangular configuration and cross-sectional area of not less than 18 square inches. Downspouts shall be provided at each intermediate structural frame and at each end of the building. Attachment shall be provided to the wall covering, column or column guard as applicable. A 45 degree elbow and a concrete splash block shall be provided at the bottom of each downspout.

Installation of gutters and downspouts shall be in accordance with manufacturer's recommendations.

- C. Pipe Flashing at roof penetrations shall be accomplished with a one piece unit with a flexible base that conforms to panel configuration. Flashing units shall be constructed of E.P.D.M. rubber with a ductile aluminum reinforcing ring bonded to a rubber flange on the base. The base fastens to the flat area of the roof panel.

Installation shall be performed in accordance with manufacturer's recommendations. Penetration through a major roof panel corrugation will not be allowed.

- D. Insulation shall be installed over secondary structural members under the roof panels of all buildings and under the wall panels of the office. Insulation shall be 3" thick fiberglass blanket with a white metallized polypropylene scrim kraft backing visible from the underside of the roof or inside of the walls.

- E. Ventilators shall be gravity type fabricated from galvanized steel in 10'0" lengths spaced as shown on the drawings. Splice plates and end caps shall be provided to make up the specified lengths. Ventilators shall have dampers that provide an adjustable opening of the throat and that are manually operated by pull chains protected by fusible links. Ventilators shall match the color of the roof panels. Ventilators shall have a 9" minimum throat width and a CFM flow per 10 foot section as shown on the drawings.

A total of eight (8) ventilators shall be installed on the ridge of the roof.

- F. Guard Posts shall be 6" steel pipe in accordance with ASTM A-53, standard weight. Concrete shall be 3000 psi with 2' slump maximum.

Guard Posts shall be installed where shown on the drawings and shall project 4' above and below the finished floor. The pipe below the floor shall be encased in concrete 2' square. The floor shall not rest on the concrete encasement. After installation the pipe shall be filled with concrete. See guard post detail of the drawings. Posts shall be installed plumb. Ends shall be cut square and concrete fill rounded off above end of pipe. Painting shall be performed in accordance with Section I, G., Painting.

2.07 FINISHES

- A. Framing Members: Clean, prepare, shop prime and paint as required by 2.2 H of this specification section. Do not prime surfaces to be field welded until after welding is completed. Final paint may be either field applied or shop applied and touched up in field after structural steel erection is completed. Field welded surfaces to be field cleaned, prepared, primed, and painted after erection and welding is completed.
- B. Exterior and Interior Surfaces of Wall Roof Components and Accessories:

Exterior - 70% Kynar 500/Hylar 5000 (standard colors)

Interior - polyester type (standard color)

2.08 DOORS FRAMES AND WINDOWS

- A. Doors for access to the building by personnel shall be stock hollow metal, flush type, 1 3/4" thick formed from commercial quality, 18 gauge, cold-rolled, steel sheets with clean, smooth surfaces. Outer face sheets shall be reinforced with 20 gauge interlocking vertical, channels or z-shaped members spaced approximately 6" apart and spot-welded to the outer sheets. Tops of doors shall be capped. Cork, fiberboard or mineral wool shall fill spaces between reinforcing channels.

Doors shall be mortised, reinforced, drilled, and tapped at the factory for fully templated hardware. Doors shall be fabricated to receive glass where indicated. Moldings and other devices to properly mount and secure glass shall be furnished. Door sills shall be provide where indicated.

Door surfaces shall be cleaned and painted at the factory with primer of even consistency to provide a uniformly finished surface ready to receive field applied paint.

Doors shall be fitted in their frames with clearances sufficient to provide proper opening and closing.

- B. Door (Personnel) and Window Frames shall be formed from 16 gauge steel with 2" face, 5 3/4" depth, and 1/2" integral stop. Provide metal anchors of shapes and sizes required for the adjourning wall construction. Anchors shall not be lighter gauge steel than used for frames.

For frames set in masonry, provide 10" long corrugated or other deformed type adjustable anchor, four per jamb.

For frames set in metal stud partitions or metal framed openings, weld jamb, anchor clips to back of frames at jamb. Provide for securing anchors to steel with 1/4" machine screws and nuts or by welding. Furnish four anchors per jamb.

Window frames shall be prepared to receive glass. Moldings and other devices to properly mount and secure glass shall be furnished.

Frame surfaces shall be cleaned and painted at the factory with primer of even consistency to provide a uniformly finished surface ready to receive field applied paint.

Frames shall be set accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders having surfaces smooth and undamaged.

- C. Hardware, including locks, hinges, and closers shall be designed for medium duty with aluminum finish.

Locks shall be cylinder type all keyed alike. Three (3) hinges shall be provided for each door. Door bumpers shall be provided for each door. Door bumpers shall be provided where open door or hardware will strike wall, column or part of building construction. All closers for both interior and exterior doors shall be the product of one manufacturer and match in design. Construction shall be of the rack and pinion type and compression spring. Closures are to be the sizes as recommended in the manufacturer's reference tables for the doors to which they apply.

Hardware shall be installed in accordance with manufacturer's recommendations. Templates must be used for proper location.

- D. Glass in doors and windows shall be 1/2" thick clear double insulating type, tempered safety glass recommended by the manufacturer for the applicable service. Glass shall be installed in accordance with manufacturer's recommendations. Glazing materials including setting blocks, spacer shims, glazing compound, glazing tape, and stop beads shall be furnished. Glass shall be free from cracks, smears, and other defects.

2.09 GUARD RAIL SYSTEM

- A. Pipe railing shall be designed and installed in accordance with OSHA and the N. C. State Building Code, Factory - Industrial occupancy, Group F, and the following requirements.

- B. Guard Rail Requirements:

- 1A. Guardrail Height: 42-inches to centerline of top rail (Code Reference 1121).
2. Number of Rails: Two (One top, one intermediate)
3. Rail Spacing: Maximum clear distance between rails shall be 21 inches. (Code Reference 1121.5)
4. Pipe cross section: 1 1/2-inch minimum diameter (Code Reference 1112.5.3)
5. Pipe material: Schedule 40 (min.) aluminum alloy 6063-T6 or 6105-T5, ASTM b-429 or ASTM B-221
6. Tow plate: 4-inch high, mounted 1/4-inch above walking surface (Code Reference 11121)
7. Max. post spacing: 6 feet center to center.
8. Finish: Anodized. Pipe shall be plastic wrapped and shall not be removed until after installation.

9. The top surface of the rail shall be smooth and not be interrupted by projections.
10. Rail along curved structures shall be curved to match radius of structure or may be installed in cord length. Cord length shall not be longer than the maximum post spacing.
11. Provide self-closing gate at rail openings.
12. Manufacturer shall provide expansion joint for rail and tow plate as necessary.
13. Aluminum surfaces in contact with concrete or gout shall have a coating of bituminous paint. When in contact with dissimilar metals pipe shall be protected by a mylar isolator or other approved material.

C. Rail system shall be of welded construction. Railings shall be shop assembled in the largest practical sections for shipping and installing. Posts shall be set in galvanized steel pipe sleeves set in the concrete. Caulk posts into sleeves with lead or other setting material.

D. Welds shall be ground smooth.

E. Shop drawings for rail system shall be signed and sealed by a professional engineer registered in the State of North Carolina who is regularly engaged in the design of pipe rail system. Shop drawings shall include a note that the rail system was designed in accordance with the N. C. State Building Code.

F. Rail system shall be as manufactured by Alumaguard. Hollaender Manufacturer, Thompson Fabricating Co. (05/95) or equal.

2.10 CONTRACTOR SHALL PROVIDE AND INSTALL THREE VENTILATOR FANS AS SHOWN ON THE PLANS.

A. Sidewall Propeller Exhaust fans: Provide three - Greenheck Model SBC - 3H72-50 or equal. Capacities: 53,870 CFM at 0.15 inch static pressure, 5 HP 230 V 1 phase. Provide with backdraft damper and motorside guard.

B. Contractor shall provide three louvers size is 74" x 74" one for each of the 3 fans required.

2.11 CONTRACTOR SHALL PROVIDE THE BOOSTER PUMP AND INSTALL AND PLUMB WHERE SHOWN ON THE PLANS.

A. Booster pump: Teel or approved equal (Granger Stock No. 2P005)
Capacity: 8 gpm at 40 psi, 1 HP 115/230 Volt 1 phase

B. Contractor shall mount and plumb in accordance with the manufacturers recommendations. Include intended mounting fasteners in the shop drawings.

2.12 STAIRS

A. Stairs and landings shall be fabricated of steel and shall be designed and installed in accordance with OSHA and the NC State Building Code, Factory-Industrial Occupancy Group F.

2.13 ELECTRONIC SCALES

A. General

The intent of this section of these specifications is to provide a complete and operating scale system to weight loading trucks beneath the truck loading bury which may be provided as a bid alternate.

The scales two (2) shall be provided in two (2) sections each. The scales provided shall be capable of withstanding the tamping operation that will be required to load the trailers.

Warranty shall extend two (20 years from date of acceptance.

B. Features

- 11' wide platforms
- digital load cells, stainless steel encased, hermetically sealed and purged with inert gas factory assembled modules
- capacity 100 tons
- tandem axle capacity 55000 lb.
- keyboard tare
- push button zero
- automatic zero maintenance
- time/date
- consecutive numbering
- numeric I.D.
- capable of sending output to printer or computer
- 4" remote display for axle scale one, axle scale two and total of one and two

C. Foundations

Scale foundations shall be provided as shown on the drawings approved by the manufacturer of the scale system.

D. Equipment

Scale equipment shall be provided as follows. Alternate equipment must be approved.

- 2 - Toledo 756CD1011D 10'x11' ton capacity
55K tandem axle capacity
- 2 - Toledo 756CD1511D 15'x11' 60 ton capacity
55K tandem axle capacity

E. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.

F. Set column base plates with non-shrink grout to full plate bearing.

G. Do not field cut or alter structural members without approval of Engineer.

H. After erection, prime welds, abrasions, and surfaces not shop primed.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

- B. Verify that foundation, floor slab, plumbing stub-outs and stub-out for plumbing vent through roof and place anchors are in correct position.

3.02 ERECTION - WALL AND ROOFING SYSTEMS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 6 inches. Place sidelaps over bearing.
- E. Provide expansion joints as required.
- F. Use concealed fasteners.
- G. Install sealant and gaskets to prevent weather penetration.
- H. System: Free of rattles, noise due to thermal movement and wind whistles.

3.03 ERECTION - GUTTER AND DOWNSPOUT

- A. Rigidly support and secure components. Joint lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Apply bituminous paint on surfaces in contact with cementitious materials.
- C. Slope gutters minimum 1/16 inch/ft.
- D. Install Gutters to withstand snow loads and allow snow to slide from roof.

3.04 INSTALLATION - ACCESSORIES

- A. Install door frames, doors, rolling doors, fan and louvers, in accordance with manufacturer's instructions.
- B. Seal wall and roof accessories watertight and weather tight with manufacturer's standard sealant.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from level; 1/8 inch (3 mm) from plumb.
- B. Siding and Roofing: 1/8 inch (3 mm) from true position.

3.06 ORIENTATION

- A. Doors, fans, gutter and downspouts and louvers to be oriented as shown on the plan.

---END OF SECTION---

SECTION 15041

DISINFECTION OF POTABLE WATER AND WASH WATER SYSTEM COMPONENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work under this section includes the provision of all plant, labor, and material required for the sterilization by chlorination of the potable water lines installed under this contract.

1.02 REFERENCE STANDARDS

- A. American Water Works Association (AWWA).
 1. B 300 Standard for Hypochlorites
 2. B 301 Standard for Liquid Chlorite
 3. C 652 Standard for Disinfection of Water Storage Facilities
 4. C 651 Disinfecting Water Mains

1.03 SUBMITTALS

- A. Three copies of the bacteriological test results shall be submitted to the Engineer for approval prior to acceptance of the water lines.

PART 2 - PRODUCTS

2.01 DISINFECTANT

- A. The following products may be used as the disinfectant at the Contractor's option:
 1. Chlorine, liquid: AWWA B301.
 2. Hypochlorite, calcium and sodium: AWWA B300.

PART 3 - EXECUTION - WATER MAINS

3.01 DISINFECTION

- A. Before acceptance or placing the water lines in service, the new potable water piping shall be disinfected in accordance with AWWA C-651 and as specified herein.

3.02 FLUSHING

- A. After satisfactory completion of the pressure test, the line shall be thoroughly flushed with water of potable quality to remove all sediment or foreign material. The line shall then be disinfected by injection of a chlorine solution. The chlorination material shall be induced in sufficient quantity to maintain a chlorine residual of at least 50 ppm and shall remain in the system at least 24 hours.

3.03 OPENING AND CLOSING

- A. All valves on the lines being disinfected shall be opened and closed several times during the contact period. Fire hydrants and other specials should receive special attention to insure proper sterilization.

3.04 STERILIZATION

- A. Pipe, taps, and fittings used at connection to existing piping shall be thoroughly sterilized before installation. Excavation for such connections shall be kept free from water until the connection is completed, and great care shall be exercised to prevent contamination of the existing pipe and connection fittings. The inside of the existing pipe within 3 feet of point of connection shall be sterilized by spraying with a solution containing not less than 200 ppm of chlorine immediately before connection is made.

3.05 CONTAMINATION

- A. If at any time, in the opinion of the Engineer, foreign matter or possible contaminants enter the existing piping, or if samples show the water from the pipes to be unsafe on completion, the existing piping shall be sterilized as specified for new piping, back to the nearest gate valve or valves on existing piping and beyond those points as necessary to include all contaminated piping.

3.06 ACCEPTANCE OF PIPING

- A. On completion of the sterilizing, the piping shall be flushed thoroughly, samples shall be taken and tested by a recognized testing laboratory, similar samples being delivered to the Engineer, and the water approved as fit and safe for human consumption before acceptance. Should the samples shown the water unsafe, the piping shall be resterilized until satisfactory tests are obtained. The Contractor shall be responsible for all testing.

3.07 USE OF WATER

- A. Before new mains are to be filled or flushed, the Owner of the existing water mains from which water is to be obtained shall be notified and permission shall be gained prior to using water from the Owner's system. The Contractor is responsible for making his own arrangements to obtain water for testing. Water mains shall be filled, flushed, and sterilized in a maximum length of 2000 feet or 10,000 gallons, whichever is smaller, on any one day for each municipal water system in order to keep the demand on the water system to a minimum. Due to the quantity of water required to flush and sterilize the mains, the Contractor will be required to use the utmost care to clean the pipe before installation and to keep it clean during installation so that the use of water will be held to a minimum.

3.08 DISCHARGE OF HEAVILY CHLORINATED WATER

- A. Care shall be exercised so that the discharge point for flushing sterilized water mains is not immediately adjacent to existing standing bodies of water such as creeks, swamps or streams. Where possible the terminal end of a reach of pipe to be flushed shall be selected at locations which discharge to roadside ditches which are some distance upstream or down stream of natural watercourses.

PART 4 - EXECUTION

4.01 BACTERIOLOGICAL AND CHLORINE RESIDUAL SAMPLING AND TESTING

- A. Test for the chlorine residual at all required bacteriological test locations immediately after induction of the highly chlorinated water and again after 24-hours, prior to flushing of the highly chlorinated water from the potable water system.
- B. Two samples at each location specified shall be obtained after the chlorination procedure is completed, and prior to placing the system in service. The first sample shall be taken immediately after flushing of the chlorinated water again and again in 24-hours. A set of samples shall be taken as a minimum at the outlet piping of the tank.
- C. Recommended additional samples. During the disinfection operation and the required sampling of water from the new system, it is recommended that samples be taken from water inflowing to the new work to determine if coliforms are present in the typical potable water source.
- D. Care in sampling. No hose or fire hydrant shall be used for the collection of samples. The samples shall be taken from an approved sample tap consisting of a corporation stop installed in the main with a copper tube gooseneck assembly. The operation shall be such as to ensure that the sample collected is actually from water that has been in the storage facility.
- E. Samples shall be tested for the presence of coliform organisms in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater. The testing method used shall be either the multiple-tube fermentation technique or the membrane-filter technique.
- F. All testing shall be performed by a laboratory certified for the required testing by the State of North Carolina.
- G. Test for odor. The water in the new system should also be tested to assure that no offensive odors exist due to chlorine reactions or excess chlorine residual.
- H. If any of the samples show the presence of coliform, procedure 1 or 2 described below shall be followed, with the approval of the Owner, before placing the unit or facility in service.
 - 1. Take repeat samples at least 24 hours apart until consecutive samples do not show the presence of coliform.
 - 2. Again subject the unit or facility to chlorination and sampling as described in this standard.
- I. After samples are shown to be free of coliform, and after the approval of the Owner, the potable water system may be placed in service.

4.02 CONTAMINATION

- A. If, in the opinion of the Engineer, possible contaminants have entered the existing water system, or water samples show the water in the existing system to be unsafe on completion of the work the existing water system shall be disinfected as specified herein. Disinfection of the existing system shall be coordinated with the Owner.

---END OF SECTION---

SECTION 15042
PIPE LINE TESTS

PART 1 - GENERAL

1.01 SCOPE

- A. Work under this section consists of supplying all labor, materials, and equipment required for the testing of gravity sewer lines and pressure piping systems.
- B. Pipe lines to be tested include, but are not limited to, the following:
 - 1. Gravity Sewer Lines, Manholes and Service Laterals
 - 2. Water Mains (Not applicable except for force main reference)
 - 3. Wastewater Force Mains
- C. Prior to the commencement of testing, the Engineer shall be contacted to request scheduling of inspection and testing. The Resident Project Representative shall visually inspect the installation prior to testing to insure that all valves and other appurtenances are properly located, operable, and installed at the proper grade. All defects disclosed by the inspection shall be corrected prior to testing.
- D. The following test sequence shall be for all wastewater system gravity extension including services unless otherwise permitted by the Engineer.
 - (1) Perform a visual inspection through light testing.
 - (2) Correct defects revealed by visual inspection.
 - (3) Perform leakage testing as directed by the Engineer.
 - (4) Make any necessary repairs.
 - (5) Make the necessary retests.
- E. The following test sequence shall be for all water system extensions including services unless otherwise permitted by the Engineer.
 - (1) Perform pretest inspection.
 - (2) Flush the main.
 - (3) Perform the hydrostatic tests.
 - (4) Apply the proper dosage of chlorine.
 - (5) Allow chlorine solution to remain in the water main a minimum of 24 hours.
 - (6) Flush the main.
 - (7) Take bacteriological samples.
- F. The following test sequence shall be for all wastewater force mains unless otherwise permitted by the Engineer.
 - (1) Same as for water main except disinfection and bacteriological sampling not required.

PART 2 - EXECUTION

2.01 GENERAL

- A. The Contractor shall provide all equipment, instruments, and water as required for the proper completion of the testing of the pipe system. The source and quality of the water test procedure and disposal of the water shall be approved by the Engineer. Test pump shall have an accurate gage graduated in 1.0 PSI increments.
- B. The Contractor shall notify the Owner and Engineer a minimum of 48 hours before any work is to be tested.
- C. All tests shall be accomplished in the presence of the Resident Project Representative or Engineer.
- D. All defects in the piping system shall be repaired and/or replaced. Repairs shall be made to the same quality and standard as specified for the complete system.
- E. Repaired sections shall be retested until acceptance.
- F. Pressure tests shall be made on sections between valves. Where the line ends in free flow, suitable plugs shall be furnished.
- G. Gravity lines shall be tested between manholes, junction boxes or clean-out. Gravity lines not meeting minimum requirements and tolerances as determined by the Engineer shall be relaid at Contractor's expense.
- H. All visible leaks shall be repaired whether or not the subject line passes the test imposed.
- I. All lines shall be cleaned of debris and sediment prior to testing.

2.02 GRAVITY SEWER LINES AND MANHOLES

- A. Clean all gravity sewer lines of debris and sediment. Leakage testing shall be by low pressure air testing unless prior written approval from Engineer is obtained.
- B. Visual Inspection:

All gravity sewers shall be visually inspected from every manhole by use of mirrors, television cameras, or other devices. At a minimum, gravity sewer lines will be checked by the Engineer to determine whether any displacement of the pipe has occurred (a) after the trench has been filled to two feet above the pipe and tamped as specified; and (b) upon completion of the project. The test will be as follows: A light will be flashed between manholes, or if the manholes have not as yet been constructed, between the locations of the manholes by means of a flashlight by reflecting sunlight with a mirror. If the illuminated interior of the pipe shows any misalignment, displaced pipe, or any other defects, the defects designated by the Engineer shall be remedied by the Contractor at his expense prior to leakage testing.

- C. Leakage Testing:

- 1. Air Testing:

- a. Air testing shall be used in lieu of exfiltration and infiltration testing. All air used for testing shall pass through a single, above ground control panel visible to the Resident Project Representative during testing.

- b. The test pressure shall be 5.0 psig. The air pressure shall be maintained for a minimum of two (2) minutes by throttling the air supply. The air supply shall then be disconnected and the pressure allowed to drop. At any convenient point at which internal air pressure is greater than 4.5 psig, timing shall commence with a stop watch or other timing device that is at least 99.8% accurate. The time required for the pressure to drop 1.0 psi shall be recorded. The leakage rate shall be considered acceptable if the pressure does not drop over 1 psi in the time prescribed for the test in Table 1 in this Section. Otherwise, the leakage rate shall be considered unacceptable.

Manhole entry during the test shall not be allowed. The internal pressure on the system shall not exceed 9.0 psig.

- c. Sewer service lengths shall be ignored for computing required test times for mains. In the event a test section, having a total surface area less than 625 square feet, fails to pass the air test when services have been ignored, the test time shall be recomputed to include all services using the following formula:

$$T = \frac{0.085 (D1)(D1) L1 + (D2)(D2)L2 + \dots (Dn)(Dn)Ln}{D1L1 + D2L2 + \dots DnLn} \frac{K}{Q}$$

Where T = Shortest allowable time, in seconds for the air pressure to drop 1.0 psig;

K = 0.000419 (D1L1 + D2L2 +DnLn), but not less than 1.0;

Q = 0.0015 cu.ft/min./sq.ft. of internal surface;

D1, D2,.....Dn = Nominal diameters of the different size pipes being tested in inches.

L1, L2, ...Ln = Respective lengths of the different size pipes being tested in feet.

If the recomputed test time is short enough to allow the section to pass, the section undergoing the test shall have passed.

D. Deflection Testing for PVC (SDR 35) Gravity Sewers

If PVC (SDR 35) sewer pipe is utilized, deflection testing shall be required with a rigid device (mandrel) sized to pass 5% or less deflection (or deformation) of the pipe.

Deflection test 100% of the total footage of solid wall PVC pipe.

The mandrel device shall be cylindrical in shape and constructed with nine or ten evenly spaced arms or prongs. Mandrels with less than nine arms will not be approved for use. The dimensions of the mandrel shall be as listed in the table below: The diameter of the mandrel shall carry a tolerance of plus or minus 0.01 inch.

Nominal Diameter	Contact Length	Mandrel Diameter ASTM 3034 SDR 35	Mandrel Diameter ASTM D 2680
8"	8"	7.28"	7.36

10"	10"	9.08"	9.26
12"	10"	10.79"	11.16
15"	12"	13.20"	14.01

Allowances for piping wall thickness tolerances or ovality (from heat, shipping, poor production, etc.) shall be deducted from the "D" dimension but shall not be counted in as a part of the 5% or lesser deflection allowance.

The mandrel shall be hand pulled by the Contractor through all sewer lines in the presence of the Engineer or his representative. Any sections of the sewer not passing the mandrel shall be uncovered and the Contractor shall reround or replace the sewer to the satisfaction of the Engineer. These required sections shall be retested.

The inspection shall be conducted no earlier than 30 days after reaching final trench backfill grade, provided in the opinion of the Engineer that sufficient water densification or rainfall has occurred to thoroughly settle the soil throughout the entire trench depth. If this cannot be achieved in the time after installation prior to the project completion date, the Contractor may, with the prior approval of the Owner, increase the mandrel size to measure 1/3 less of a deflection allowance.

Contact length shall be measured between points of contact of the mandrel arm. This length shall not be less than that shown in the table above.

The mandrel may not be used until approved by the Engineer. Proving rings provided by Contractor shall be used to assist in this. Drawings of the mandrel with complete dimensions shall be furnished by the Contractor to the Engineer for each diameter and specification of pipe.

The mandrel device shall be as manufactured by H and H Fabricating of Fairfield, Ohio or Wortco, Inc. of Franklin, Ohio, Cherne Industries Inc. of Minn. Minnesota and shall be approved by the Engineer.

E. Manhole Testing:

1. Each manhole shall be tested for leakage immediately after assembly and prior to backfilling. The test method shall be the vacuum test.

The Contractor shall provide all materials, labor, and equipment necessary to perform the testing. Testing equipment shall be subject to approval by the Owner. The Owner shall be contacted prior to testing to schedule the test time such that the resident project representative may be present. The resident project representative shall be present during all testing. All lift holes shall be plugged with an approved non-shrink grout. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole. The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendations.

2. A vacuum of ten inches (10") of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to nine inches (9"). The manhole shall pass if the time is greater than sixty (60) seconds for forty-eight-inch (48") diameter, seventy-five (75) seconds for sixty-inch (60"), and ninety (90) seconds for seventy-two inch (72") diameter manholes.

3. If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.

F. Manhole Construction Tolerance:

The as-constructed pipe inverts at manholes shall be within 0.05 feet (plus or minus) of the elevations shown on the plans.

2.03 WATER MAINS

- A. Flush all potable lines of debris and sediment prior to clean and performing pressure test. Flushing shall be done in accordance with AWWA C601. Where large quantities of water may be required for flushing, the Engineer reserves the right to require that flushing be done at periods of low demand. Mains shall be flushed only in the presence of the Resident Project Representative.
- B. Immediately upon completing a portion of the line between valves, the pipe shall be tested by applying 150 psig hydrostatic pressure maintained for a two-hour period or to the full satisfaction of the Engineer.
- C. Allowable leakage shall be based on the following table:

PIPE SIZE	ALLOWABLE LEAKAGE (Gallons per hour per 1000 feet of pipe)
2	0.16
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99
14	1.29
16	1.47
18	1.66
20	1.84
24	2.21
30	2.76
36	3.31

If the leakage is greater than the allowable leakage as given by the above, the Contractor shall replace any defective materials and perform all necessary work to insure that the installation is acceptable and a retest shall be performed subsequent to any repair work performed. Remedial repair work and retesting shall be repeated until the leakage occurring during the test period is less than or equal to the allowable leakage.

- D. Water mains and fittings installed outside of gate valve installation shall be visually inspected for leaks by the Contractor and Resident Project Representative. Any leaks shall be repaired and/or replaced by the Contractor. Repairs shall be made to the same quality and standard as specified for the complete system. Repaired sections shall be retested until acceptance, as determined by the Owner and Resident Project Representative.

---END OF SECTION---

SECTION 15060
PIPE AND PIPE FITTINGS

PART 1 - GENERAL

1.01 SCOPE

- A. The materials used for the construction of all gravity, sewer and sewer force main pipelines and fittings thereof shall be new, free of defects in product workmanship, and of the highest quality available in the industry. Materials not specified but deemed equal to those specified may be approved for use provided that documentation and samples necessary for approval are provided to the Engineer prior to the ordering of said materials. Approvals must be given by the Engineer before such material may be used in construction. Current specifications (latest revisions) shall apply in all cases where materials are described by reference to published standards such as ASTM, AWWA, ANSI, etc.

- B. The work under this section includes but is not limited to the following:
 - 1. Gravity Sewer Pipe (Includes Pipe From Trench Drains)
 - 2. Sewer Force Main Pipe
 - 3. Water Pipe

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221 - Excavating, Trenching, Backfilling, and Dewatering for Pipes

- B. Section 15042 - Pipe Line Tests

- C. Section 15080 - Piping Accessories

- D. Section 15100 - Valves

- E. Section 15130 - Pipe Installation

1.03 REFERENCED STANDARDS

- A. ANSI

- B. ASTM

- C. FS

- D. NSI

1.04 SUBMITTALS

- A. Certification: The Contractor shall submit 5 copies of certifications by the pipe manufacturer as specified hereinafter.

- B. Shop Drawings: Submit shop drawings as required by these specifications. Include details of pipe and fittings, designation of class to be used.

1.05 DELIVERY AND HANDLING

- A. Every precaution shall be taken to prevent injury to the pipe during the transportation and delivery of the pipe to the site of the work. More than ordinary care must be taken in loading and unloading the pipe. Such work must be done slowly with skids or suitable power equipment, if necessary, and the pipe shall be under perfect control at all times. Under no conditions shall the pipe be dropped, bumped, or dragged.
- B. Each pipe shall rest upon suitable pads, strips, skids, or blocks during transportation and while awaiting installation in the field and shall be securely wedged and tied in place.
- C. When handling the pipe with a crane, a suitable pipe hook, or rope sling around the pipe shall be used. The crane shall be so placed that all lifting is done in a vertical plane. Under no conditions shall the sling be allowed to pass through the pipe unless adequate measures are taken to prevent damage to the tongue or groove ends.
- D. Each section of the pipe shall be delivered in the field as near as practicable to the place where it is to be installed. Pipe shall be distributed along the side of the trench opposite to the spoil bank. Where necessary to move the pipe longitudinally along the trench, it shall be done in such a manner as not to injure the pipe or coating. Pipe shall not be rolled nor dragged on the ground.
- E. If, in the process of transportation or handling, any pipe or special is damaged, such pipe or pipes shall be rejected and immediately removed from the site and replaced at the Contractor's expense.
- F. PVC pipe and fittings stored on site shall be shielded from the sun's ultraviolet rays by suitable cover, or indoor storage shall be provided.

1.06 INSPECTION

The pipes shall be inspected immediately on delivery to site and after distribution on the job site. In the opinion of the Engineer, damaged pipe or fittings shall be removed immediately from the job site.

PART 2 - PRODUCTS

2.01 GRAVITY SEWER PIPE

Gravity sewers and outlet piping from trench drains shall be constructed of PVC (SDR 35), PVC Composite, ABS Composite or ductile iron pipe, except for circumstances where the plans, specifications, or Engineer specifically require a particular pipe material be utilized for an installation.

1. PVC (SDR 35) Pipe

PVC gravity sewer pipe and fittings of the size indicated shall be manufactured from PVC components as defined and described in ASTM-D-2748 specification for rigid poly (vinyl chloride) compounds and chlorinated poly (vinyl chloride) compounds. Pipe and fittings shall meet the requirements of ASTM-D-3034 for

SDR 35. Joints shall be bell and spigot with elastomeric (gasketed joint). Pipe lengths shall be supplied in 13.0 foot lengths. Pipe strength shall be capable of withstanding the impact test (ASTM-D-2444) with no shattering or splitting and the flattening test (ASTM-D-2412) with no evidence of splitting, cracking or breaking. Joints shall be assembled and tested in accordance with ASTM-D-3212. Minimum pipe stiffness at 5% deflection shall be 46 psi when tested in accordance with ASTM-D-2412. The extrusion quality of the pipe shall be tested in accordance with ASTM-D-2152. Gaskets shall meet the requirements of ASTM F477. Minimum cell class shall be 12-5-4B.

2. Ductile Iron Pipe

All ductile iron pipe shall be manufactured in compliance with ANSI Standard A21.51. The interior of the pipe shall be cement-mortar lined with an asphaltic coating in accordance with ANSI A21.4. The exterior of the pipe shall have a one (1) mil bituminous coating in accordance with ANSI A21.51. The thickness class for ductile iron pipe shall be Class 50 unless required otherwise by the Engineer. Pipe shall be in nominal 18-20 foot laying lengths. The pipe joints for ductile iron pipe shall be "push-on" manufactured in accordance with ANSI 21.11. Where fittings are required, as in the installation of drop manholes, the fittings shall conform to the requirements of Part 2.03.3 (this section) for water main fittings. Polyethylene encasement shall be applied to all underground ductile iron pipe installations. Materials and installation procedures shall be in accordance with ANSI/AWWA C105/A21.5.88.

2.02 WATER PIPE

Water mains shall be constructed of polyvinyl chloride (PVC), except in instances where the plans, specifications, or Engineer specifically require a particular pipe material be utilized for an installation. All plastic pipe shall bear the seal of the National Sanitation Foundation. If ductile iron pipe is necessary, it shall conform to Part 2.03.3 of this section.

1. PVC (C900) Pipe

PVC water main shall be manufactured in accordance with AWWA Standard C900. The pipe shall have push-on type joints with elastomeric gaskets. The pipe shall be pressure rated at 150 psi with a dimension ratio of 18 for both bell and pipe thickness. Pipe shall be furnished in nominal twenty foot (20') lengths.

2. Ductile Iron Pipe

Ductile iron pipe for water mains shall be manufactured in conformance with AWWA C151 and shall be cement-mortar lined with an asphaltic coating in accordance with AWWA C104. The exterior of the pipe shall be bituminous coated in accordance with AWWA C151. The minimum thickness class of pipe shall be Class 50. Pipe shall be furnished in nominal 18 to 20 foot lengths. Pipe joints for ductile iron pipe shall be "push-on" unless the additional pipe deflection allowed by mechanical joints is necessary or other considerations dictate the use of mechanical joints. (See Part 2.03.4.b. of this Section for allowable deflection). The joints for ductile iron pipe shall conform to AWWA Standard C111 revision (ANSI A21.11). Polyethylene encasement shall be applied to all ductile iron pipe installations. Materials and installation procedures shall be in accordance with ANSI/AWWA C105/A21.5.88.

3. PVC (SDR 21) Pipe

PVC water main (service pipe) of two-inch (2") size shall be Class 200 SDR 21 conforming to ASTM D1784 and ASTM D2241 with "push-on" joints. Pipe shall bear the National Sanitation Foundation seal for potable water.

4. Fittings

Tees, elbows and other fittings for PVC C-900 pipe and ductile iron pipe shall be of ductile iron unless otherwise permitted or required by the Engineer. Standard dimension fittings or compact fittings may be used in accordance with the requirements of this section.

The interior of all fittings shall be cement mortar lined with an asphaltic coating in accordance with AWWA Standard C-104 (ANSI 21.4). The exterior of all fittings shall have a one (1) mil bituminous coating in accordance with AWWA Standard C-100 (ANSI A21.10).

Compact fittings shall be ductile iron with either push-on or mechanical joints in accordance with ANSI/AWWA C153/A21.53-84. Cement lining with an asphaltic coating shall be provided in accordance with ANSI/AWWA C104/A21.4.

Standard dimension fittings for PVC C-900 pipe and ductile iron pipe shall be of ductile iron with "push-on" joints unless the additional pipe deflection allowed by mechanical joints or other considerations dictate the use of mechanical joints (See Part 2.03.4. of this section for allowable deflection). The fittings shall comply with all requirements of AWWA Standard C-110 (ANSI A21.10) and shall be designed for a minimum working pressure of 150 psi plus 100 psi surge pressure.

5. Allowable Deflection

The Engineer shall require fittings at sufficient locations to minimize the possibility that pipe joint deflections will exceed the maximum horizontal or vertical joint deflections recommended by the pipe manufacturer.

6. Copper Pipe and Tubing

General: Service tubing for interior plumbing shall be copper pipe.

- A. Copper pipe and tubing shall conform to ASTM B-88 Type K standard specification for seamless copper water tube with copper or brass fittings.
- B. Soldered joint fittings shall conform to NSI B-16.22. Fittings to be of same manufacturer as pipe.
- C. Screw joint fittings to be provided where required and/or indicated.
- D. Screw joint unions shall be provided at each in-line valve, pressure regulator, pressure reducer and/or where indicated.

PART 3 - EXECUTION

3.01 INSPECTION

The pipes shall be inspected immediately on delivery to site and after distribution on the site. In the opinion of the Engineer, damaged pipe or fittings shall be removed immediately from the job site.

3.02 EXCAVATING, TRENCHING, BACKFILLING, AND DEWATERING FOR PIPES

Refer to Section 02221 of these specifications.

3.03 PIPE INSTALLATION

Refer to Section 15130 of these specifications.

---END OF SECTION---

SECTION 15080
PIPING ACCESSORIES

PART 1 - GENERAL

1.01 SCOPE

- A. The Contractor shall provide the required accessories as indicated on the plans and/or specified herein or as reasonably implied by the plans and specifications.
- B. Work under this section includes, but is not limited to, the following:
 - 1. Piping and Supports
 - 2. Wall Sleeves
 - 3. Precast Vaults and Manholes
 - 4. Cleanouts
 - 5. Eye Wash
 - 6. Hose Reel

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221 - Trenching, Backfilling and Compaction for Pipe Lines
- B. Section 15041 - Sterilization of Potable Water Lines
- C. Section 15060 - Pipe and Pipe Fittings
- D. Section 15100 - Valves and Cocks
- E. Section 15130 - Pipe Installation

1.03 REFERENCED STANDARDS

- A. AWWA
- B. ASTM
- C. ACI

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings as required by these specifications.
- B. Unless otherwise approved in writing, the products for each contract shall be used throughout the project. For example, should the Contractor choose a particular brand and model of double check devise for service meters, that make and model shall be used throughout the Contract for that particular project. Should the Contractor elect to use polyethylene service tubing, then unless specifically called for polyethylene shall be used for the entire Contract.

1.05 DELIVERY AND HANDLING

- A. Exercise care in handling. All damaged accessories shall be removed from the job site.

PART 2 - PRODUCTS

2.01 PIPE AND SUPPORTS

A. General:

1. All interior pipe lines shall be adequately supported by concrete piers as indicated. The support provided shall maintain the required grading or pitching of the line, prevent vibration, and secure piping in place and prevent sagging. In addition, supports shall be provided to prevent stressing conditions to line items such as valves and flow meters.
2. All piping shall be supported away from direct bearing on wall, floors, and ceilings.
3. All supports shall be securely fastened in a manner acceptable to the Engineer.

B. Low Horizontal Piping:

1. Supports shall be of concrete bases, pipe column supports, or special cast bases.

2.02 WALL SLEEVES

- A. Provide hot-dipped galvanized split ring wall sleeves where pipes pass through walls and floor slabs not using wall castings. Sleeves shall be 1/2 inch larger I.D. than the O.D. of the pipe passing through. Seal space between the water piping and the sleeve by means of link-seal type expansion device.

2.03 PRECAST TANKS AND MANHOLES

A. General Requirements:

1. Septic or holding tanks shall be constructed of precast concrete in accordance with the details shown on the drawings and shall have no infiltration of ground water and shall comply with 3400 or 3405 as applicable.
2. Water Service Vault shall be constructed of reinforced concrete with a minimum interior dimension of 4' x 5' and minimum wall thickness of 4". Vault shall be reinforced in accordance with ACI 318 as described for septic tanks in Section 03400 suitable for an H-20 loading. Access shall be by means of a 30" cast iron ring and cover as specified for manholes. Vault shall be watertight with pipe entry points to receive non-shrink grout.
3. Shop Drawings:
 - a. Shop drawings shall be submitted to the Engineer for approval showing all dimensions, size, and spacing of the reinforcing access hatches or ring and covers and vault and manhole details.

2.04 SEWER SERVICE CLEANOUTS

Service cleanouts shall be PVC sewer pipe Schedule 40 conforming to ASTM D-3034 latest revision. Cleanouts shall be a minimum of 4-inch diameter with screw in cap. Installation shall be in accordance with the details as shown on the plans.

2.05 HOSE REEL

Hose reel shall have 3/4" NPT inlet, industrial quality automatic reel suitable for 70 feet of 3/4" heavy duty hose, provide 70' of heavy duty EPDM hose and mount with factory mounting bracket with suitable wedge anchor bolts at the location given by the Engineer.

Hose reel shall be Reel Kleen B1400 series or equal.

2.06 EYEWASH

The eyewash shall be a stainless steel Haws 7360BT or equal mounted in conformance with the manufacturer's requirements.

---END OF SECTION---

SECTION 15100

VALVES WATER LINES

PART 1 - GENERAL

1.01 SCOPE

- A. The Contractor shall provide the valves as indicated on the plans and specified herein.
- B. Work under this section includes, but is not limited to, the following:
 - 1. Gate Valves
 - 2. Double Check Backflow Preventer
- C. See Section 15080 for Corporation Stops.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221.2 - Excavation, Trenching & Backfilling - Water Lines
- B. Section 15041 - Sterilization of Potable Water Lines
- C. Section 15060.2 - Water Pipe and Pipe fittings
- D. Section 15130 - Pipe Installation

1.03 REFERENCED STANDARDS

- A. AWWA
- B. ASTM
- C. ACI

1.04 SUBMITTALS

- A. Contractor shall exercise care in handling and storage. All damaged units will be removed from site.

PART 2 - PRODUCTS

2.01 VALVES

- A. General:
 - 1. Valves shall be of the type, pattern, and size indicated and required for the service. All valves shall be equipped with suitable means of operation. Underground valves shall be of the inside screw type and shall have valve boxes. All gate valves that are not underground, except as otherwise noted, shall be of

the outside screw and yoke type rising stem, with hand wheel or floor stand as indicated or required for operation. All plug valves shall be equipped with a suitable lever and floor and stand if indicated or required for operation. All valves shall open by counterclockwise rotation. Suitable extension stems of cold rolled steel shall be provided for operation of valves from floor standards. All valves shall be equipped with handwheel operator except valves for underground installation in valve boxes which shall be equipped with a standard operating nut.

B. Gate Valves:

1. Gate valves shall be cast iron body, fully bronze mounted, resilient seated, design in accordance with AWWA Specification C509. They shall be suitable for a working pressure of not less than 150 psi.
2. Gate valves 3 inches and larger shall have the name and trademark of the manufacturer and the guaranteed working pressure cast on the body of the valves. All valves shall be of one manufacturer and identified by the manufacturer's catalog number stamped on a metal disc located under the valve handle nut. Valves shall be bronze and manufactured by Jenkins, Crane, Nibco, Powell, or equal.

2.02 VALVE BOXES

- A. Valve boxes shall be provided for underground valves. The boxes shall be of cast iron and shall consist of a base section, center extension sections as required, and a top section with cover marked "WATER". The box shall be set vertical with the top at finished grade. Provide concrete pad at top of valve boxes located in grassed areas as indicated on the drawings.
- B. Valve boxes provided at the master meter vaults, specifically the valve box on the main line, shall be coated to provide quick identification. Color choice and material standard shall be submitted to the owner and subject approval by the engineer. The cost for coatings shall be included under the lump sum bid price for the master meter vault.

2.03 SWING CHECK VALVES FOR 3" SERVICE LINE

The swing check valve shall conform to AWWA C508. The seat shall be accessible for cleaning without removal of the valve from the piping system. Internal components shall be of bronze, stainless steel or other corrosion resistant materials recommended for potable use by the National Sanitation Foundation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All valves, gates, and accessories shall be installed as indicated on the plans in complete accordance with the manufacturer's recommendations.

3.02 PAINTING

- A. All equipment shall receive the manufacturer's standard coating for the intended application. Contractor shall touch up damaged coatings using methods and materials approved by the component manufacturer. All coatings shall be suitable in every way for the intended application.

---END OF SECTION---

SECTION 15130
PIPE INSTALLATION

PART 1 - GENERAL

1.01 SCOPE

- A. Work under this section includes, but is not limited to, the installation of all pipe.

PART 2 - INSTALLATION

2.01 PVC PIPE

- A. Solvent Weld: Where indicated in these specifications or on the plans, solvent weld type joints shall be used. Field cut ends shall be sanded to roughing the surface. Joints shall be cleaned of foreign material. Solvent shall be applied to the joint and joint made as recommended by the manufacturer. Excess solvent shall be wiped off. The joint should not be moved until sufficiently set up.
- B. Bell and Spigot Joints: Thoroughly clean bell and spigot ends prior to jointing. Ends of field cut pipe shall be beveled with file. Gasket shall be clean and lightly lubricated. Joint shall be made as recommended by the manufacturer.
- C. Fittings: Fittings shall be blocked or otherwise restrained to prevent movement.
- D. Pipe shall be cleaned of all foreign material.
- E. Provide metallic marking tape in trench above piping and 1-1/2 feet below the ground surface.
- F. Pipe shall not be homed by use of direct contact with a backhoe bucket. If a mechanical advantage is needed to home the pipe wood blocking and a pry bar or other acceptable means is to be used. Attention shall be given not to drive pipe past homing mark on the spigot end of the pipe.

2.02 OMITTED

2.03 DUCTILE IRON PIPE, AND OTHER

- A. Bell and Spigot Joints: Thoroughly clean ball and spigot ends prior to jointing ends of field cut pipe shall have burrs removed by filing or grinding. Lubricate and join in conformance with the manufacturers requirements.
- B. Jointing shall conform with the manufacturers recommendations. Where torque values are given for bolts a torque wrench set for the recommended torque value shall be used.

2.04 VALVES AND FITTINGS

- A. Buried valves shall be installed on firm foundation of crushed stone and concrete as shown on the details. Connection to pipe shall be such that there shall be no stress at the joint caused by misalignment.
- B. Fittings shall be installed as recommended by the manufacturer. All fittings shall be blocked or otherwise restrained from movement.
- C. Valve Boxes: Valve boxes shall be set flush with sidewalks, pavement, or finished grade as required. The box shall be supported so that no stress shall be transmitted to the valve. The operating nut shall be centered in box.

2.05 WELDED JOINT

- A. All welded joint piping shall be accurately cut to measurement established. Bevel both ends prior to welding, Weld shall be of full penetration. Pipe shall be welded only by certified pipe welders.

---END OF SECTION---

SECTION 16001
ELECTRICAL WORK

PART 1 - GENERAL

1.01 SCOPE

The work covered by this section of the specifications consists of furnishing all labor, materials, and equipment, and performing all operations necessary for the installation of a complete electrical system as shown on the drawings, as hereinafter specified, and as directed by the Engineer.

1.02 CODES AND STANDARDS

The applicable provisions of the following codes and standards, each of the latest issues, and all addenda thereto, shall form a part of these specifications.

- A. North Carolina Building Code (which includes the National Electrical Code).
- B. Underwriters' Laboratories, ASTM, ASME, NEMA, ANSI, NFPA, AWWA, and other standards as specifically referred to in these specifications or as shall apply to the work being done.

1.03 GENERAL

The installation shall comply with the applicable rules of the National Electrical Code and rules and regulations of local authorities having jurisdiction. Materials and workmanship which do not meet the minimum requirements of the National Electrical Code will not be accepted. The general layout of the proposed electrical work with details sufficient to show the work to be done is shown on the contract drawings. The drawings and specifications shall be considered supplementary, one to the other, so that materials and workmanship indicated, called for or implied by the one and not by the other shall be supplied and installed as though specifically called for by both. Omission of particular reference to any item necessary for complete installation and proper operation thereof shall not relieve the Contractor of responsibility of furnish same. In case of a dispute concerning intent and meaning of the specifications, the Engineer shall interpret the same and his interpretation shall be accepted by the Contractor.

1.04 TEMPORARY POWER

The Contractor shall make arrangements for temporary service, if required, and shall pay all fees associated therewith.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL

All materials used in this work shall be new and listed or labeled by the Underwriters' Laboratories or other approved third party testing agency where they have established a standard for the material to be installed. Defective material or material damaged in the

course of installation or test shall be replaced or repaired in a manner meeting the approval of the Engineer. Catalog numbers and trade names in these specifications and indicated on the drawings are intended to describe the materials, devices, or apparatus wanted. Similar materials, devices, or apparatus of other manufacturers, if of equal quality and capacity, may be substituted on the written approval of the Engineer, except where three or more trade names are listed, or specifically noted otherwise.

2.02 NAMEPLATES

Safety switches shall be marked with a name plate to identify the equipment services. Name plates shall be of laminated plastic with black outer layers and a white core. Edges shall be chamfered. Plates shall be fastened to the equipment enclosure with screws or rivets. Minimum size of plates shall be one inch by 2.5 inches. Letters shall be 1/4 inch high.

2.03 CONDUCTORS

Conductor sizes are expressed in American Wire Gauge (AWG) or in circular mils.

A. Construction

1. Wires #10 (AWG) and smaller shall be solid copper except that control wiring shall be stranded.
2. Wires #8 (AWG) and larger shall be stranded copper.

B. Insulation:

1. Type THW or THHN/THWN.

2.04 CONNECTORS, SPLICES, AND TERMINATION

- A. Connectors shall be in accordance with UL 486A. Insulating tapes shall be in accordance with UL 510. Connectors for wires No. 10 and smaller shall be insulated pressure-type or wirenut type. Splices and connections in conductors No. 8 and larger shall be made with a solderless connector covered with an insulation material equivalent to the conductor insulation. Provide solderless terminal lugs on stranded conductors.

2.05 CONDUIT

All above grade wiring shall be in rigid steel or IMC conduit. Minimum size for conduit shall be 3/4". Rigid conduit and IMC shall be hot-dipped galvanized, zinc-metalized, or sherardized. PVC conduit may be used for underground wiring.

2.06 JUNCTION, TAP, AND PULL BOXES

Junction, tap, and pull boxes shall be cast steel or alloy with threaded hubs and screw covers by the same manufacturer as the box. Junction, tap and pull boxes shall be sized in accordance with the National Electrical Code.

2.07 SAFETY SWITCHES

Safety switches shall be heavy duty, single-throw, quick-make, quick-break, with ratings and enclosure types as indicated. Switches used as motor disconnects shall be

horsepower rated. Fused safety switches shall utilize Class R fused with ratings as indicated. Fuses for switches used as motor disconnects shall be time delay type. Operating handles shall be capable of being locked in the open position. Covers shall be interlocked with the operating handle so that the cover cannot be opened unless the handle is in the "OFF" position except by operating a permissive release device.

2.08 GROUNDING ELECTRODES

Grounding electrodes shall be copperclad, 3/4" inch in diameter, and 10 feet long.

2.09 LIGHTING FIXTURES

Provide lighting fixtures in accordance with the catalog numbers, types, and ratings listed on the drawings.

2.10 LAMPS

Shall be provided for all fixtures.

2.11 PANELBOARDS

Circuit breaker type, copper bus, 10,000 amperes rms symmetrical integrated short circuit rating with bolt on type thermal magnetic trip circuit breakers, surface type with door and lock. A ground bus shall be provided for termination of equipment grounding conductors. A directory shall be typed to indicate the load served by each circuit.

2.12 RECEPTACLES

Duplex Receptacle: 20A, 125V, ground fault circuit interrupter type, specification grade, with brown body. Provide inside NEMA 3R enclosed as indicated.

PART 3 - EXECUTION

3.01 WIRING METHOD

- A. Wiring method shall be insulated conductors installed in conduit.

3.02 CONDUCTOR INSTALLATION

- A. A complete system of conductors shall be installed in the raceway system.
 - 1. No wires or cables shall be installed until work which might cause damage to the wires or cables has been completed.
 - 2. Only powdered soapstone or approved lubricants may be used to facilitate pulling conductors into conduit.
 - 3. All feeders, motor starters and motors shall be completely phased out as to sequence and rotation. Phase sequence shall be A-B-C from front to rear, top to bottom, or left to right when facing equipment.
- B. Color Coding:

1. Color coding is required for all conductors. Color shall be green for grounding conductors. The color of the ungrounded and neutral conductors shall be as follows:

204/120V, phase system

Phase A	Black
Phase B	Red
Neutral	White

2. Conductors #8 (AWG) and smaller shall be factory color coded.
3. Conductors #6 (AWG) and larger may be identified with plastic tape of the proper color.

C. Minimum Conductor Size:

Sizes shall not be less than indicated. Branch-circuit conductors shall not be smaller than No. 12 AWG. Class 1 remote control and signal circuit conductors shall be not less than No. 14 AWG.

D. Conductor Identification:

Provide conductor identification within each enclosure where a tap, splice, or termination is made. Make identification with plastic-coated selfsticking printed markers, colored nylon cable ties and plates, or heatshrink type sleeves. Identify control and signal circuit terminations. Spare conductors shall be identified as such.

E. Splices, Taps, and Joints:

1. Splices shall be electrically and mechanically secure and shall be equal to or exceed the conductor capacity in each instance.
2. Taping:
 - a. Joints, splices, taps, and other sections of wire requiring tapping shall be wrapped with a minimum of two layers of approved gum rubber tape laid on with half-lap.
 - b. Gum rubber tape shall be wrapped with a minimum of one layer of friction tape or approved plastic tape laid on with half-lap.
 - c. Taping shall be neatly done and shall form a permanently secure insulation equal to or exceeding that of the wire.

3.03 CONDUIT INSTALLATION

A. Rigid Steel Conduit or IMC Shall be Used For:

1. All locations except that PVC may be used underground where allowed.

B. PVC Conduit May be Used For:

1. Underground installation except as noted heretofore.

C. Pull and Junction Boxes:

1. Boxes shall be provided where required by the NEC and as otherwise indicated on the drawings.
2. Boxes shall be sized per the NEC.

D. Conduit Work Exposed:

1. Conduit shall be installed with runs parallel or perpendicular to structures with right angle turns utilizing outlet boxes or symmetrical bends. Outlet, junction or tap boxes shall be cast steel or alloy with threaded hubs and approved covers.
2. Conduits shall be securely fastened in place on not more than six (6) feet centers.

E. Conduit Work Underground:

1. Trenching:

Trenches shall be excavated by hand or with mechanical trenching equipment. Excavation shall be to a depth sufficient to allow a minimum cover of twenty-four inches (24") to the top of duct. Trenches shall be in straight lines.

2. Backfill: Fill shall be compacted in six inch (6") layers. Backfill shall be free from roots, wood scrap material, and other vegetable matter and refuse.

F. General Conduit Installation:

1. Conduit shall be protected from the weather when stored outdoors.
2. Conduit ends shall be cut square, threaded and reamed to remove burrs and sharp edges. Field threads shall be of same type and have same effective length as factory cut threads. Conduit joints shall be made with UL listed couplings for concrete and raintight construction.
3. Bends and offsets shall be avoided where possible, but where necessary factory elbows shall be used for 1-inch and larger. Other offsets and bends shall be made with an approved hickey or conduit bending machine. Conduit deformed or crushed in any way shall not be installed and bends with a radius of less than 3-1/2 inches will not be permitted.
4. Conduit shall be securely fastened to all sheet metal junction and pull boxes, cabinets, and equipment enclosures with double galvanized locknuts and insulated bushings, care being observed to see that the full number of threads project through to permit the bushing to be drawn tight against the end of conduit, after the locknuts shall have been made up sufficiently tight to draw them into firm electrical contact with the box. Connections to outdoor sheet metal enclosures shall be made with insulated throat watertight hubs or equivalent watertight method.
5. During installation, conduit ends shall be capped or plugged to prevent the entrance of foreign matter. The Contractor shall exercise necessary precautions to prevent accumulation of water, dirt, or concrete in the conduits during execution of the work. Conduits in which water or other foreign materials have been permitted to

accumulate shall be cleaned thoroughly or the conduit run replaced where such accumulation cannot be removed by methods approved by the Engineer.

6. Seal annular space around conduit penetration of pump station structure with an approval weatertight compound.

3.04 SERVICE DISCONNECTS

Each service disconnecting means shall be marked "SERVICE DISCONNECT".

3.05 GROUNDING

A. Equipment and circuits:

1. Connect the secondary service neutral to the ground bus in the service equipment.
2. Grounding Electrode System:
 - a. Grounding electrode conductor: Provide a connection between the service equipment ground bus and the ground rod.
3. Conduit Systems:
 - a. Ground all metallic conduit systems.
 - b. Conduit provided for mechanical protection and containing only a grounding conductor shall be bonded to that conductor at the entrance and exit from the conduit.
4. Feeders and Branch Circuits: Install green grounding conductors with all feeders and branch circuits.
5. Boxes, Cabinets, Enclosures, and Panelboards:
 - a. Bond the grounding wires to each, junction box, cabinets, and other enclosures through which the ground wires pass.
 - b. Provide lugs in each box and enclosure for ground wire termination.

B. Ground Resistance:

1. The grounding system shall be tested to insure that the ground resistance does not exceed 25 ohms.
2. Necessary modifications to the ground electrodes for compliance shall be without additional cost to the Owner.

C. Ground Electrode Installation:

1. Drive each grounding electrode vertically for not less than ten (10) feet.
2. All connections to grounding electrodes shall be "CAD-WELD" type process to form solid metal joints.

3.06 FUSES

Provide two (2) sets of spare fuses for each fused switch.

3.07 PAINTING

Any equipment which has its factory paint coat scratched or otherwise damaged shall be retouched with paint to match the finish coat, and shall be repainted if necessary.

3.08 CLEAN-UP

The Contractor shall remove from the site all debris, crating, or waste resulting from his work.

3.09 FINAL INSPECTION

Tests shall be made in the presence of the Engineer and representatives of the Owner. The tests shall be made under conditions simulating as nearly as practicable those which will be obtained in operation and shall show conclusively that the requirements of the specifications have been fulfilled. The insulation resistance of each circuit shall be taken between conductors and between conductors and ground, and shall show values approximately those recommended by the National Electrical Code. All instruments required or the tests shall be furnished by the Contractor. Prior to receiving final payment, the Contractor shall furnish to the Engineer a certificate of inspection signed by the Electrical Inspector having jurisdiction.

---END OF SECTION---