

Case No. 2007-134

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MAR 30 2007

PUBLIC SERVICE
COMMISSION

Specifications

for

High Service Mains
for New Water Treatment Plant on Pool 3
Kentucky American Water
Lexington, Kentucky

February 2007

Exhibit B - Specifications

Prepared by:

Quest Engineers, Inc.
2517 Sir Barton Way
Lexington, Kentucky 40509
(859) 223-3755



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KENTUCKY AMERICAN WATER
HIGH SERVICE MAINS FOR NEW WATER TREATMENT PLANT ON POOL 3

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INVITATION TO BID
FOR CONSTRUCTION OF

**HIGH SERVICE MAINS FOR NEW WATER TREATMENT PLANT ON POOL 3
FOR
KENTUCKY AMERICAN WATER**

Sealed Bids for furnishing all plant, labor, equipment, materials and performing all Work to construct the **High Service Mains for New Water Treatment Plant on Pool 3** will be received and opened at the office of **Kentucky American Water, 2300 Richmond Road, Lexington, Kentucky 40502** at 2:00 p.m., local time, on _____, 2007.

Two (2) sets of Bidding Documents, including the Instructions to Bidders, Bid Form, Bid Bond Forms and Contract Documents, will be provided at no charge to the CONTRACTORS who are invited to bid the project. Additional copies can be obtained from Lynn Imaging, 328 Old Vine Street, Lexington, Kentucky 40507 (859-255-1021 and www.lynnimaging.com) for a fixed charge of \$750.00 per set.

Requests for complete sets shall be forwarded to the above address and shall be accompanied by a check in the proper amount. Checks shall be made payable to Lynn Imaging. Checks shall be non-refundable and no refunds will be made for return of complete or partial Contract Documents.

Subcontractors, manufacturers and material suppliers should obtain information and review the Bidding Documents by contacting potential Bidders. Documents will also be available for review at **Kentucky American Water, 2300 Richmond Road, Lexington, Kentucky 40502** or the office of **Quest Engineers, Inc., 2517 Sir Barton Way, Lexington, Kentucky 40509**.

Each proposal shall be accompanied by a Bid Bond in an amount not less than ten (10%) percent of the bid total, payable to the OWNER, all in accordance with the provisions contained in the Bidding Documents.

OWNER reserves its rights to waive any informality or deficiency in any Bid, to accept any Bid, to negotiate modifications of any Bid with any Bidder and accept any modified Bid, to reject any Bid, to reject all Bids, and to rebid the Project, all at the OWNER's sole discretion.

INSTRUCTIONS TO BIDDERS

1. Defined Terms

Terms used in these Instructions to Bidders which are defined in the General Conditions of the Contract Documents have the meanings assigned to them in the General Conditions. The term "Bidder" means one who submits a Bid directly to OWNER, as distinct from a subbidder, who submits a Bid to a Bidder. The term "Successful Bidder" means the lowest, qualified, responsible and responsive Bidder to whom OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Invitation to Bid, Instructions to Bidders, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

2. Copies of Bidding Documents

2.1 Complete sets of the Bidding Documents in the number and for the amount, if any, stated in the Invitation to Bid may be obtained from the party listed on the Invitation to Bid. No refunds will be made for the return of complete or partial copies of the Bidding Documents.

2.2 Complete sets of Bidding Documents must be used in preparing Bids; neither OWNER nor ENGINEER assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3 OWNER and ENGINEER in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

3. Qualifications of Bidders

Bidders must be prequalified. Each Bid must contain evidence of Bidder's qualification to do business in the state where the project is located or covenant to obtain such qualification prior to award of the contract.

4. Examination of Contract Documents and Site

4.1 It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work, (c) consider Laws and Regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify ENGINEER of all conflicts, errors or discrepancies in the Contract Documents.

4.2 Reference is made to the Supplementary Conditions for identification of:

4.2.1 those reports of explorations and tests of subsurface conditions at the site which have been utilized by ENGINEER in preparation of the Contract Documents. Bidder may rely upon

the accuracy of the technical data contained in such reports but not upon non-technical data, interpretations or opinions contained therein or for the completeness thereof for the purposes of bidding or construction.

4.2.2 those drawings of physical conditions in or relating to existing surface and subsurface conditions (except Underground Facilities) which are at or contiguous to the site which have been utilized by ENGINEER in preparation of the Contract Documents. Bidder may rely upon the accuracy of the technical data contained in such drawings but not upon non-technical data, interpretations or opinions contained therein or for the completeness thereof for the purpose of bidding or construction.

Copies of such reports and drawings will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract Documents.

4.3 Information and data reflected in the Contract Documents with respect to Underground Facilities at or contiguous to the site is based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities or others, and OWNER does not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

4.4 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground Facilities and other physical conditions, and possible changes in the Contract Documents due to differing conditions appear in Paragraphs 4.2 and 4.3 of the General Conditions.

4.5 Before submitting a Bid, each Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.6 On request in advance and after submittal of Bidder's evidence of insurance coverage meeting limits designated in the Supplementary Conditions, OWNER will provide each Bidder access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.

4.7 The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by CONTRACTOR. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by OWNER unless otherwise provided in the Contract Documents.

4.8 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

5. Interpretations and Addenda

5.1 All questions about the meaning or intent of the Contract Documents are to be directed to ENGINEER. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by ENGINEER as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5.2 Addenda may also be issued to modify the Bidding Documents as deemed advisable by OWNER or ENGINEER.

6. Bid Security

6.1 Each Bid must be accompanied by Bid security made payable to OWNER in an amount of ten percent of the Bidder's maximum Bid price and in the form of a Bid Bond (on form attached), issued by a surety meeting the requirements of Paragraph 5.1 of the General Conditions.

6.2 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required contract security, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Agreement and furnish the required contract security within fifteen days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the expiration of the period that bids are subject to acceptance, whereupon Bid security furnished by such Bidders will be returned. Bid security with Bids which are not competitive will be returned within Fourteen days after the Bid opening.

7. Contract Times

The times for Substantial Completion and final completion are to be set forth by Bidder in the Bid and will be included in the Agreement. The times will be taken into consideration by OWNER during the evaluation of Bids, and it will be necessary for the Successful Bidder to satisfy OWNER of Bidder's ability to achieve Substantial Completion and final completion within the times designated in the Bid. Substantial Completion is desired within five hundred forty (540) days of Notice to Proceed.

8. Liquidated Damages

Provisions for liquidated damages, if any, are set forth in the Agreement.

9. Substitute and "Or-Equal" Items

Substitute or "Or-Equal" items are subject to the requirements of Paragraph 6.7 of the General Conditions.

All Bids shall be based upon the specified products. However, Bidders are encouraged to quote on alternative products by listing them in the tabulation of "Alternative Equipment and/or Materials" of the Bid Form as required by Section 1100 of the General Requirements. No later substitutes will be considered by the OWNER.

The specified products have been used in preparing the Drawings and Specifications and thus establish minimum qualities which alternatives must meet to be considered acceptable. The burden of proof of equality rests with the Bidder and adequate supporting information must be provided. The OWNER reserves the right to accept or reject proposed alternatives.

The Bid sum for each proposed alternative shall include all money required to incorporate the alternative into the project. Later requests for additional monies for alternatives will not be considered.

10. Subcontractors, Suppliers and Others

10.1 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers and other persons and organizations (including those who are to furnish the principal items of material and equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within seven days after the Bid opening submit to OWNER a list of all such Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent organization information if requested by OWNER. If OWNER or ENGINEER after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, OWNER or ENGINEER may before the Notice of Award is given request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price.

If apparent Successful Bidder declines to make any such substitution, OWNER may award the contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers and other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Bidder. Any Subcontractor, Supplier, other person or organization listed and to whom OWNER or ENGINEER does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.8.2 of the General Conditions.

10.2 No CONTRACTOR shall be required to employ any Subcontractor, Supplier, other person or organization against whom CONTRACTOR has reasonable objection.

11. Bid Form

11.1 The Bid Form is included with the Bidding Documents; additional copies may be obtained from the party issuing the documents as listed on the Invitation to Bid.

11.2 All blanks on the Bid Form must be completed in ink or by typewriter.

11.3 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 must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.

11.4 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

11.5 All names must be typed or printed below the signature.

11.6 The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which must be filled in on the Bid Form).

11.7 The address and telephone number for communications regarding the Bid must be shown.

12. Submission of Bids

Bids shall be submitted at the time and place indicated in the Invitation to Bid and shall be enclosed in an opaque sealed envelope, marked with the Project title and name and address of the Bidder and accompanied by the Bid security and other required documents. If the Bid is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it.

13. Modification and Withdrawal of Bids

Bids 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 opening of Bids.

14. Opening of Bids

The opening of Bids will occur at the time and location identified in the Advertisement for Bid.

15. Bids to Remain Subject to Acceptance

All Bids will remain subject to acceptance for one hundred twenty (120) days after the day of the Bid opening, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to the acceptance period.

16. Award of Contract

16.1 OWNER reserves the right to reject any and all Bids, to waive any and all informalities and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming, nonresponsive, unbalanced or conditional Bids. Also, OWNER reserves the right to reject the Bid of any Bidder if OWNER believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by OWNER. Discrepancies in the multiplication of units of Work and Unit Prices will be resolved in favor of the Unit Prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

16.2 In evaluating Bids, OWNER will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, Unit Prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

16.3 OWNER may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. OWNER also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

16.4 OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to OWNER's satisfaction within the prescribed time.

16.5 If the contract is to be awarded, it will be awarded to the lowest Bidder whose evaluation by OWNER indicates to OWNER that the award will be in the best interests of the Project.

16.6 If the contract is to be awarded, OWNER will give the Successful Bidder a Notice of Award within the period of time that bids are subject to acceptance.

17. Contract Security

Paragraph 5.1 of the General Conditions and the Supplementary Conditions set forth OWNER's requirements as to performance, payment or other Bonds. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by the required Bonds.

18. Signing of Agreement

When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within fifteen days thereafter CONTRACTOR shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER with the required Bonds. Within ten days thereafter OWNER shall deliver one fully signed counterpart to CONTRACTOR.

19. Prebid Conference

A prebid conference will be held at * a.m. on the * day of * at * . Representatives of OWNER and ENGINEER will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Minutes of the Pre-Bid Conference will not be published.

20. Retainage

Provisions concerning retainage are set forth in the Agreement.

END OF INVITATION TO BIDDERS

BID

PROJECT IDENTIFICATION:

**HIGH SERVICE MAINS FOR NEW WATER
TREATMENT PLANT ON POOL 3**

THIS BID IS SUBMITTED TO:

Kentucky American Water
2300 Richmond Road
Lexington, Kentucky 40502

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance as stated in paragraph 15 of the Instructions To Bidders. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen days after the date of OWNER's Notice of Award.

3. In submitting this Bid, Bidder represents, as more fully set forth in the Agreement:

- (a) Bidder has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

Date	Number
_____	_____
_____	_____
_____	_____
_____	_____

- (b) Bidder has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

- (c) Bidder has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in Paragraph 4.2 of the General Conditions, and accepts the determination set forth in Paragraph GC-4.2.2 of the General Conditions, as

may be amended by the Supplemental Conditions, of the extent the technical data contained in such reports and drawings upon which Bidder is entitled to rely.

- (d) Bidder has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise which may affect the cost, progress, performance or furnishing of the Work as Bidder considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Paragraph 4.2 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by Bidder for such purposes.
- (e) Bidder has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by Bidder in order to perform and furnish the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Paragraph 4.3 of the General Conditions.
- (f) Bidder has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- (g) Bidder has given ENGINEER written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to Bidder.
- (h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

4. Bidder will complete the Work for the price(s) shown.

Where materials are furnished by the OWNER, the prices provided herein are for installation only. Otherwise the prices include furnishing and installation of materials.

BID SCHEDULE

CONTRACT A HIGH SERVICE MAINS FOR NEW WATER TREATMENT PLANT ON POOL 3 KENTUCKY-AMERICAN WATER

Item No.	Description	Unit	Qty.	Unit Price	Total Amount
1	Mobilization	LS	1	\$	\$
2	General Conditions	LS	1	\$	\$
3	Bonds and Insurance	LS	1	\$	\$
4	42-inch Waterline	LF	49,668	\$	\$
5	42-inch Restrained Joint Waterline	LF	16,770	\$	\$
6	Stream Crossing with Concrete Encasements	LF	1,015	\$	\$
7	Paved Roadway Crossing with Special Backfill	LF	235	\$	\$
8	60-inch Steel Encasement Pipe, Bore & Jack Under Road	LF	105	\$	\$
9	11° Bends	EA	89	\$	\$
10	22° Bends	EA	35	\$	\$
11	45° Bends	EA	22	\$	\$
12	Combination Air Valve Assembly	EA	5	\$	\$
13	Gate Valve Assembly	EA	4	\$	\$
14	Drain Assembly	EA	5	\$	\$
15	Leak Detection Assembly	EA	1	\$	\$
16	Full Width Pavement Overlay	LF	13,520	\$	\$
17	Paved Driveway Restoration	LF	45	\$	\$
18	Gravel Driveway Restoration	LF	535	\$	\$
19	Paved Driveway Free Bore	LF	45	\$	\$
20	Connection to Existing System	EA	2	\$	\$
21	Relocation or Removal of Existing Utilities	LS	1	\$	\$
22	Demobilization	LS	1	\$	\$
TOTAL					\$

For all work identified above, the amount of _____
_____ (\$ _____).

BID SCHEDULE**CONTRACT B
HIGH SERVICE MAINS FOR NEW WATER TREATMENT PLANT ON POOL 3
KENTUCKY-AMERICAN WATER**

Item No.	Description	Unit	Qty.	Unit Price	Total Amount
1	Mobilization	LS	1	\$	\$
2	General Conditions	LS	1	\$	\$
3	Bonds and Insurance	LS	1	\$	\$
4	42-inch Waterline	LF	89,925	\$	\$
5	42-inch Restrained Joint Waterline	LF	2,185	\$	\$
6	Stream Crossing with Concrete Encasements	LF	1,115	\$	\$
7	Paved Roadway Crossing with Special Backfill	LF	820	\$	\$
8	60-inch Steel Encasement Pipe, Bore & Jack Under Road	LF	305	\$	\$
9	Crossing of I-75, Open Cut & Bore & Jack	LF	1,420	\$	\$
10	Railroad Crossing, 60-inch Steel Encasement Pipe, Bore & Jack Under Road	LF	185	\$	\$
11	11° Bends	EA	37	\$	\$
12	22° Bends	EA	20	\$	\$
13	45° Bends	EA	46	\$	\$
14	Combination Air Valve Assembly	EA	12	\$	\$
15	Gate Valve Assembly	EA	9	\$	\$
16	Drain Assembly	EA	4	\$	\$
17	Leak Detection Assembly	EA	2,865	\$	\$
18	Paved Driveway Restoration	LF	689	\$	\$
19	Gravel Driveway Restoration	LF	500	\$	\$
20	Paved Driveway Free Bore	LF	70	\$	\$
21	Connection to Existing System	EA	1	\$	\$
22	Relocation or Removal of Existing Utilities	LS	1	\$	\$
23	Demobilization	LS	1	\$	\$
TOTAL					

For all work identified above, the amount of _____

_____ (\$ _____).

All specific cash allowances are included in the price(s) set forth above.

5. Bidder agrees that the Work will be substantially complete within five hundred forty (540) calendar days after the date when the Contract Times commences to run as provided in Paragraph 2.3 of the General Conditions, and completed and ready for final payment within six hundred (600) calendar days after the date when the Contract Times commences to run.

Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

6. The following documents are attached to and made a condition of this Bid:

- (a) Required Bid Security in the form of Bid Bond.
- (b) Evidence of Bidder's qualification to do business in the State where the project is located.
- (c) Bidder's contractor's license number if required to work in the State where the project is to be constructed.
- (d) Information describing the proposed alternative equipment and/or materials.

8. The terms used in this Bid which are defined in the General Conditions of the Contract Documents have the meanings assigned to them in the General Conditions.

SUBMITTED on _____, 20____.

If Bidder is:

An Individual

By _____

(SEAL)

(Individual's Name)

doing business as _____

Business address: _____

Phone No.: _____

A Partnership

By _____ (SEAL)

(Firm Name)

(general partner)

Business address: _____

Phone No.: _____

A Corporation

By _____

(Corporation name)

(state of incorporation)

By _____

(name of person authorized to sign)

(Title)

(Corporate Seal)

Attest _____

(Secretary)

Business address: _____

Phone No.: _____

A Joint Venture

By _____

(Name)

(Address)

By _____

(Name)

(Address)

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above).

END OF BID

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____
_____, as Principal and _____
(BIDDER)
_____ of the City of _____, State
of _____, a corporation existing under the laws and the State of _____,
and authorized to transact business in _____

_____, as Surety, are held and firmly bound unto Kentucky American Water,
2300 Richmond Road, Lexington, Kentucky 40502, hereinafter called the Obligee, in the sum of

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

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has
submitted the accompanying Bid dated _____, 20____, for the **High Service Mains for
New Water Treatment Plant on Pool 3.**

NOW, THEREFORE, the condition of this Bond shall be such that if the Principal, upon
due acceptance of said Bid and award of a Contract to him by the Obligee, bonds with good and
sufficient surety as may be required by the Contract Documents, and furnishes the Obligee proper
evidence of effectiveness of insurance coverage, respectively, within the time, in the forms and in
the amounts, as appropriate, required by the Contract Documents, and enters into a Contract with
the Obligee in accordance with the Contract Documents, then this Bond shall be void; otherwise,
the Bond shall be and shall remain in full force and effect.

The Principal and the Surety hereby stipulate and agree that if the Principal fails to
perform all conditions of this Bond, they will pay the sum of the Bond to the Obligee as fixed,
liquidated damages.

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 time within
which the Obligee may accept such Bid; and said Surety does hereby waive notice of any such
extension. It is the intention of the parties to be legally bound by this instrument.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals this _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned and representative, pursuant to authority of its governing.

ATTEST:

DATE _____, 20____

WITNESS:

Name of Bidder, Corporation
Firm or Individual

By _____

(Title)

Business Address of Bidder

ATTEST:

Secretary

Surety

Attorney-In-Fact

NOTE: This agreement must be properly executed and must accompany the Bid Bond as proposal security.

AGREEMENT OF SURETY

KNOW ALL MEN BY THESE PRESENTS, that we
_____, as Surety, a corporation existing under the laws of the State of
_____, and authorized to transact business in the State of
_____; hereby agree to execute, within the time limit specified in the
Contract, the Bonds, in the forms and in the amounts required for the faithful performance and
proper fulfillment of the Contract for Construction of High Service Mains for New Water
Treatment Plant on Pool 3.

on behalf of _____
(Bidder)

hereinafter called the Bidder, provided that the Notice of Award be delivered to the Bidder
within the time period that Bids are subject to acceptance or within any extended period for
which the Bidder agrees not to withdraw his bid; and the Surety further agrees that should the
Surety, after notification of such award, omit or refuse to execute the required bonds, then the
Surety shall pay to Kentucky American Water (OWNER) the amount of the Bid Bond.

Date

Corporate Surety

(AFFIX
CORPORATE

SEAL)

Title

Business Address

END OF BID BOND

AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ in the year 20____ by and between **Kentucky American Water** (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Furnish and install approximately 161,000 LF of 42-inch waterline, together with all special construction and appurtenances.

Article 2. ENGINEER

The ENGINEER for the Project is the Quest Engineers, Inc. and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

Article 3. CONTRACT TIMES

3.1 The Work will be substantially completed within five hundred forty (540) days from the date when the Contract Times commences to run as provided in Paragraph 2.3 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.13 of the General Conditions within six hundred (600) days from the date when the Contract Times commences to run.

3.2 Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in Paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in providing in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER two thousand dollars (\$2,000) for each day that expires after the times specified in Paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion if

CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Times or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER one thousand dollars (\$1,000) for each day that expires after the times specified in Paragraph 3.1 for completion and readiness for final payment.

Article 4. CONTRACT PRICE

4.1 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds as follows:

Article 5. PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

5.1 Progress Payment. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER. At intervals of once a month, the CONTRACTOR shall submit an estimate of the value of the Work completed to the first day of such month, and the value of materials and equipment suitably stored at the work site to be incorporated into the finished project. Upon approval by the OWNER, payment will be made for the net sum of ninety (90%) percent of such value less aggregate of previous payments. The net sum will be paid to the CONTRACTOR within thirty (30) days following receipt of the approved estimate.

5.2 Final Payment. Upon final completion and acceptance of the Work in accordance with Paragraph 14.13 of the General Conditions, OWNER shall pay the remainder of the Contract Price and any retained funds, as recommended by ENGINEER as provided in said Paragraph 14.13.

Article 6. CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

6.1 CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Contract Times, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

6.2 CONTRACTOR has studied carefully all reports of explorations and tests of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in Paragraph 4.2 of the General Conditions, and accepts the limitations set forth in Article 4, Section 4.2 of the General Conditions.

6.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies (in addition to or to supplement those referred to in Paragraph 6.2 above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise which may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Paragraph 4.2 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

6.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Paragraph 4.3 of the General Conditions.

6.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

6.6 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

Article 7. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

7.1 This Agreement (pages A-1 to A-5, inclusive).

7.2 Performance and Labor and Material Payment Bonds, identified as exhibits A and B and consisting of 5 pages.

7.3 Notice of Award. (Note: This document is not attached to this Agreement.)

7.4 General Conditions (Document Identification: 5/91 - AWWWS Co. Standard Documents, pages GC-0 to GC-29, inclusive).

7.5 Supplementary Conditions.

7.6 Specifications consisting of 16 divisions as listed in table of contents thereof.

7.7 Drawings, consisting of a cover sheet and sheets numbered 1 through ____, inclusive with each sheet bearing the following general title: High Service Mains for New Water Treatment Plant on Pool 3.

7.8 Addenda numbers ____ to ____, inclusive.

7.9 CONTRACTOR's Bid (pages ____ to ____, inclusive) marked exhibit ____.

7.10 Documentation submitted by CONTRACTOR prior to Notice of Award (pages ____ to ____, inclusive).

7.11 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All Written Amendments and other documents amending, modifying, or supplementing the Contract Documents pursuant to Paragraphs 3.5 and 3.6 of the General Conditions.

7.12 The documents listed in Paragraphs 7.2 et seq. above are attached to this Agreement (except as expressly noted otherwise above).

There are no Contract Documents other than those listed above in this Article 7. The Contract Documents may only be amended, modified or supplemented as provided in Paragraphs 3.5 and 3.6 of the General Conditions.

Article 8. MISCELLANEOUS

8.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meaning indicated in the General Conditions.

8.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

8.3 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

Article 9. OTHER PROVISIONS

9.1 Government Regulations

The following clauses, where applicable, are incorporated in this Agreement by reference as is fully set out; the Equal Opportunity Clause prescribed in 41 CFR 60-1.40, the Affirmative Action Clause prescribed in 41 CFR 60-250.4, regarding veterans and veterans of the Vietnam Era, and the Affirmative Action Clause for Handicapped Workers prescribed in 41 CFR 60-741.4.

CONTRACTOR accepts this Agreement and will supply any information relating to federal or state laws, rules or regulations relating to the above.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in quadruplicate. Two counterparts have been delivered to OWNER, and one counterpart each has been delivered to CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement will be effective on _____, 20__.

OWNER _____

CONTRACTOR _____

By _____

By _____

(Corporate Seal)

(Corporate Seal)

Attest _____

Attest _____

Address for giving notices

Address for giving notices

License No. _____

(If CONTRACTOR is a
corporation, attach evidence
authority to sign.)

END OF AGREEMENT

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that _____,
having an office at _____, as Principal, hereinafter
called CONTRACTOR, and _____, having an office at
_____, as Surety, hereinafter called Surety, are
held and firmly bound unto **Kentucky American Water**, having an office at **2300 Richmond
Road, Lexington, Kentucky 40502**, as Obligee, hereinafter called OWNER, for the use and
benefit of claimants as hereinbelow defined in the amount of _____
(\$_____), for the
payment whereof CONTRACTOR and Surety bind themselves, their heirs, executors,
administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, CONTRACTOR has by written agreement dated _____, 20____, entered
into a Contract with the OWNER for the construction of the project entitled **High Service Mains
for New Water Treatment Plant on Pool 3** in accordance with Drawings and Specifications
prepared by **Quest Engineers, Inc.**, which Contract is by reference made a part hereof, and is
hereinafter referred to as the Contract.

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

1. A claimant is defined as one having a direct contract with the
CONTRACTOR or with a Subcontractor of the CONTRACTOR for labor,
material, or both, used or reasonably required for use in the performance of the
Contract, labor and material being construed to include that part of water, gas,
power, light, heat, oil, gasoline, telephone service or rental of equipment directly
applicable to the Contract.
2. The above named CONTRACTOR and Surety hereby jointly and severally
agreed with the OWNER that every claimant as herein defined, who has not been
paid in full before the expiration of a period of ninety (90) days after the date on
which the last of such claimant's work or labor was done or performed, or
materials were furnished by such claimant, may sue on this bond for the use of
such claimant, prosecute the suit to final judgment for such sum or sums as may
be justly due claimant, and have execution thereon. The OWNER shall not be
liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant:

a) Unless claimant, other than one having a direct contract with the CONTRACTOR, shall have given written notice to any two of the following: the CONTRACTOR, the OWNER or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the CONTRACTOR, OWNER or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.

b) After the expiration of one (1) year following the date on which CONTRACTOR ceased Work on said Contract or after the expiration of one (1) year following the Date of Substantial Completion of the Project, whichever is later, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, on any part thereof, is situated, and not elsewhere.

4. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against such improvement, whether or not claim for the amount of such lien be presented under and against this bond.

Signed and sealed this _____ day of _____, 20____.

WITNESS:

CONTRACTOR (SEAL)

By _____

(Witness)

(Title)

WITNESS:

(Name of Surety) (SEAL)

By _____
(Attach Power of Attorney)

(Witness)

(Title)

END OF LABOR AND MATERIAL PAYMENT BOND

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that _____,
having an office at _____, as Principal, hereinafter
called CONTRACTOR, and _____,
having an office at _____, as Surety, hereinafter
called Surety, are held and firmly bound unto **Kentucky American Water**, having an office at **2300
Richmond Road, Lexington, Kentucky 40502**, as Obligee, hereinafter called OWNER, for the use
and benefit of claimants as
hereinbelow defined, in the amount of _____ (\$_____), for
the payment whereof CONTRACTOR and Surety bind themselves, their heirs, executors,
administrations, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, CONTRACTOR has by written agreement dated _____, 20____, entered
into a Contract with the OWNER for the construction of the project entitled **High Service Mains for
New Water Treatment Plant on Pool 3**, in accordance with Drawings and Specifications prepared
by **Quest Engineers, Inc.**, which Contract is by reference made a part hereof, and is hereinafter
referred to as the Contract.

NOW, THEREFORE, the condition of this obligation is such that, if CONTRACTOR shall
promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise it
shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of Contract Times made by the
OWNER.

Whenever CONTRACTOR shall be and declared by OWNER to be in default under the
Contract, the Surety shall promptly remedy the default. If the OWNER terminates the Contract for
such default, the following precautions shall govern the liability of the CONTRACTOR and the
Surety hereunder.

In the event of such termination, the CONTRACTOR and the Surety shall remain fully liable
to the OWNER for the CONTRACTOR'S failure to timely complete the Contract, any additional
costs incurred by the OWNER in completing the Contract, and liquidated damages from the originally
scheduled completion date to the date of the actual completion of the work by the OWNER.

In the event of such termination, the Surety company may elect to take over and complete
performance of the Contract by giving written notice to the OWNER of such determination within
seven (7) days of the OWNER'S mailing of notice of termination to the Surety and actually
commencing completion with fourteen (14) days of the OWNER'S notice to the Surety. The Surety

shall fully complete the work by the originally scheduled date of completion and the CONTRACTOR and the Surety shall remain liable to the OWNER for all damages sustained by the OWNER and for liquidated damages for delay.

Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due or before the expiration of two (2) years from the Date of Substantial Completion of the Project, whichever is later.

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

Signed and sealed this _____ day of _____, 20____.

WITNESS:

CONTRACTOR (SEAL)

By

(Witness)

(Title)

WITNESS:

(Name of Surety) (SEAL)

By _____

(Witness)

(Title)

END OF PERFORMANCE BOND

GENERAL CONDITIONS

The General Conditions contained in this part of the Contract Documents are based on the Standard General Conditions of the Construction Contract prepared by the Engineers Joint Contract Documents Committee with modifications to be consistent with American Water System Policies. Only the General Conditions contained herein are a part of the Contract Documents for the project.

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS

Whenever 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 *Bonds* -- Performance and Payment bonds and other instruments of security.

1.7 *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.

1.8 *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 Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, 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 and 4.2.2 are not Contract Documents.

1.9 *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).

1.10 *Contract Times* -- The number 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.

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

1.12 *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).

1.13 *Drawings* -- The drawings which show the scope, extent and character of the Work to be furnished and performed by the 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.

1.14 *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. However, the contractor has no rights or remedies arising from execution of the Agreement prior to the Commencement of Contract Times.

1.15 *ENGINEER* -- The person, firm or corporation named as such in the Agreement.

1.16 *ENGINEER's Consultant* -- A person, firm or corporation having a contract with OWNER to furnish professional services for the benefit of OWNER and ENGINEER with respect to the Project and who is identified as such in the Supplementary Conditions. The term ENGINEER's Consultant shall be deemed also to include a person, firm or corporation having a contract with ENGINEER's Consultant to furnish professional services as an independent professional associate or consultant to ENGINEER's Consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

1.17 *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.

1.18 *General Requirements* -- Sections of Division 1 of the Specifications.

1.19 Hazardous Waste -- The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 9603) as amended from time to time.

1.20 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 or courts having jurisdiction.

1.21 Liens -- Liens, charges, security interests or encumbrances upon real or personal property.

1.22 Notice of Award -- The written notice 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.

1.23 Notice to Proceed -- A written notice to CONTRACTOR fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

1.24 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.

1.25 Partial Utilization -- Use by OWNER of a finished part of the Work for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work.

1.26 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 and kerosene and oil mixed with other non-Hazardous Wastes and crude oils.

1.27 PCBs -- Shall mean Polychlorinated Biphenyls.

1.28 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.

1.29 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.

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

1.31 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.

1.32 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.

1.33 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.

1.34 Specifications Special Conditions -- The part of the Contract Documents if used, that amends or supplements the Specifications.

1.35 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.

1.36 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 evidence 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.

1.37 Supplementary Conditions -- The part of the Contract Documents which amends or supplements these General Conditions.

1.38 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.

1.39 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, telephones or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

1.40 Unit Price Work -- Work to be paid for on the basis of unit prices.

1.41 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.

1.42 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.

1.43 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 owner have any obligations or duties to CONTRACTOR under the Agreement until Contract Times commence to run.

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 should have known thereof.

2.6 Within ten days after the Effective Date of the Agreement (unless otherwise specified in Division 1 - General Requirements), CONTRACTOR shall submit to ENGINEER for review:

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

2.6.2 a preliminary schedule of Shop Drawings 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.

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 Payments, and maintaining required records.

Finalizing Schedules:

2.9 Unless otherwise provided in the Supplementary Conditions, 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 finalize 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 submit the finalized schedules. No progress payment shall be made to CONTRACTOR until the finalized schedules are submitted to and acceptable to the ENGINEER as provided below. The finalized progress schedule will be as indicated in the Specifications and will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within any specified milestone completion Times and the Contract Times, but such acceptance will neither impose on ENGINEER responsibility for the sequencing scheduling or progress of the Work nor relieve CONTRACTOR from full responsibility therefore. CONTRACTOR's finalized schedule of Shop Drawings and Sample submissions will be acceptable to ENGINEER as providing a workable arrangement for reviewing and processing the submittals. The CONTRACTOR's finalized 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. Clarifications 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 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 paragraphs 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 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 compliance with the provisions of the Contract Documents would result in violation of such Law or Regulation).

No provisions 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 judgement of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgement will be solely to evaluate, in general, the completed Work for compliance with the information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as indicated by and reflected 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. Where "provide" is used in the Specifications or Drawings, it shall be understood to mean, "provide complete in place", that is, furnish and install.

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).

3.6.4 Any variations and deviation in the Work arising from any of the methods set forth in Paragraph 3.6 will not authorize any amendment to the Contract Price or Contract Times. The sole method to amend the Contract Price or Contract Times is pursuant to Paragraph 3.5.

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 or 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, right-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 at the Site: Those reports of explorations and tests of subsurface conditions at the site that have been utilized by ENGINEER in preparation of 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 the ENGINEER in preparing the Contract Documents.

4.2.2 Limited Reliance by CONTRACTOR Authorized; Technical Data: CONTRACTOR may rely upon the accuracy of the technical data contained in such reports and drawings, but such reports and drawings are not Contract Documents. Except for such reliance on technical data, CONTRACTOR may not rely upon and shall make no claim against OWNER, ENGINEER or any of the

ENGINEER's Consultants with respect to:

4.2.2.1 the completeness of such reports and drawings for CONTRACTOR's purposes,

4.2.2.2 nontechnical data, interpretations, opinions and information contained in such reports or otherwise relating to subsurface conditions at the site, or

4.2.2.3 nontechnical data, interpretations, opinions and information shown or indicated in such drawings or otherwise relating to such structures.

4.2.3 Reports of Differing Subsurface or Physical Conditions: If any subsurface or latent physical condition at the site that is uncovered or revealed (i) differs materially from that shown or indicated in the Contract Documents, or (ii) is of an unusual nature, which differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents, or (iii) is of such a nature as to require a change in the Contract Documents, or (iv) 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, 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.

4.2.4 ENGINEER's Review: ENGINEER will promptly review the pertinent conditions, determine the necessity of OWNER's obtaining additional explorations 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 described 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 Time Adjustments: If a condition described in paragraph 4.2.3 causes an increase or decrease in the Contract Price or Contract Times, an equitable adjustment in the Contract Price (subject to the provisions of paragraphs 9.10 and 11.9 with respect to Unit Price Work) or an equitable adjustment of the Contract Times, or any combination thereof, will be allowed, to the extent that such condition has caused an increase or decrease in CONTRACTOR's cost of, or time required for performance of the Work, whether or not the Contract Documents are changed pursuant to paragraph 4.2.5, provided that:

4.2.6.1 such subsurface or physical condition was unknown to and could not reasonably have been anticipated by CONTRACTOR, and

4.2.6.2 such subsurface or physical condition meets the criteria established in paragraph 4.2.3, and

4.2.6.3 CONTRACTOR has timely given the written notice required by paragraph 4.2.3, and

4.2.6.4 CONTRACTOR has complied with the requirements of Article 6 of the Agreement.

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 costs, losses or damages sustained by CONTRACTOR on or in connection with any other project or anticipated project or that otherwise do not increase CONTRACTOR's cost of the Work.

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 thereof 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 consequence 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 Times or Contract Price, 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 costs, losses or damages sustained by CONTRACTOR on or in connection with any other project or anticipated project or that otherwise do not increase CONTRACTOR's cost of the Work.

Reference Points:

4.4 OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgement 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 onto the job site by CONTRACTOR, Subcontractors, 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 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 and ENGINEER and their respective officers, directors, consultants, Subcontractors, agents and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs) arising out of or resulting from such hazardous condition, provided that (a) any such claim, damage, loss or expense 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 (b) 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, PCB's, Petroleum, Hazardous

Waste or Radioactive Material uncovered or revealed at the site.

4.5.6 In accordance with the intent of the Federal Occupational Safety and Health Administration (OSHA) Standard Section 29CFR-1910.12. Hazard Communication with effective date of May 25, 1986, as it may be amended from time to time, the OWNER hereby notifies the CONTRACTOR Work is to be performed on company property where the CONTRACTOR's employees may be exposed to hazardous materials existing on the premises.

Chemicals known to be used or stored by the OWNER and required to be disclosed by said OSHA Standard Section 29CFR-1910.12 are listed in the Supplementary Conditions.

OWNER, CONTRACTOR and any Subcontractors will each provide or make available to the others: (a) any written hazard communication program required to be maintained with respect to the site and any material safety data sheet and other hazard communication information required to be provided in accordance with applicable Laws and applicable Regulations, or (b) in the event that applicable Laws and Regulations do not require the provision or exchange of such hazard communications, CONTRACTOR and any Subcontractors shall, nevertheless, provide or make available to OWNER and any other employers at the site a written hazard communication program, material safety data sheets and other hazard communication information of the type and consistent with the intent of said OSHA Standard Section 29CFR-1910.12 and acceptable to OWNER and ENGINEER. CONTRACTOR shall be responsible for coordinating any such required exchange of documents or information between or among OWNER, and any other employers at the site, or any of them. CONTRACTOR shall include the provisions of this paragraph 4.5.6 in any subcontract for any part of the Work at the site.

ARTICLE 5 -- BONDS AND INSURANCE

Performance and Other Bonds:

5.1 CONTRACTOR shall furnish a Performance Bond, and a Labor and Material Payment Bond, 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 otherwise provided 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 forms prescribed by the Contract Documents, except as otherwise provided by Laws or Regulations, and be executed by such sureties having a rating of "A" by the most recent Best's Key Rating Guide, and 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 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 paragraphs 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 indicated in the Supplementary Conditions, including ENGINEER, 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 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, by 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 OWNER and ENGINEER (subject to any customary exclusion in respect of professional liability) and any other persons or entities indicated in the Supplementary Conditions, all of whom shall be listed by name 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 Law and Regulation, whichever is greater;

5.4.9 include completed operations insurance;

5.4.10 include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.16, 6.31 and 6.32;

5.4.11 contain a provision or endorsement that the coverage afforded will not be cancelled, materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER, ENGINEER and each other additional insured indicated in the Supplementary Conditions to whom a certificate of insurance had 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 other 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 any other additional insured indicated 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 OWNER shall be responsible for purchasing and maintaining OWNER's own liability insurance and, at OWNER's option, may purchase and maintain such insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

Builders Risk Property Insurance:

5.6 Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain "builders risk" property insurance upon the Work at the site in the amount of the full replacement cost there (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws or Regulations). This insurance shall:

5.6.1 include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultant, and any other persons or entities indicated in the Supplementary Conditions, all of whom shall be listed as insureds or additional insureds;

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

5.6.3 include damages, losses and expenses arising out of or resulting from any insured loss or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals);

5.6.4 cover materials and equipment stored on or off the site or in transit prior to being incorporated in the Work where such materials and equipment are included in an approved Application for Payment; 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 OWNER, CONTRAC-

TOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other insureds as may be indicated in the Supplementary Conditions, all of whom shall be listed by name as insureds or additional insureds.

5.8 All the policies of insurance (or 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 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 the CONTRACTOR, Subcontractors 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 policy, 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.

Waiver of Rights:

5.11 OWNER and CONTRACTOR intend that all policies provided in response to paragraphs 5.6 and 5.7 will protect all of the parties listed as insureds or additional insureds in such policies and provide primary coverage for all losses and damages covered by perils insured 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 parties so listed. Accordingly, OWNER and CONTRACTOR waive all rights against each other for all losses and damages caused by any of the perils covered by such policies and any other property insurance applicable to the Work to the extent of insurance proceeds received under all such policies; and, in addition, waive all such rights against Subcontractors and all other parties so listed, and also against ENGINEER and ENGINEER's Consultants, for losses and damages so caused. None of the above waivers shall extend to the rights that any of the parties so listed may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

Receipt and Application of Proceeds:

5.12 Any insured loss under the policies of insurance re-

quired 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 monies 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 is 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 Insurance:

5.14 If OWNER has any objection to the coverage afforded by or other provisions of the Bonds or Insurance required to be purchased and maintained by CONTRACTOR in accordance with paragraphs 5.1, 5.2, 5.3 and 5.4 and any applicable provisions of the Supplementary Conditions on the basis of their not complying with the Contract Documents, OWNER shall notify CONTRACTOR in writing thereof within ten days of the date of delivery of such certificates (or other evidence requested) in accordance with paragraph 2.7. If CONTRACTOR has any objection to the coverage afforded by or other provisions of the policies of insurance required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 and any applicable provisions of the Supplementary Conditions on the basis of their not complying with the Contract Documents, CONTRACTOR shall notify OWNER in writing thereof within ten days of the date of delivery of such certificates (or other evidence requested) in accordance with paragraph 2.7. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided by each as the other may reasonably request.

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 the 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 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 OWNER shall have the right to reject or demand replacement of such superintendent at any time, with or without cause, solely at the OWNER's discretion, based upon objective or subjective reasons, which reasons the OWNER may, but is not required to, disclose to the CONTRACTOR. The superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given 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 and lay out the Work and perform construction 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 the instructions of the applicable Supplier, except as otherwise provided in Contract Documents.

Progress Schedule:

6.6 CONTRACTOR shall adhere to the finalized progress schedule established in accordance with paragraph 2.9, as it may be adjusted from time to time in accordance with the Contract Documents. CONTRACTOR shall submit to the ENGINEER for acceptance (to the extent indicated in paragraph 2.9) adjustments in the finalized progress schedule to reflect the impact thereon of new developments. 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.

Substitutes and "Or-Equal" Items:

6.7 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, no like, equivalent, or "or equal" item or substitution is permitted.

6.8 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 and 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 or Contract Times will be adjusted by the difference in the cost or time 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 CONTRACTOR Responsible for Subcontractors:

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 Contractor, Supplier, or other person or organization except as may otherwise be required by Laws or Regulations.

6.9.2 CONTRACTOR shall be fully 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 any Subcontractor, Suppliers or 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 identification 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 any of the perils covered by such policies and any other property insurance applicable to the Work. If the in-

surers 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. CONTRACTOR shall indemnify and hold harmless and defend OWNER and ENGINEER and ENGINEER's Consultants and anyone directly or indirectly employed by any of them from and against all claims, damages, losses and expenses (including but not limited to fees of engineers, architects, attorneys, and other professionals, and court and arbitration costs) arising out of 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.

6.14 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 costs arising therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with such Laws and

Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.3.2.

Taxes:

6.15 Unless otherwise provided in the Supplementary Conditions, 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 against OWNER or ENGINEER by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly attempt to settle with such other party by agreement 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, hold harmless and defend OWNER, ENGINEER and ENGINEER's Consultants and anyone directly or indirectly employed by any of them from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against OWNER, ENGINEER or ENGINEER's Consultant 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, and 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 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 designed 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 the 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 the protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRAC-

TOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.21 Safety Representative: CONTRACTOR shall designate an 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.

6.22 In performing the Work, CONTRACTOR shall take all measures to prevent the release, spillage or improper disposal of any hazardous substance or construction or waste materials which may contaminate the OWNER's or adjacent properties or the environment or substantially endanger human health. The transportation, handling, storage and use of gasoline, oils, paints, residual cleaning solvents and other hazardous substances or contaminating materials by CONTRACTOR or any Subcontractor shall be in such a manner to prevent release, spillage or improper disposal. Should any such hazardous substances or contaminating materials be released, spilled or improperly disposed of by the CONTRACTOR or any Subcontractors, the CONTRACTOR shall immediately notify the OWNER and ENGINEER, notify any applicable environmental agency as required by Laws and Regulations, and immediately remedy or remove such substances or materials, and clean and restore the affected areas to a safe condition and to the satisfaction of the OWNER and any applicable environmental agency. The CONTRACTOR shall pay all costs for the remedy or removal of contaminate materials and the proper disposal of them at an approved and permitted site and the restoration of the affected areas. The CONTRACTOR shall also be responsible for the payments of and shall indemnify, hold harmless and defend the OWNER, ENGINEER and ENGINEER's Consultant from all penalties, fines and damage claims resulting from the release, spillage or improper disposal by CONTRACTOR or any Subcontractor of any such hazardous substances or contaminating material.

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 ENGINEER or OWNER, 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 the changes or variations.

Shop Drawings and Samples:

6.24 CONTRACTOR shall submit:

6.24.1 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 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 Verification and Notice of Variations:

6.25.1 Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified (i) all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto, (ii) all materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work, and (iii) 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 final 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 specific 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 a 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 final 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 CONTRACTOR and OWNER 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*.

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

TRACTOR's obligation to perform the Work in accordance with the Contract Documents:

6.30.2.1 observations by ENGINEER;

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

6.30.2.5 any act or 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; or

6.30.2.7 any inspection, test or approval by others; or

6.30.2.8 any correction of defective Work by OWNER.

6.31 Indemnification;

6.31.1 To the fullest extent permitted by Laws and Regulations CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant and the affiliated companies, consultants, agents, officers, directors and employees of each and any of them from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs) arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, personal 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 (b) 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.

6.31.2 In any and all claims against OWNER, ENGINEER, ENGINEER's Consultant or the affiliated companies, consultants, agents, officers, directors, or employees of each or any of them 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.

6.31.3 If any provisions of paragraphs 6.31 or 6.32 in respect of indemnification is prohibited or unenforceable by applicable law, then said paragraphs 6.31 and 6.32, as applicable, shall be reformed and amended so that the parties indemnified hereunder are provided with the fullest extent of indemnification as is permitted under applicable law and the remainder of the Contract Documents shall remain in full force and effect and not be invalidated.

6.32 Survival of Obligations:

All representations, indemnifications, warranties and guarantees made in, required by, or given in accordance with 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 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 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 the 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's Consultant, OWNER may appoint a replacement whose status under the Contract Documents shall be that of the former ENGINEER's Consultant.

8.3 OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly after 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 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 or relating to existing structures which have been utilized by ENGINEER in preparing the Drawings and Specifications

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 Material uncovered or revealed at the site is set forth in paragraph 4.5.

ARTICLE 9 – ENGINEER'S STATUS

9.1 OWNER's Representative:

9.1.1 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.

9.1.2 The assignment of any authority, duties or responsibilities to ENGINEER under the Contract Documents, or any undertaking, exercise or performance thereof by ENGINEER, is intended to be for the sole and exclusive benefit of OWNER and not for the benefit of CONTRACTOR, Subcontractor, Supplier or any other person or organization.

Visits to Site:

9.2 Subject to the limitations of authority and responsibilities indicated in paragraph 9.13, 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 will not supervise, direct or have control over any of CONTRACTOR's Work during such visits or as a result of such observations of CONTRACTOR's 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 duties, responsibilities and limitations of authority of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions. If OWNER designates another agent to represent OWNER at the site who is not ENGINEER's agent or employee, the duties, responsibilities and limitations of authority 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 the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If CONTRACTOR or OWNER believes that a written clarification or interpretation justifies an adjustment in the Contract Price or an adjustment, if any, of the Contract Times and the parties are unable to agree to the amount or extent thereof, CONTRACTOR or OWNER may make a claim therefor as provided in Article 11 or Article 12. All requests from CONTRACTOR for clarification or interpretation shall be submitted to ENGINEER in writing.

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 complete 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 CONTRACTOR or OWNER believes

that a Field Order justifies an adjustment in the Contract Price or an extension of the Contract Times and the parties are unable to agree as to the amount or extent thereof. CONTRACTOR or OWNER may make a 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 ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Appeal in accordance with paragraph 9.12 will not be subject to procedures of paragraph 9.11.

Decisions on Disputes:

9.11 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 and 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 a reasonable time after receipt of the opposing party's submittal, if any, in accordance with this paragraph.

9.12 ENGINEER's written decisions pursuant to paragraphs 9.10 and 9.11 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 party to the Agreement and to ENGINEER written notice of intention to appeal ENGINEER's decision. Delivery of such written notice of intention to appeal a decision by ENGINEER pursuant to paragraphs 9.10 or 9.11 with respect to any claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.15) 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. OWNER and CONTRACTOR agree to defer the exercise of their respective rights and remedies under Article 16 with respect to any claim, dispute or other matter that is the subject of such notice of intention to appeal until the making and acceptance of final payment, unless such deferral would irrevocably prejudice the rights of OWNER or CONTRACTOR. OWNER and CONTRACTOR intend to attempt to negotiate a settlement of any outstanding claims at or before the making and acceptance of final payment.

9.13 Limitations on ENGINEER's Authority and Responsibilities

9.13.1 Neither ENGINEER's responsibility or authority to act under this Article 9 or under any other provision of the Contract Documents or under any agreement between OWNER and ENGINEER or OWNER and ENGINEER's Consultant 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, or any other person or organization, or to any surety, or employee or agent for 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

Suppliers, or of any other person or organization performing or furnishing any of the Work.

9.13.4 ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. When functioning as initial interpreter and judge, ENGINEER will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

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 and 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 such start of the 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 amount claimed covers all known amounts (direct, indirect and consequential) 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). Such allowance shall not exceed a fee calculated 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 all 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 Subcontractors 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, only to the extent authorized and approved in writing by the ENGINEER.

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, express delivery 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, project 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.

11.5.6 Other overhead or general expense costs of any kind.

11.5.7 The costs of any item not specifically and expressly included in paragraph 11.4.

CONTRACTOR's Fee:

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, for example:

Cost of the Work Performed by Sub-Subcontractor	= \$10,000.00
Sub-Subcontractor's Fee (15 percent)	<u>1,500.00</u>
Total to Sub-Subcontractor	\$11,500.00
Subcontractor's Fee (5 percent)	<u>575.00</u>
Subtotal	\$12,075.00
CONTRACTOR's Fee (5 percent)	<u>603.75</u>
Total Change Order	= \$12,678.75

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 or OWNER for any such 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 ten percent of the net decrease; and

11.6.2.6 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 paragraph 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 done by such Subcontractors or Suppliers and for such sums within the limit of the allowances as may be acceptable to 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. 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.

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 prices 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 CONTRACTOR or OWNER 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 has incurred additional expense as a result thereof or OWNER believes that OWNER is entitled to a decrease in Contract Price; and

11.9.3.4 the parties are unable to agree as to the amount of any such increase or decrease.

Delays Beyond the Control of Both Parties:

11.10 Neither OWNER nor CONTRACTOR shall be entitled to an increase or decrease in the Contract Price, nor to any other compensation or damages from the other as the result of delays beyond the control of both OWNER and CONTRACTOR, such as fires, floods, epidemics, abnormal weather conditions or acts of God.

ARTICLE 12 -- CHANGE OF CONTRACT TIMES

12.1 The Contract Times (or any applicable specified milestone completion date or time) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times 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 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 to the other party and the ENGINEER within sixty days after the start of such occurrence (unless ENGINEER allows an additional period of time to submit additional or 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 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 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 the Work within the Contract Times (or any applicable specified milestone completion date or time), the Contract Times (or any applicable specified milestone completion date or time) will be extended in an amount equal to the time lost due to delays beyond the control of CONTRACTOR if a claim is made therefor as provided in paragraph 12.1. At OWNER's option, the Contract Times (or any applicable specified milestone completion date or time) will be extended for the entire Work or only that portion of the Work affected by the event giving rise to the claim. The CONTRACTOR will be notified in writing of the OWNER's decision in this matter. If OWNER elects to extend the Contract Times (or any applicable specified milestone completion date or time) for the affected portion of Work only, liquidated damages, if applicable, will be apportioned between affected Work and non-affected Work based on the value each portion represents as a percentage of the Contract Price. 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 the Work within the Contract Times (or any applicable specified milestone completion date or time), an extension of the Contract Times (or any applicable milestone completion

date or time) in an amount equal to the time lost due to delays beyond the control of both OWNER and CONTRACTOR shall be CONTRACTOR's sole and exclusive remedy for such delays. At OWNER's option, the Contract Times (or any applicable specified milestone completion date or time) will be extended for the entire Work or only that portion of the Work affected by the event giving rise to the claim. The CONTRACTOR will be notified in writing of the OWNER's decision in this matter. If OWNER elects to extend the Contract Times (or any applicable specified milestone completion date or time) for the affected portion of Work only, liquidated damages, if applicable, will be apportioned between affected Work and non-affected Work based on the value each portion represents as a percentage of the Contract Price. In no event shall OWNER or CONTRACTOR be liable to the other for damages arising out of or resulting from (i) delays caused by or within the control of the other, 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 and 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 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 progress 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 inspection, 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 or 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 (including 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. Such uncovering 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.

13.7 Neither observations by ENGINEER nor inspections, tests or approvals by others shall relieve CONTRACTOR from CONTRACTOR's obligations to perform the Work in accordance with the Contract Documents.

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 bear all direct, indirect and consequential costs and damages of such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction, (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs), 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, 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 any applicable specified milestone completion date), or both, directly attributable to such un-

covering, 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 Article 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 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 bear all direct, indirect and consequential costs and damages of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs) made necessary thereby.

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 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 direct, indirect and consequential costs and damages of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs) will be paid by CONTRACTOR.

13.12.2 In special circumstances where a particular item of equipment is placed in continuous service for the benefit of the OWNER 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 bear all direct, indirect and consequential costs attributable to OWNER's evaluation of and determination to accept such *defective* Work (such costs to be approved by ENGINEER as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs). 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. To the extent necessary to complete 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 Consultant such access to the site as may be necessary to enable OWNER to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs and damages of 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 direct, indirect and consequential costs and damages will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, court and arbitration or other dispute resolution costs and all cost of repair and 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 Time because of any delay in 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 thirty days before the date established for each progress payment, 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 required 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 fifteen 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. Fifteen 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 engineer 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 (i) the Work has progressed to the point indicated, and (ii) 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 (iii) 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) there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or 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 such representations to OWNER. 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 of ENGINEER's 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,

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.

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 tentative 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 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 useable 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 such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that said 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 therefore. 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 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 6.9) and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments, except that the progress payment shall be clearly marked "Final Application for Payment." The final Application for payment shall be accompanied 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.

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, all 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 fifteen 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 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 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 or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by OWNER of any rights in respect of 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 OWNER may, at any time and without cause, 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 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 revised from time to time);

15.2.2 if CONTRACTOR disregards or violates Laws or Regulations of any public body having jurisdiction or insurance requirements;

15.2.3 if CONTRACTOR disregards the authority of ENGINEER;

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

15.2.5 if CONTRACTOR has numerous or serious violations of Laws and Regulations pertaining to worker protection or safety;

15.2.6 if CONTRACTOR makes the assignment for the benefit of creditors of any of the monies due CONTRACTOR under this Agreement;

15.2.7 if CONTRACTOR intentionally submits documentation that is false or misleading;

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 the direct, indirect and consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs) such excess will be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such costs 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 amounts paid in settlement of terminated contracts with Subcontractors, Suppliers, and others (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs incurred in connection with termination of contracts with Subcontractors and Suppliers); 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 or any consequential damages arising out of 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 days' written notice to OWNER and ENGINEER stop the Work until payment of all 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

Subject to the provisions of paragraph 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 Time:

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 paragraph 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.

SUPPLEMENTARY CONDITIONS

The Supplementary Conditions amend or supplement the General Conditions (5/91 AWWA Co. Standard Documents Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

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Appendix A - Sample Insurance Certificates (2 pages)

Appendix B - Release of Liens forms
(Contractor, 2 pgs., Subcontractor
and Suppliers, 1 pg.)

Appendix C - Sales Tax Guidelines

Appendix D - Stipulation Waiver of
Right To File Lien & Cross Indexed Filing Forms (3 pages)



SUPPLEMENTARY CONDITIONS

SC-1 Definitions

The terms used in these Supplementary Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

Whenever the term "Water Company" is used in these Contract Documents it shall have the same meaning as OWNER or ENGINEER, whichever is applicable.

SC-1.16 ENGINEER'S Consultant

The ENGINEER'S Consultants for this project are:

Qore Property Sciences, 422 Codell Drive, Lexington, Kentucky 40509
Thelen Associates, 1398 Cox Avenue, Erlanger, Kentucky 41018

SC-2.10 Stipulation Waiver of Right to File Lien

Add a new paragraph immediately after Paragraph 2.9 of the General Conditions which is to read as follows:

Simultaneous with the signing of the Agreement for a project to be constructed in Pennsylvania, and as a condition precedent to the enforceability of any provision of the Agreement by the CONTRACTOR, the CONTRACTOR shall execute and deliver to the OWNER the Stipulation Waiver of Right to File Lien in the form attached hereto. OWNER will file the executed Stipulation Waiver of Right to File Lien with the Prothonotary's office in the County where the project is located prior to the commencement of the Work or within ten days after the effective date of the Agreement.

CONTRACTOR shall give a copy of the executed Stipulation Waiver of Right to File Lien to all Subcontractors, Suppliers, or any other person furnishing services, labor, materials or equipment to or for the Project under any contract with the CONTRACTOR at the time the orders are placed by the CONTRACTOR and prior to the time such services, labor, materials and equipment are furnished.

A copy of the form for filing the Stipulation Waiver of Right to File Lien is included in Appendix D attached to the Supplementary Conditions.

SC-4.2 Subsurface and Physical Conditions

4.2.1 In the preparation of Drawings and Specifications, ENGINEER has relied upon:

4.2.1.1 The following reports of explorations and tests of subsurface conditions at the site of the Work:

- 1) Report dated March 2007 prepared by Thelen Associates entitled "Geotechnical Exploration."
- 2) Report dated March 2007 prepared by Qore Property Sciences entitled "Geotechnical Exploration."

Copies of these reports may be obtained from Lynn Imaging for the non-refundable amount of \$25.00. These reports and drawings are not part of the Contract Documents.

4.2.2 Anything in Paragraph GC 4.2 to the contrary notwithstanding, CONTRACTOR shall not be entitled to rely on the following data: All information contained in the geotechnical investigation report, except the rock quality indexes of the borings. The borings were not performed to indicate depth to rock, but to provide an indication of the difficulty of excavation when rock is encountered. Native rock can be expected to occur throughout the transmission main routing, often at depths which will require removal before pipe installation.

SC-4.5.5 Chemicals Used or Stored

Chemicals known to be used or stored by the OWNER include the following: None.

SC-5.4 CONTRACTOR's Liability Insurance

The limits of liability for insurance required by General Conditions paragraph 5.4 are as shown on the attached ACORD sample Certificate of Insurance except that no Professional Liability Insurance is required.

Insurance Requirements

(A) At no expense to American Water (hereinafter referred to as Company), Contractors and subcontractors shall, at its expense, obtain and keep in force during the term of this Agreement, and any renewals or extensions hereof, the following minimum insurance limits and coverage during the term of the agreement/contract to cover his legal liability to third parties in accordance with the Conditions of Contract. The insurance coverage limits stated below are minimum coverage requirements, not limitations of liability, and shall not be construed in any way as Owner's acceptance of the responsibility of the Contractor:

- | | |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Commercial General Liability: | \$1,000,000 per occurrence
Combined Single Limits
\$1,000,000 General Aggregate
\$1,000,000 Products and Completed
Operations Aggregate |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|

Occurrence form including Premises and Operations Coverage, Products and Completed Operations, Coverage for Independent Contractors, Personal Injury Coverage and Blanket Contractual Liability. Contractor's Protective Liability if the Contractor subcontracts to another all or any portion of the Work. Completed Operations shall be maintained for a

period of ten (10) years following Final Completion. The renewal of each annual policy shall include a three year extension of Completed Operations coverage.

2. Workers Compensation:

- A. Applicable Federal or State Requirements: Statutory minimum
- B. Employer's Liability: Each Accident - \$1,000,000
Policy Limit - \$1,000,000 Disease
Each Employee - \$1,000,000 Disease
- C. Voluntary workers compensation insurance covering all employees not subject to the applicable workers compensation act or acts.

The Workers' Compensation policy shall also include U.S. Longshoremen and Harbor Workers' Compensation Act Coverage, if any work shall be done over or within 100 feet of any body of water, or otherwise at the sole discretion of Company. It shall also provide maritime (Jones Act) coverage if a boat or vessel of any type is to be used.

3. Automobile Liability

Including owned, hired, borrowed and non-ownership liability.

Bodily Injury and Property	\$1,000,000 each occurrence
Damage Liability	Combined Single Limits

4. Umbrella Liability \$9,000,000 each occurrence and
annual aggregate in

excess of Employer's Liability, General Liability and Automobile Liability (no more restrictive than the underlying insurance).

The minimum liability limits required may be satisfied through the combination of the primary General Liability, Employer's Liability, and Automobile Liability limits with an Umbrella Liability policy, with coverage no more restrictive than the underlying insurance, providing excess limits at least equal to or greater than the combined primary limits.

All Commercial General Liability including completed operations-products liability coverage and Automobile liability insurance shall designate Owner and Company, its parent, affiliates and subsidiaries, its directors, officers and employees as Additional Insured. All such insurance should be primary and non-contributory, and is required to respond and pay prior to any other insurance or self-insurance available to Owner and Company. In addition to the liability limits available, such insurance will pay on behalf or indemnify Owner and Company for defense costs. Any other coverage available to the Owner and Company applies on a contingent and excess basis. Such insurance shall include appropriate clauses pursuant to which the insurance companies shall waive its rights of subrogation against Owner and Company.

Contractor and subcontractors shall furnish prior to the start of work, certificates or adequate proof of the foregoing insurance including, if specifically requested by Company, copies of the endorsements and insurance policies naming Owner and Company as an Additional Insured. Current certificates of insurance shall be provided prior to the commencement of work and be maintained until completion of the contract. Owner shall be notified in writing at least thirty (30) days prior to cancellation of or material change in a policy. Carriers providing coverage will be rated by A.M. Best with at least an A- rating and a financial size category of at least Class VII. Such cancellation or material alteration shall not relieve Contractor of its continuing obligation to maintain insurance coverage in accordance with this contract.

(B) If Contractor shall fail to procure and maintain said insurance, Owner or Company, upon written notice, may, but shall not be required to, procure and maintain same, but at the expense of Contractor. In the alternative, Owner or Company may declare a default hereunder and, unless such default is timely cured, terminate the Lease. Unless and until the default is cured, neither Contractor nor its servants, employees or agents will be allowed to enter upon the Premises.

SC-5.4.7 Additional Insureds

The policies of insurance so required by Paragraph 5.4 shall include as additional insureds the following parties:

1. OWNER
2. ENGINEER
3. ENGINEER's Consultant

SC-5.6 Builders Risk Insurance

The CONTRACTOR shall bear all risks of all loss or damage to the materials and Work until the Work is finally accepted by the OWNER, except that the CONTRACTOR may claim reimbursement under the OWNER's builder's risk insurance policy as herein provided and limited. OWNER will carry "All Risk" Builders Risk Insurance subject to deductibles, terms and conditions as stated in the policy and below. It is the obligation and responsibility of the CONTRACTOR to make appropriate claim to the insurance company for all losses claimed under the policy. Should any loss not be covered under this policy, in whole in or parts, the CONTRACTOR shall bear the loss. Any questions regarding coverages, limitation, exclusion, etc. contained in the policy shall be addressed by bidders prior to submittal of bids, by Michaela Grasshoff, phone 212-488-0272, mgrasshoff@frenkel.com, or Ed Todd, 212-488-0456, etodd@frenkel.com, at Frenkel & Co. Inc., 1740 Broadway, New York, NY 10019, fax 212-488-0220.

Such insurance shall cover the full value of the cost of replacement to the OWNER, less applicable deductibles, of all completed portions of the work to be performed throughout the entire time of construction. The deductibles on each separate and unrelated loss are (1) 5% of the value of loss caused by earthquake and (2) \$1,000 on all other losses. OWNER will furnish to the CONTRACTOR evidence of the insurance coverage provided.

Such insurance shall not cover (1) damage to or loss of material or equipment furnished by either party which are damaged or lost due to carelessness or negligence on the part of the CONTRACTOR, or (2) damage to or loss of machinery, tools, equipment, or other property furnished by the CONTRACTOR whether or not used by the CONTRACTOR in carrying out the terms of the Contract unless such machinery, tools, equipment or other property are specifically intended for permanent incorporation into the Contract work and are included in an approved application for payment.

SC-6.13 Permits

OWNER will obtain and pay for all necessary permits which by Laws or Regulations must be obtained by the OWNER. The CONTRACTOR will obtain and pay for all other permits, licenses and certificates of inspection. The CONTRACTOR will pay for all inspection costs and fees.

The CONTRACTOR and/or his Subcontractor(s) shall obtain, complete, seal and sign all applications required to obtain construction permits required by state and local government agencies. A Xerox copy of the electrician's and plumber's current state and/or local license shall be delivered to the OWNER.

When required by the local governing body, the electrician and plumber will execute a mechanical bond in the form approved by the local government.

All bonds, application forms and copies of licenses shall be delivered to the OWNER so these documents may be submitted with the OWNER's application for a building permit.

SC-6.15 Sales Tax

Add the following language after Paragraph 6.15 of the General Conditions:

Without altering CONTRACTOR's full responsibility to properly determine and pay such taxes, the OWNER will provide the CONTRACTOR, for use at CONTRACTOR's risk, a copy of any Guidelines developed by the OWNER with respect to sales and use tax exemptions in the state in which the Project is located. A copy of the Guidelines for the state in which the Project is located is included in Appendix C attached to the Supplementary Conditions.

CONTRACTOR shall indemnify and hold harmless the OWNER for any sales and use tax which OWNER is required to pay by reason of CONTRACTOR's failure to seek and to implement any available Sales and Use Tax Exemption and CONTRACTOR's failure to obtain any necessary exemption certificate.

OWNER may set off against monies otherwise due CONTRACTOR hereunder the amount of any sales and use tax, or any other tax, which OWNER is required to pay by reason of CONTRACTOR's failure to comply with Paragraph 6.15 of the General Conditions.

CONTRACTOR shall furnish evidence satisfactory to OWNER that CONTRACTOR has paid all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR. OWNER reserves the right to audit the CONTRACTOR's statement prior to release of retainage and final payment.

SC-9.3 Project Representation

The duties, responsibilities and limitations of authority of the Resident Project Representative shall be as follows:

A. General

The Resident Project Representative (RPR) is ENGINEER's agent at the site, will act as directed by and under the supervision of ENGINEER.

B. Duties and Responsibilities of RPR

1. **Conferences and Meetings:** Attend meetings with CONTRACTOR, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings.
2. **Liaison:** Serve as ENGINEER's liaison with CONTRACTOR, working principally through CONTRACTOR's superintendent and assist in understanding the intent of the Contract Documents; and assist ENGINEER in serving as OWNER's liaison with CONTRACTOR when CONTRACTOR's operations affect OWNER's on-site operations.
3. **Shop Drawings and Samples:** Advise ENGINEER and CONTRACTOR of the commencement of any Work requiring a Shop Drawing or sample if the submittal has not been approved by ENGINEER.
4. **Review of Work, Rejection of Defective Work, Inspections and Tests:**
 - a. Conduct on-site observations of the Work in progress to assist ENGINEER in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to ENGINEER whenever RPR believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made.
 - c. Verify that tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel, and that CONTRACTOR maintains adequate records thereof.

5. Interpretation of Contract Documents: Report to ENGINEER when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by ENGINEER.

6. Modifications: Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report with RPR's recommendations to ENGINEER. Transmit to CONTRACTOR decisions as issued by ENGINEER.

7. Payment Requests: Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to ENGINEER, noting particularly the relationship of the payment requested to the schedule of values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.

8. Completion:

a. Before ENGINEER issues a Certificate of Substantial Completion, submit to CONTRACTOR a list of observed items requiring completion or correction.

b. Conduct final inspection in the company of ENGINEER, OWNER and CONTRACTOR and prepare a final list of items to be completed or corrected.

c. Observe that all items on final list have been completed or corrected and make recommendations to ENGINEER concerning acceptance.

C. Limitations of Authority

Resident Project Representative:

1. Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by ENGINEER.

2. Shall not exceed limitations of ENGINEER's authority as set forth in the Agreement or the Contract Documents.

3. Shall not undertake any of the responsibilities of CONTRACTOR, subcontractors or CONTRACTOR's superintendent.

4. Shall not issue directions relative to, or assume control over, any aspect of the means, methods or techniques of construction unless such directions or control are specifically required by the Contract Documents.

SC-14.12 Final Application for Payment

Add the following language at the end of Paragraph 14.12 of the General Conditions:

CONTRACTOR, Subcontractors and Suppliers shall execute and deliver to OWNER their release of liens on forms supplied by OWNER. Blank forms are included in Appendix B of these Supplementary Conditions.

END OF SUPPLEMENTARY CONDITIONS

ACORD		CERTIFICATE OF INSURANCE		ISSUE DATE:											
PRODUCER VENDOR'S INSURANCE BROKER AND ADDRESS INSURED VENDOR/CONTRACTOR/TRADE I.A, I.B. Address		<p>THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.</p> <p style="text-align: center;">COMPANIES AFFORDING COVERAGE</p> <table style="width: 100%;"> <tr> <td style="width: 15%;">COMPANY LETTER</td> <td>A. ABC INSURANCE COMPANY</td> </tr> <tr> <td>COMPANY LETTER</td> <td>B. XXX INSURANCE COMPANY</td> </tr> <tr> <td>COMPANY LETTER</td> <td>C. YYY INSURANCE COMPANY</td> </tr> <tr> <td>COMPANY LETTER</td> <td>D.</td> </tr> <tr> <td>COMPANY LETTER</td> <td>E</td> </tr> </table>				COMPANY LETTER	A. ABC INSURANCE COMPANY	COMPANY LETTER	B. XXX INSURANCE COMPANY	COMPANY LETTER	C. YYY INSURANCE COMPANY	COMPANY LETTER	D.	COMPANY LETTER	E
COMPANY LETTER	A. ABC INSURANCE COMPANY														
COMPANY LETTER	B. XXX INSURANCE COMPANY														
COMPANY LETTER	C. YYY INSURANCE COMPANY														
COMPANY LETTER	D.														
COMPANY LETTER	E														
<p>COVERAGES</p> <p>THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.</p>															
CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS										
	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR. <input type="checkbox"/> OWNER'S & CONTRACTOR'S PROT. <input checked="" type="checkbox"/> PER PROJECT AGG <input checked="" type="checkbox"/> CGL FORM #	CGL1234	1/1/2006	1/1/2007	GENERAL AGGREGATE PRODUCTS-COMP/OP AGG. \$ 1,000,000 PERSONAL & ADV. INJURY \$ 1,000,000 EACH OCCURRENCE \$ 1,000,000 FIRE DAMAGE (Any one Fire) \$ 1,000,000 MED EXPENSE (Any one person) \$ 300,000 \$ 10,000										
	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS <input type="checkbox"/> COMP DED \$500 <input checked="" type="checkbox"/> NON-OWNED AUTOS	AL5678	1/1/2006	1/1/2007	COMBINED SINGLE LIMIT \$ 1,000,000 BODILY INJURY (Per Person) \$ BODILY INJURY (Per Accident) \$ PROPERTY DAMAGE \$ \$										
B.	EXCESS LIABILITY <input checked="" type="checkbox"/> UMBRELLA FORM <input type="checkbox"/> OTHER THAN UMBRELLA FORM	XS 9876	1/1/2006	1/1/2007	EACH OCCURRENCE \$9,000,000 AGGREGATE \$9,000,000										
A	WORKER'S COMPENSATION AND EMPLOYERS LIABILITY	WC 5432	1/1/2006	1/1/2007	<input checked="" type="checkbox"/> STATUTORY LIMITS EACH ACCIDENT \$1,000,000 DISEASE-POLICY LIMIT \$1,000,000 DISEASE-EACH EMPLOYEE \$1,000,000										
	OTHER				Personal Property: \$250,000 Deductible:										
<p>DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS</p> <p>Reference Project Location or Contract No.) Certificate holder is included as Additional Insured, except for workers compensation, with respect to liability arising out of the named insured's operations as required by written contract. Any coverage afforded to the Additional Insured shall apply as primary and not excess to any other insurance or self insurance available to Additional Insured. Waiver of Subrogation shall apply to all insurance.</p>															
CERTIFICATE HOLDER			CANCELLATION												
American Water Company Address City, State,			SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT. AUTHORIZED REPRESENTATIVE												
ACORD 25-S (7/90)			ACORD CORPORATION 1990												

RELEASE OF LIENS

WHEREAS, we, the undersigned, have installed or furnished labor, materials and/or equipment for the installation of the Project entitled **High Service Mains for New Water Treatment Plant on Pool 3**, installed pursuant to a written agreement dated _____, 20____, between the **Kentucky American Water**), having an office at 2300 Richmond Road, Lexington, Kentucky 40502 hereinafter called OWNER and _____, having an office at _____, hereinafter called CONTRACTOR, which said facilities are owned by the OWNER and described and located as follows:

Furnish and install approximately 161,000 LF of 42-inch waterline, together with all special construction and appurtenances.

WHEREAS, we, the undersigned, have agreed to release any and all claims and liens which we have, or might have, against the OWNER, or said facilities by reason of the labor, materials and equipment furnished by us in connection with said installation;

NOW THESE PRESENTS WITNESS that we the undersigned, in consideration of the premises, and of the sum of One Dollar (\$1.00) in hand paid by the said OWNER, at and before the sealing and delivery hereof, the receipt whereof we do hereby acknowledge, have remised, released and forever quitclaimed, and by these presents do remise, release and forever quitclaim, unto the said OWNER, its successors and assigns, any and all manner of liens, claims and demands whatsoever which we now have, or might or could have, on or against the said facilities, or the owner thereof, for work done, or for equipment or materials furnished in connection with the installation thereof. It is the intent of this release that the OWNER, its successors and assigns shall and may hold, have, use and enjoy the said facilities free and discharged from all liens and demands whatsoever which we now have, or might or could have against the same if these presents had not been made.

IN WITNESS WHEREOF, we have hereunto set our hand and seal the day written opposite our signature.

Company Name _____ (SEAL)

By _____

Title _____

Dated _____, 20 ____

Sworn to and subscribed before me,
a Notary Public, this _____ day
of _____, 20 ____.

Notary Public (SEAL)

I, _____, duly authorized representative of
_____, designated as CONTRACTOR, do
hereby state that the parties whose names are signed to the attached releases, pages 1 through _____,
are all of the parties who have furnished labor, materials or equipment in connection with the
construction of the facilities mentioned above; excepting only such materials as may have been
furnished by the OWNER.

Dated: _____, 20 ____.

Sworn to and subscribed before me,
a Notary Public, this _____ day
of _____, 20 ____.

Notary Public (SEAL)

RELEASE OF LIENS

WHEREAS, we, the undersigned, have installed or furnished labor, materials or equipment for the installation of the Project entitled _____, installed pursuant to a written agreement dated _____, 20____, between the **Kentucky American Water**, having an office at 2300 Richmond Road, Lexington, Kentucky 40502 hereinafter called OWNER and _____, having an office at _____, hereinafter called CONTRACTOR, which said facilities are owned by the OWNER and described and located as follows:

Furnish and install approximately 161,000 LF of 42-inch waterline, together with all special construction and appurtenances.

WHEREAS, we, the undersigned, have agreed to release any and all claims and liens which we have, or might have, against the OWNER or said facilities by reason of the labor, materials and equipment furnished by us in connection with said installation;

NOW THESE PRESENTS WITNESS that we, the undersigned, in consideration of the premises, and of the sum of One Dollar (\$1.00) in hand paid by the said OWNER, at and before the sealing and delivery hereof, the receipt whereof we, do hereby acknowledge, have remised, released and forever quitclaimed, and by these presents do remise, release and forever quitclaim, unto the said OWNER, its successors and assigns, any and all manner of liens, claims and demand whatsoever which we now have, or might or could have, on or against the said facilities, or the owner thereof, for work done, or for equipment or materials furnished in connection with the installation thereof. It is the intent of this release that the OWNER, its successors and assigns shall and may hold, have, use and enjoy the said facilities free and discharged from all liens and demands whatsoever which we now have, or might or could have against the same if these presents had not been made. And we do further certify and acknowledge, that we have received of and from the said CONTRACTOR, payment in full on account of labor done or materials or equipment furnished for or in connection with said facilities.

IN WITNESS WHEREOF, we have hereunto set our hand and seal the day written opposite our signature.

Company Name _____ (SEAL)
By _____
Title _____
Dated _____, 20 ____

Sworn to and subscribed before me, a Notary Public,
this _____ day of _____, 20 ____.

(SEAL)
Notary Public
(Subcontractors and Suppliers)

END OF RELEASE OF LIENS

Division 1 - General Requirements

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Installation/construction of high service water transmission mains in Franklin, Scott, Owen and Fayette counties in Kentucky.
- B. The Contractor shall provide all materials, labor and equipment necessary for completion of the Project. The Contract Documents are intended to provide the basis for proper completion of the work suitable for the intended use of the Owner. Anything not expressly set forth but which is reasonably implied or necessary for proper performance of the Project shall be included.
- C. Continuous Operations: The existing system must be maintained in continuous operation in such a manner that it meets all local, state, and federal requirements. The Contractor is responsible not to deactivate, demolish, or interfere with any system component required for the continuous operation until a new or temporary permanent-like system has been installed and is operational. The Contractor is responsible for payment of all fines resulting from any action or inaction on his part or the part of his subcontractors during performance of the Work that causes the facility/facilities to operate in an illegal manner or fail to operate in a legal manner.
- D. The following major Work items are included in the Contract:
 - 1. Approximately 161,000 LF of 42-inch waterline.
 - 2. Gate valve assemblies.
 - 3. Combination air valve assemblies.
 - 4. Drain assemblies.
 - 5. Fire hydrant assemblies.
 - 6. Stream crossings.
 - 7. Highway crossings.
 - 8. Railroad crossing.

1.02 PERMITS

The Contractor shall obtain any permits related to or required by, the Work in this Contract.

1.03 CODES

Comply with applicable codes and regulations of authorities having jurisdiction. Submit copies of inspection reports, notices, citations and similar communications, to the Owner.

1.04 EXISTING CONDITIONS AND DIMENSIONS

- A. The Work in this Contract will primarily be performed in or around existing facilities of which a portion must remain functional. The Contractor must maintain the required items and/or systems functional without additional effort by the Owner's personnel and at no extra costs to the Owner.
- B. The Contractor is responsible for verifying all existing conditions, elevations, dimensions, etc., and providing his finished work to facilitate existing conditions.

END OF SECTION 01010

SECTION 01015 - WORK SEQUENCE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall conform to all miscellaneous requirements as contained in the Contract.
- B. The Contractor shall perform all Work included in the Contract Documents.
- C. The Contractor shall perform all the Work incidental to the items shown in the Contract Documents even though it may not be specifically enumerated.
- D. The Contractor will have to perform the work in a sequence acceptable to the Owner, and in some instances the Work will have to be performed in a sequence directed by the Owner.
- E. Further, the Contractor shall have to perform all the Work included in this project in a sequence that does not impair the capabilities of the water distribution system nor cause undue hardships on day-to-day operating personnel.

1.02 RELATED REQUIREMENTS

- A. General Conditions.
- B. Section 01010 - Summary of Work.
- C. Section 01040 - Coordination.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SCHEDULING THE SEQUENCE OF CONSTRUCTION OPERATIONS

The Contractor shall submit to the Engineer, for review and approval, a complete schedule (progress chart) of his proposed sequence of construction operations prior to commencement of the work.

The Engineer will neither consider nor approve a construction schedule that fails to utilize the entire time allocated by the Contract for the construction of the Project.

The Contractor shall schedule the various construction activities to complete the Project throughout the entire Contract time period. This schedule requirement shall not prevent the Contractor from completing the Project in a shorter time frame than illustrated in the schedule. The construction schedule along with a cost breakdown schedule shall be reviewed and approved by the Owner prior to the submission of the first partial payment request in accordance with the General Conditions.

A copy of the construction schedule shall be submitted to the Owner with each pay request, appropriately marked to indicate the actual progress of the work compared to the planned schedule. This revised schedule must be approved by the Owner prior to payment.

3.02 OTHER WORK SEQUENCE ITEMS

- A. Traffic stoppages.
- B. Crossings of I-75, U.S. 25, U.S. 460, and U.S. 62.
- C. CSX Railroad crossing.

END OF SECTION 01015

SECTION 01040 - COORDINATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall coordinate the Work of all crafts, trades and subcontractors engaged on the Work, and he shall have final responsibility in regards to the schedule, workmanship and completeness of each and all parts of the Work.
- B. The Contractor shall be prepared to guarantee to each of his subcontractors the dimensions which they may require for the fitting of their work to the surrounding work.
- C. All crafts, trades and subcontractors shall be made to cooperate with each other and with others as they may be involved in the installation of work which adjoins, incorporates, precedes or follows the work of another. It shall be the Contractor's responsibility to point out areas of cooperation prior to execution of subcontract agreements and the assignment of the parts of the Work. Each craft, trade and subcontractor shall be made responsible to the Contractor, for furnishing embedded items, giving directions for doing all cutting and fitting, making all provisions for accommodating the Work, and for protecting, patching, repairing and cleaning as required to satisfactorily perform the Work.
- D. The Contractor shall be responsible for all cutting, digging and other actions of his subcontractors and workmen. Where such action impairs the safety or function of any structure or component of the Project, the Contractor shall make such repairs, alterations and additions as will, in the opinion of the Engineer, bring said structure or component back to its original design condition at no additional cost to the Owner.
- E. Each subcontractor is expected to be familiar with the General Requirements and all Sections of the Detailed Specifications for all other trades and to study all Drawings applicable to his work to the end that complete coordination between the trades will be affected. Each subcontractor shall consult with the Contractor, who shall advise the Engineer if conflicts exist on the Drawings.
- F. No extra compensation will be allowed to cover the cost of removing piping, conduits, etc., or equipment found encroaching on space required by others.

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide cutting and patching work to properly complete the work of the project, complying with requirements for connection to existing lines and structures.
- B. Do not cut and patch in a manner that would result in a failure of the work to perform as intended, decreased energy efficiency, increased maintenance, reduced operational life, or decreased safety.

PART 2 - PRODUCTS

2.01 MATERIALS

Match existing materials with new materials conforming to project requirements when performing cutting and patching work.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Inspect conditions prior to work to identify scope and type of work required. Protect adjacent work. Notify Owner of work requiring interruption to building services or Owner's operations.
- B. Perform work with workmen skilled in the trades involved. Prepare sample area of each type of work for approval.
- C. Cutting: Use cutting tools, not chopping tools. Make neat holes. Minimize damage to adjacent work. Check for concealed utilities and structure before cutting.
- D. Patching: Make patches, seams, and joints durable and inconspicuous. Comply with tolerances for new work.
- E. Clean work area and areas affected by cutting and patching operations.

END OF SECTION 01045

SECTION 01075 - BASIS OF PAYMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all necessary labor, machinery, tools, apparatus, equipment, materials, services and other necessary supplies and perform all work shown on the Drawings and/or described in the Specifications and Contract Documents at the unit or lump sum prices for the items enumerated in Part 2 of this Section.

1.02 COMPUTATION OF QUANTITIES

- A. For estimating quantities in which the computation of areas by geometric methods would be comparatively laborious, it is agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of such areas.
- B. It is further agreed that the computation of the volume of prismsoids shall be by the method of average end area.

PART 2 - PRODUCTS

2.01 MOBILIZATION

Payment for the Contractor's mobilization will be made at the Contract lump sum price and shall include all costs incurred for moving equipment onto the Project area and any pertinent costs related thereto.

2.02 BONDS AND INSURANCE

Payment for bonds and insurance will be made at the Contract lump sum price, and shall include the costs of the Performance and Payment Bonds provided under the Contract, and the premiums for insurance required under the Contract.

2.03 GENERAL REQUIREMENTS

Payment for general requirements will be made at the Contract lump sum price distributed over the initial term of the Contract and shall include field supervision and support staff, office supervision and support staff, costs associated with maintaining the field operation, and other items required by the general requirements and conditions of the Contract.

2.04 WATER LINE

- A. Payment for water line will be made at the Contract unit price per linear foot in place, which shall include compensation for furnishing pipe, trenching, bedding, laying, jointing, shoring, sheeting and bracing, initial backfill, and all other appurtenances required but not specifically delineated herein. Fittings (including restraints) are included in this pay item.
- B. The quantity of piping to be paid for shall be the length of pipe measured along the centerline of the completed pipe line without deducting the length of fittings.
- C. Payment for final backfill shall be included in this pay item except for asphalt material and concrete required in restoration of paved areas as defined in Sections 02510 and 02520. Bituminous binder and concrete shall be included in the pay item "Bituminous Pavement Replacement", or "Concrete Pavement Replacement". Class II material (DGA and/or crushed stone paving) required in the restoration of gravel roadways and drives shall be included in this pay item.
- D. All excavation is unclassified and is included in this pay item and will not be paid for separately. Disposal of any excavated material that is necessary will also be included in this price.
- E. Testing of the completed water line and any electric, gas or other utility relocation, if necessary, is included in this pay item. However, no payment for the labor portion of this unit item shall be made until the line has been tested and accepted by the Engineer.
- F. Payment for seeding and final clean-up (including furnishing and placing topsoil, finish grading, seeding, mulching and erosion control, removal of construction materials and debris, cleaning, and site restoration) is included in this pay item. However, the Owner will not pay eight percent (8%) per foot of the line unit cost until final clean-up and seeding has been performed to the satisfaction of the Owner. The eight percent (8%) per foot of the line unit cost shall be shown as a subsidiary line item on the payment request, which shall also be subject to retainage.
- G. Fence repair/replacement incidental to water line construction is included in this pay item and will not be paid for separately.

2.05 VALVES

Payment for valves will be made at the Contract unit price each which shall include valves, thrust blocking, valve box, concrete pad, and all appurtenances necessary for a complete installation. Valves related to fire hydrants are not included in this pay item.

2.06 DRAIN ASSEMBLY

Payment for drain assemblies will be made at the Contract unit price each which will include fittings, pipe, thrust blocking, housing, valves, and all appurtenances necessary for a complete installation.

2.07 FIRE HYDRANT ASSEMBLY

Payment for fire hydrants will be made at the Contract unit price each which shall include fittings, pipe, hydrants, valve, thrust blocking, drainage pits and all appurtenances necessary for a complete installation.

2.08 COMBINATION AIR VALVE

Payment for a combination air valve release valve will be made at the Contract unit price each, complete in place, including all excavation, material, valve box, saddles, fittings, backfilling, and labor necessary to complete the installation.

2.09 PAVED ROADWAY CROSSING

Payment for the crossing of paved roadways (not driveways) as shown on the Drawings will be paid for at the Contract unit price per linear foot for the size and type. This work shall include the waterline, excavation, bedding, specialized backfill, complete in place with fittings, blocking, spacers, and all items necessary for its construction and installation. Any disposal of excavated material will also be included in this price.

2.10 ENCASEMENT PIPE, BORE AND JACK

Payment for waterline crossing under roadways as shown on the Drawings shall include the respective encasement pipe bored under the roadway and will be paid for at the Contract unit price per linear foot of encasement pipe for the size and type. This work shall include the encasement pipe, complete in place with fittings, blocking, spacers, and all items necessary for its construction and installation. Carrier pipe is paid separately under Item 2.04.

2.11 STREAM CROSSING

- A. Payment for stream crossing will be made at the Contract unit price per linear foot in place, which shall include excavation, waterline, laying, jointing, temporary trench shoring, backfilling, and all other appurtenances required as shown on the Drawings.
- B. The quantity of piping shall be the length of pipe measured along the centerline of the completed encasement pipe.
- C. Payment for final backfill, creek gravel, and concrete encasement required for restoration of the creek bed is included in this pay item.
- D. Rock excavation is included in this pay item and will not be paid for separately.

2.12 RIVER CROSSING

- A. Payment for river crossings will be made at the Contract unit price per linear foot in place, which shall include compensation for waterline pipe, trenching (including rock excavation), laying, jointing, temporary trench shoring, coffer dams, dewatering, sheeting,

and bracing, backfill, and all other appurtenances required but not specifically delineated herein. Fittings (including thrust blocking) are included in this pay item.

- B. The quantity of piping to be paid for shall be the length of pipe measured along the centerline of the completed pipeline without deducting the length of fittings.
- C. Payment for final backfill shall be included in this pay item. Creek gravel required in the restoration of the river bed shall be included in this pay item. Concrete encasement around the pipeline is required and shall be paid for as part of this item.
- D. Rock excavation is included in this pay item and will not be paid for separately.
- E. Payment for this item shall include the testing of the completed force main at the river crossings.

2.13 CONCRETE PIPE COLLAR

Payment for concrete pipe collar will be made at the Contract unit price each, which shall include excavation, backfill, cast-in-place concrete, anchor straps and all appurtenances necessary for a complete installation.

2.14 LINE MARKER

Payment for line marker will be paid for at the Contract unit price each, complete in place, including all labor and materials to install the line marker as shown on the Drawings and specified herein.

2.15 BITUMINOUS PAVEMENT RESTORATIONS (DRIVEWAYS)

Payment for bituminous pavement replacement will be paid for at the Contract unit price per linear foot which shall include base, placement of bituminous material, compaction and all appurtenances necessary for a complete installation.

2.16 CONCRETE PAVEMENT RESTORATION (DRIVEWAYS)

Payment for concrete pavement restoration will be made at the Contract unit price per linear foot which shall include base, placing concrete, finishing and all appurtenances necessary for a complete installation.

2.17 GRAVEL DRIVEWAY RESTORATION

Payment for gravel driveway restoration will be paid for at the Contract unit price per linear foot which shall include full depth stone bedding and backfill.

2.18 CONNECTION TO EXISTING PIPE

Payment for connections of the new water line to the existing water system will be made at the Contract unit price each which includes the excavation, backfill, cutting the existing

pipe, and fittings required to complete the connections. This item also includes costs of all fittings, valve sleeves or appurtenances required for connection to the existing line. Any disinfection or sampling required will also be covered under this item.

2.19 TRAFFIC CONTROL

Payment for traffic control will be made at the Contract lump sum price. Payment shall include all signs, traffic control devices and other materials, flaggers and other labor required, and all items necessary to provide traffic control for the duration of the project, in accordance with the specifications and the Kentucky Department of Highways encroachment permit.

2.20 DEMOBILIZATION

Payment for the Contractor's demobilization upon completion of the Project will be made at the Contract lump sum price and shall include all costs incurred for removing equipment and materials from the Project area and any pertinent costs related thereto.

PART 3 - EXECUTION

3.01 PAY ITEMS

- A. The pay items listed hereinbefore refer to the items listed in the Bid Schedule and cover all of the pay items for this Contract.
- B. Any and all other items of Work listed in the Specifications or shown on the Drawings for this Contract shall be considered incidental to and included in those pay items.

3.02 ESTIMATED QUANTITIES OF WORK

Wherever the estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of the documents, including the Bid Proposal, they are given for use in comparing bids and the right is specifically reserved, except as otherwise limited by the Contract Documents, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the Work contemplated by this Contract. Such increase or diminution shall be accompanied by an adjustment in the Contract Amount in accordance with the Contract Conditions, and shall not give cause for claims or liability for damages against the Owner or the Engineer, due to such increase or diminution.

END OF SECTION 01075

SECTION 01090 - REFERENCES AND ABBREVIATIONS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth as follows:

ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
ANS	American National Standard
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association
AWWA	American Water Works Association
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, DC
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IPS	Iron Pipe Size
NBS	National Bureau of Standards
NEC	National Electrical Code; latest edition
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPT	National Pipe Thread
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
Stl. WG	U.S. Steel Wire, Washburn and Moen, American Steel and Wire or Roebling Gage
125-lb. ANS; 250-lb. ANS	American National Standard for Cast-Iron Pipe Flanges and Flanged Fittings, Designation B16.1-1975, for the appropriate class
UL	Underwriters' Laboratories

B. REFERENCE STANDARDS

1. For products or workmanship specified by association, trade or federal standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
2. The date of the standard is that in effect as of the Bid date, or the date of the Owner-Contractor Agreement when there are no bids, unless a certain date is indicated for the standard in the Contract Documents.
3. When required by an individual Specification section, the Prime Contractor shall obtain a copy of the standard. Maintain the copy at the job site, available for review by Owner, Engineer, Resident Representative and other appropriate parties until Substantial Completion.

END OF SECTION 01090

SECTION 01120 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.01 SCOPE

For the purpose of this Specification, environmental protection is defined as the retention of the environment in Project construction and to enhance the natural appearance in its final condition. Environmental protection requires consideration of air and land and involves noise as well as other pollutants. In order to prevent, and to provide for abatement and control of, any environmental pollution arising from the construction activities in the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable federal, state and local laws and regulations concerning environmental pollution control and abatement. This Section covers the furnishings of all labor, materials, equipment and performing all work required for the protection of the environment during construction operations except for those measures set forth in other Sections of these specifications.

1.02 PROTECTION OF LAND RESOURCES

The land resources within the Project boundaries and outside the limits of work performed under this Contract shall 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.

1.03 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS

In the event archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of this project, work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall not commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.

1.04 PROTECTION OF LAND AREAS

Except for any work on storage areas and access routes specifically assigned for the use of the Contractor under this Contract, the land areas outside the limits of permanent work performed under this Contract shall be preserved in their present condition. Contractor shall confine his construction activities to areas defined for work on the plans or specifically assigned for his use. No other areas shall be used by the Contractor without written consent of the Owner.

1.05 PROTECTION OF TREES AND SHRUBS

Reasonable care shall be taken during construction to avoid damage to vegetation.

The Contractor shall not deface, injure or destroy trees or shrubs, nor remove or cut them without prior approval from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage.

1.06 TREE PROTECTIVE STRUCTURES

Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured or otherwise damaged by the Contractor's equipment or by his other operations, he may direct the Contractor to provide temporary protection of such trees by placing boards, plans, or poles around them. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage.

1.07 RESTORATION OF DAMAGED TREES

Any tree 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. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. All scars made on trees shall be coated as soon as possible with an approved tree wound dressing.

Trees that are to remain, either within or outside established clearing limits, that are damaged by the Contractor so as to be beyond saving in the opinion of the Engineer, shall be immediately removed, if so directed, and replaced with a nursery-grown tree of the same species and size.

1.08 PROTECTION OF WATER RESOURCES

The Contractor shall control the disposal of fuels, oils, bitumens, calcium chloride, acids, or harmful materials, and shall comply with applicable Federal, State, County and Municipal laws concerning pollution of rivers and streams while performing work under this Contract. Special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, herbicides and insecticides from entering public waters. Water used in on-site material processing, concrete curing, foundation and concrete cleanup, and other waste waters shall not be allowed to reenter a stream if an increase in the turbidity of the stream could result therefrom.

1.09 BURNING

Air pollution restrictions applicable to this project are as follows: Materials shall not be burned on the premises. If the Contractor elects to dispose of waste materials off the premises, by burning, he shall make his own arrangements for such burning area and shall, as specified in the General Conditions, conform to all applicable regulations.

1.10 DUST CONTROL

The Contractor shall maintain all excavations, stockpiles, access roads, waste areas, and all other work free from excess dust to such reasonable degree as to avoid causing a hazard or nuisance to others. Approved temporary methods consisting of sprinkling, chemical treatment, or similar methods will be permitted to control dust. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

1.11 EROSION CONTROL

Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall be graded to control erosion within acceptable limits. Temporary control measures shall be provided and maintained until permanent drainage facilities are completed and operative. The area of bare soil exposed at any one time by construction operations, should be held to a minimum.

1.12 CORRECTIVE ACTION

The Contractor shall, upon receipt of a notice in writing of any noncompliance with the foregoing provisions, take immediate corrective action. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs of damages by the Contractor unless it was later determined that the Contractor was in compliance.

1.13 POST-CONSTRUCTION CLEANUP OR OBLITERATION

The Contractor shall, unless other wise instructed in writing by the Engineer, obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed areas shall be graded and filled and the entire area seeded.

END OF SECTION 01120

SECTION 01200 – PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION CONFERENCES

- A. Prior to commencing the work, a preconstruction conference will be held at the job site and representatives of the following organizations shall have at least one representative in attendance:
1. Owner.
 2. Engineer.
 3. Contractor.
 4. Major subcontractors as the Contractor may direct, or the Engineer may require upon sufficient notice.
 5. Representatives of the appropriate state and federal agencies as they may choose to attend.
- B. The preconstruction conference will be for the purpose of reviewing procedures to be followed concerning the orderly flow of required paperwork; coordination of the various parties involved with the project, review of Shop Drawing submittals, Contract time, liquidated damages, payment estimates, Change Orders, and other items of interest to the parties involved.

1.02 PROGRESS MEETINGS

With the express purpose of expediting construction and providing the opportunity for cooperation of affected parties, meetings shall be called which shall be attended by representatives of (a) Owner, (b) the Engineer, (c) the Contractor, (d) all Subcontractors. A location on or near the site will be designated where such meetings will be held. The frequency of meetings shall be at the discretion of the Engineer and Owner.

END OF SECTION 01200

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED

Shop drawings, descriptive literature, project data and samples (when samples are specifically requested) for all manufactured or fabricated items shall be submitted by the Contractor to the Engineer for examination and review in the form and in the manner required by the Engineer. All submittals shall be furnished in at least three (3) copies to be retained by the Engineer and shall be checked and reviewed by the Contractor before submission to the Engineer. The review of the submittal by the Engineer shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Review of such submittal will not relieve the Contractor of the responsibility for any errors which may exist as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.

1.02 RELATED REQUIREMENTS

- A. General Conditions.
- B. Section 01720 - Project Record Documents

1.03 DEFINITIONS

The term "submittals" shall mean shop drawings, manufacturer's drawings, catalog sheets, brochures, descriptive literature, diagrams, schedules, calculations, material lists, performance charts, test reports, office and field samples, and items of similar nature which are normally submitted for the Engineer's review for conformance with the design concept and compliance with the Contract Documents.

1.04 CONTRACTOR'S ULTIMATE RESPONSIBILITY

Review by the Engineer of shop drawings or submittals of material and equipment shall not relieve the Contractor from the responsibilities of furnishing same of proper dimension, size, quantity, materials and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Review shall not relieve the Contractor from responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. Review of shop drawings shall not be construed as releasing the Contractor from the responsibility of complying with the Specifications.

1.05 GENERAL REQUIREMENTS FOR SUBMITTALS

- A. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Documents. Where applicable, show fabrication, layout, setting and erection details. Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting or erection details of equipment, materials and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for his distribution plus three (3) which will be retained by the Engineer and Owner. Shop drawings shall be folded to an approximate size of 8-1/2 inch x 11 inch and in such manner that the title block will be located in the lower righthand corner of the exposed surface.
- B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the Project, and shall be supplemented to provide additional information applicable to the Project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the Project.
- C. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.
- D. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable Drawing(s) or Drawing schedule(s) and shall be accompanied by transmittal forms in the format provided by the Engineer.
- E. The Contractor shall review and check submittals, and indicate his review by initials and date.
- F. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer, in letter of transmittal of the deviation and the reasons therefor. All changes shall be clearly marked on the submittal with a bold mark other than red. Any additional costs for modifications shall be borne by the Contractor.
- G. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineer, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted item.

- H. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.
- I. Submittals for all electrically operated items (including instrumentation and controls) shall include complete wiring diagrams showing lead, runs, number of wires, wire size, color coding, all terminations and connections, and coordination with related equipment.
- J. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers and fabricators; the Contractor shall be responsible for insuring the compatibility of such coatings with the field-applied paint products and systems.
- K. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.
- L. Where manufacturer's brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions and similar products, the Contractor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.
- M. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.
- N. All bulletins, brochures, instructions, parts lists, and warranties packaged with and accompanying materials and products delivered to and installed in the Project shall be saved and transmitted to the Owner through the Engineer.

1.06 CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, field construction criteria, catalog numbers and similar data.
- B. Coordinate each submittal with requirements of Work and Contract Documents.
- C. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
- D. Begin no work, and have no material or products fabricated or shipped which required submittals until return of submittals with Engineer's stamp and initials or signature indicating review.

END OF SECTION 01300

SECTION 01380 - CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 WORK INCLUDED

Provide monthly photographs of the construction throughout the progress of the Work.

1.02 RELATED WORK

- A. General Conditions.
- B. Section 01700 - Project Closeout.

1.03 CONSTRUCTION PHOTOGRAPHY

- A. The term "photograph" as used herein refers to a photographic view, including similar exposures taken to assure the usefulness of the photographic record. All necessary photographs shall be taken to assure the usefulness of the photographic record. All photographs shall be taken in color, not black and white. Minimum film size shall be 35 mm print film, film speed and illumination as necessary to provide clear, crisp images. Digital photography may be substituted for film photography as approved by Owner.
- B. Provide monthly photographs (two sets) of the construction throughout the progress of the Work. Provide twenty-four (24) views of Work each month or more as may be necessary to clearly show any new work.
- C. Take the photographs as close as possible to the cutoff date for each Application for Payment, except for those photographs necessary to comply with Paragraph D., following.
- D. Take photographs at the beginning, during, and completion of each element of construction listed below:
 - 1. Entire waterline route.
 - 2. Switzer Bridge area.
 - 3. Fish hatchery area.

1.04 PRINTS

- A. Two prints of each photograph shall be furnished to the Engineer with each pay request, and each print shall have a glossy finish and be mounted in plastic sleeving on a substantial backing. The overall dimensions of each mounted print shall be 4-inches x 6-inches, or larger. Mount with binder tabs or in clear plastic sheets.

- B. Each photograph shall have attached to the backing a paper label, approximately 2-1/4-inches wide by 1-3/4-inches high containing the following information in neat lettering:

1. Project name.
- 2.. Contractor's name.
3. Short Description of View.
4. Photo Number and Date Taken.
5. Phototographer's (Firm) Name.

1.05 NEGATIVES

The film negatives shall be indexed, cataloged and retained in the files of the Contractor until the completion of the project and shall then be turned over to the Engineer. Digital photographs shall be provided on compact disks with label and identification requirements specified above.

1.06 TECHNIQUE

- A. All views shall provide factual presentation of the Work progress.
- B. All photos shall provide correct exposure and focus, high resolution and sharpness, maximum depth of field and minimum distortion.

1.07 VIEWS

The photographs shall be from varied views which show the most representative examples of the Work progress.

1.08 PRECONSTRUCTION VIDEO

- A. Prior to the initiation of any construction activities, the Contractor shall videotape the entire site, including the complete exterior of all buildings within fifty (50) feet of the edge of Construction Limits.
- B. The original of the tape(s) shall be provided to the Owner. One (1) copy of the tape(s) shall be provided to the Engineer. Contractor shall retain one or more copies, as necessary to meet the requirements of their insurance and bonding coverage.
- C. Maximum camera travel speed during the taping shall not exceed 5.9 feet per second (approximately 4 miles per hour). Slower camera travel speeds are recommended in and around developed areas. Addresses, stationing, or other orientation information should be provided on an audio track of the videotape. A typewritten index of the tape shall be provided, indicating by tape counter location each address, stationing number or other location identifier, to allow rapid location of specific views on the video record.

- D. A minimum of (1) two hour color tape shall be used for documenting the existing site conditions.

1.09 SUBMITTALS

- A. Submit Preconstruction Video prior to beginning site clearing activities.
- B. Submit monthly construction photograph prints with each Application for Payment.

END OF SECTION 01380

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work of all crafts and trades shall be laid out to lines and elevations as established by the Contractor from the Drawings or from instructions by the Engineer.
- B. Unless otherwise shown, all work shall be plumb and level, in straight lines and true planes, parallel or square to the established lines and levels. The Work shall be accurately measured and fitted to tolerance as established by the best practices of the crafts and trades involved, and shall be as required to fit all parts of the Work carefully and neatly together.
- C. All equipment, materials and articles incorporated into the Work shall be new and of comparable quality to that specified. All workmanship shall be first-class and shall be performed by mechanics skilled at, and regularly employed in, their respective trades.
- D. The Contractor shall determine that the equipment he proposes to furnish can be brought into the facility and installed in the space available. Equipment shall be installed so that all parts are readily accessible for inspection and maintenance.

1.02 WORKMANSHIP

Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

1.03 MANUFACTURERS' INSTRUCTIONS

Comply with manufacturers' instructions in full detail as to shipping, handling, storing, installing, start-up and operation.

1.04 MANUFACTURERS' FIELD SERVICES

- A. The Contractor shall arrange for the services of qualified service representatives from the companies manufacturing or supplying each type of equipment required in the Specification sections and/or in Section 01450.
- B. The manufacturer or supplier shall provide sufficient engineering and technician manhours to satisfactorily complete Supervision of Installation, Equipment Check-out, Field Acceptance Tests, Pre-startup Operator Training, and Post-startup Services (see Section 01450).

1.05 TESTING SERVICES

- A. Tests, inspections and certifications of materials, of equipment, of subcontractors' work, or of completed work shall be provided by the Contractor, as required by the various sections of the Specifications, and all costs for such tests, inspections and certifications shall be included in the Contract Price.
- B. The Contractor shall submit the name of testing laboratory proposed for use on the Project to the Owner, for approval.
- C. The Contractor shall deliver written notice to the Engineer at least two (2) work days in advance of any inspections or tests to be made at the Project site. All inspections or tests to be conducted in the field shall be done in the presence of the Owner or his representative.
- D. Certifications by independent testing laboratories may be by properly attested copies of the data including scientific procedures and results of tests.
- E. Contractor shall schedule and provide site visit services by the same firm which provided geotechnical investigations utilized in the structural design of the foundations for the project. Said visits shall be for the sole purpose of confirming that the conditions described in the geotechnical report are present over the foundation areas extending beyond the investigational borings. The actual costs of providing the described services is included in the bid as a "cash allowance". The Engineer or his representative may waive site visits which are intended to evaluate sub-grade conditions which, in the Engineer's opinion, are substantially identical to adjacent conditions which have been exposed and evaluated.

END OF SECTION 01400

SECTION 01510 - TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall maintain strict supervision of use of temporary utility services:
 - 1. Enforce compliance with applicable standards.
 - 2. Enforce safety practices.
 - 3. Prevent abuse of services.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Obtain and pay for all permits as required by governing authorities.
- B. Obtain and pay for temporary easements required across property other than that of Owner.
- C. Comply with applicable codes.

1.03 REMOVAL

- A. Completely remove temporary materials, equipment, and miscellaneous items upon completion of construction and approval of the Engineer.
- B. Repair damage caused by installation and restore to specified or original condition.

1.04 TEMPORARY ELECTRICITY

Electrical services for construction needs and for lighting and heating the work area will be provided by the Contractor.

1.05 TEMPORARY LIGHTING

- A. Furnish and install temporary lighting required for:
 - 1. Construction needs.
 - 2. Safe and adequate working conditions.
 - 3. Public Safety
 - 4. Security lighting.
- B. Service periods:
 - 1. Security lighting: All hours of darkness.
 - 2. Safety lighting:

- a. Within construction area: All times that authorized personnel are present.
 - b. Public areas: At all times.
- C. Costs of Installation and Preparation: Contractor shall pay all installation, maintenance and removal costs of temporary lighting.
- D. Maintenance of temporary lighting service (replacement of bulbs, etc.) shall be the sole responsibility of the Contractor.

1.06 TEMPORARY WATER

Water necessary for construction, testing and disinfection shall be provided at the Contractor's expense.

END OF SECTION 01510

SECTION 01535 - PROTECTION OF INSTALLED WORK

PART 1 - GENERAL

1.01 WORK INCLUDED

Protection for products, including Owner-provided products, after installation.

1.02 RELATED REQUIREMENTS

Division 1 - General Requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PROTECTION AFTER INSTALLATION

- A. Protect installed products and control traffic in immediate area to prevent damage from subsequent operations.
- B. Restrict traffic of any kind across planted lawn and landscape areas.

END OF SECTION 01535

SECTION 01540 - SECURITY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Project area has to remain safely accessible to Owner's personnel; however, the Contractor will provide any non-interfering security he deems necessary to protect his work, equipment, etc.
- B. Provide an adequate system to secure the Project area at all times, especially during non-construction periods; the Contractor shall be solely responsible for taking proper security measures.
- C. For both security and safety purposes, cranes, vehicles and other equipment left on-site by the Contractor shall be locked at the end of each working day.

1.02 COSTS

Contractor shall pay for all costs for protection and security systems.

END OF SECTION 01540

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SECTION 01550 - ACCESS ROADS AND PARKING AREAS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Access roads.
- B. Temporary parking.
- C. Existing pavements and parking areas.
- D. Permanent pavements and parking areas.
- E. Maintenance.
- F. Removal and repair.

1.02 RELATED REQUIREMENTS

- A. Section 01045 - Cutting and Patching.
- B. Section 01510 - Temporary Utilities.

PART 2 - PRODUCTS

2.01 MATERIALS

For temporary construction: Contractor's option but must be approved by the Owner.

PART 3 - EXECUTION

3.01 PREPARATION

Clear areas, provide proper surface and storm drainage of premises and adjacent areas.
Install erosion protection.

3.02 ACCESS ROADS

- A. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load-bearing capacity to provide unimpeded traffic for construction purposes.

- B. Construct temporary bridges and/or culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate as work progress requires, and provide detours as necessary for unimpeded traffic flow.
- D. Locate temporary access roads as approved by the Owner and/or the Engineer.
- E. Provide and maintain access to all Owner facilities.

3.03 TEMPORARY PARKING

Construct temporary parking areas to accommodate use of construction personnel in an area acceptable to the Owner and/or the Engineer. The Contractor shall enforce the requirement that all Project employees and subcontractors park only in the designated areas. Pay all costs relating to temporary parking.

3.04 MAINTENANCE

- A. Maintain traffic and parking areas in a sound condition, free of excavated material, construction equipment, products, mud, snow and ice. Use whatever dust control measures required to prevent airborne particles.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water and other deficiencies to maintain paving and drainage in original and/or specified condition.

3.05 REMOVAL AND REPAIR

- A. Remove temporary materials and construction when permanent facilities are usable as directed by the Engineer.
- B. Remove underground work and compacted materials to a depth of two (2) feet; fill and grade site as specified.
- C. Repair existing permanent facilities damaged by usage to original and/or specified condition.

END OF SECTION 01550

SECTION 01563 - DUST CONTROL

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

Dust control.

1.02 RELATED REQUIREMENTS

Section 01565 - Erosion and Sediment Control.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 DUST CONTROL

- A. Execute work by methods to minimize raising dust from construction operations.
- B. Provide positive means to minimize construction or traffic generated dust from dispersing into atmosphere.
- C. Provide spraying of construction traffic areas with water to hold dust leaving the construction site to the minimum amounts allowed by regulations.

END OF SECTION 01563

SECTION 01565 - EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall do all Work and take all measures necessary to control soil erosion resulting from construction operations, shall prevent the flow of sediment from the construction site, and shall contain construction materials (including excavation and backfill) within his protected working area so as to prevent damage to the adjacent wetlands or water courses.
- B. The Contractor shall not employ any construction method that violates a rule, regulation, guideline or procedure established by Federal, State or local agencies having jurisdiction over the environmental effects of construction.
- C. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste shall not be discharged into or alongside of any body of water or into natural or man-made channels leading thereto.

PART 2 - PRODUCTS

2.01 MATERIALS

Silt checks shall be constructed of No. 1 coarse aggregate as defined by the Kentucky Transportation Cabinet. Filter fabric for sediment traps shall be of suitable materials acceptable to the Engineer. Bales may be hay or straw, and shall be reasonably clean and free of noxious weeds and deleterious materials.

PART 3 - EXECUTION

3.01 METHODS OF CONSTRUCTION

- A. The Contractor shall use any of the acceptable methods necessary to control soil erosion and prevent the flow of sediment to the maximum extent possible. These methods shall include, but not be limited to, the use of silt fences, hay bales, water diversion structures, temporary revegetation, diversion ditches and settling basins.
- B. Construction operations shall be restricted to the areas of work indicated on the Drawings and to the area which must be entered for the construction of temporary or permanent facilities. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of the wetlands and adjacent watercourses. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope

drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

- C. Excavated soil material shall not be placed adjacent to the wetlands or watercourses in a manner that will cause it to be washed away by high water or runoff. Earth berms or diversions shall be constructed to intercept and divert runoff water away from critical areas. Diversion outlets shall be stable or shall be stabilized by means acceptable to the Engineer. If for any reason construction materials are washed away during the course of construction, the Contractor shall remove those materials from the fouled areas as directed by the Engineer.
- D. For Work within easements or rights-of-way, all materials used in construction such as excavation, backfill, roadway, and pipe bedding and equipment shall be kept within the limits of these easements or rights-of-way.
- E. The Contractor shall not pump silt-laden water from trenches or other excavation into the wetlands, or adjacent watercourses. Instead, silt-laden water from his excavations shall be discharged within areas surrounded by baled hay or into sediment traps or ensure that only sediment-free water is returned to the watercourses. Damage to vegetation by excessive watering or silt accumulation in the discharge area shall be avoided.
- F. Prohibited construction procedures include, but are not limited to the following:
 - 1. Dumping of spoil material into any streams, wetlands, surface waters, or unspecified locations.
 - 2. Indiscriminate, arbitrary, or capricious operation of equipment in wetlands or surface waters.
 - 3. Pumping of silt-laden water from trenches or excavations into surface waters, or wetlands.
 - 4. Damaging vegetation adjacent to or outside of the construction area limits.
 - 5. Disposal of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in wetlands, surface waters, or unspecified locations.
 - 6. Permanent or unauthorized alteration of the flow line of any stream.
 - 7. Open burning of debris from the construction work.
- G. Any temporary working roadways required shall be clean fill approved by the Engineer. In the event fill is used, the Contractor shall take every precaution to prevent the fill from mixing with native materials of the site. All such foreign fill materials shall be removed from the site following construction.

3.02 EROSION CHECKS

- A. The Contractor shall furnish and install baled hay or straw erosion checks surrounding the base of all deposits of stored excavated material outside of the disturbed area, and where indicated by the Engineer. Checks located surrounding stored material shall be located

approximately 6 feet from that material. Bales shall be held in place with two 2 inch by 2 inch by 3 feet wooden stakes. Each bale shall be butted tightly against the adjoining bale to preclude short circuiting of the erosion check.

- B. The Contractor shall remove silt and sediment from the site as it accumulates at erosion checks and repair damaged checks during construction.

- 3.03 The Contractor shall remove all erosion control materials from the site as soon as potential for erosion has been eliminated and when approved by the Engineer. Reseed area where hay bales or silt has been removed.

END OF SECTION 01565

SECTION 01570 - TRAFFIC REGULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Construction parking control.
- B. Flagmen.
- C. Flares and lights.
- D. Haul routes.
- E. Removal of controls.

1.02 RELATED REQUIREMENTS

- A. Section 01530 - Barriers.

PART 2 - PRODUCTS

2.01 SIGNS AND DEVICES

- A. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- B. Flagman Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.01 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and Owner's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.02 TRAFFIC CONTROL

- A. Whenever and wherever, in the Engineer's opinion, traffic is sufficiently congested or public safety is endangered, Contractor shall furnish uniformed officers to direct traffic and to keep traffic off any highway area affected by construction operations.
- B. Contractor shall abide by county and state regulations governing utility construction work.
- C. Traffic control shall be provided according to the Kentucky Department of Highways Manual on Uniform Traffic Control Devices for Streets and Highways.

3.03 FLAGMEN

Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.04 FLARES AND LIGHTS

Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.05 HAUL ROUTES

- A. Consult with authorities to establish public thoroughfares to be used for haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.06 REMOVAL OF CONTROLS

Remove equipment and devices when no longer required.

END OF SECTION 01570

SECTION 01580 - PROJECT IDENTIFICATION SIGN

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall provide signs near the site of the Work. The sign shall set forth the description of the Work and the names of the Owner, Engineer, Funding Agency or Source (if required), and Contractor.

PART 2 - PRODUCTS

2.01 IDENTIFICATION SIGN (4-feet x 8-feet)

- A. Basic design shall be as required by the Engineer per the attached drawing.
- B. Colors shall be as selected by the Engineer.
- C. Number Required: 4.

PART 3 - EXECUTION

3.01 INSTALLATIONS

Signs shall be installed at locations specified by the Engineer.

3.02 MAINTENANCE

The signs shall be maintained in good condition until the completion of the Project.

END OF SECTION 01580

SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 STORAGE OF MATERIALS AND EQUIPMENT

All excavated spoil, all materials and all equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

1.02 HANDLING AND DISTRIBUTION

- A. The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until final completion and acceptance of the Work.
- B. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

1.03 MATERIALS, SAMPLES, INSPECTION

- A. Unless otherwise expressly provided on the Drawings or in any of the other Contract Documents, only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer. No material shall be processed or fabricated for the Work or delivered to the Work site without prior concurrence of the Engineer.
- B. Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor. Defective materials and equipment shall be removed immediately from the site of the Work.
- C. If the Engineer so requires, either prior to or after commencement of the Work, the Contractor shall submit samples of materials for such special tests as the Engineer deems necessary to demonstrate that they conform to the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed. The Contractor shall furnish suitable molds for and make the concrete test cylinders. Except as otherwise expressly specified, the Contractor shall make arrangements for, and pay for, the tests.
- D. All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, the Contractor shall notify the Engineer by letter that the samples have been shipped and shall properly describe the samples in the

letter. The letter of notification shall be sent separate from and should not be enclosed with the samples.

- E. The Contractor shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences of his failure to do so shall be the Contractor's sole responsibility.
- F. In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall provide such samples of workmanship of wall, floor, finish, etc., as may be required.
- G. When required, the Contractor shall furnish to the Engineer triplicate sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.
- H. After review of the samples, data, etc., the materials and equipment used on the Work shall in all respects conform therewith.

END OF SECTION 01600

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

- A. General Conditions.
- B. Section 01710 - Cleaning.
- C. Section 01720 - Project Record Documents.

1.02 SUBSTANTIAL COMPLETION

- A. Contractor:
 - 1. Submit written certification to Engineer that project is substantially complete.
 - 2. Submit list of major items to be completed or corrected.
- B. Engineer will make an inspection within seven days after receipt of certification, together with the Owner's representative.
- C. Should Engineer consider that work is substantially complete:
 - 1. Contractor shall prepare, and submit to Engineer, a list of the items to be completed or corrected, as determined by on-site observation.
 - 2. Engineer will prepare and issue a Certificate of Substantial Completion, containing:
 - a. Date of Substantial Completion.
 - b. Contractor's list of items to be completed or corrected, verified and amended by Engineer.
 - c. The time within which Contractor shall complete or correct work of listed items.
 - d. Time and date Owner will assume possession of work or designated portion thereof.
 - e. Responsibilities of Owner and Contractor for:
 - (1) Insurance.
 - (2) Utilities.
 - (3) Operation of mechanical, electrical and other systems.
 - (4) Maintenance and cleaning.
 - (5) Security.
 - f. Signatures of:
 - (1) Engineer.

- (2) Contractor.
- (3) Owner.

3. Contractor: Complete work listed for completion or correction, within designated time.

D. Should Engineer consider that work is not substantially complete:

- 1. He shall immediately notify Contractor, in writing, stating reasons.
- 2. Contractor: Complete work, and send second written notice to Engineer, certifying that Project, or designated portion of project is substantially complete.
- 3. Engineer will re-review work.

1.03 FINAL INSPECTION

A. Contractor shall submit written certification that:

- 1. Contract Documents have been reviewed.
- 2. Project has been inspected for compliance with Contract Documents.
- 3. Work has been completed in accordance with Contract Documents.
- 4. Equipment and systems have been tested in presence of Owner's representative and are operational.
- 5. Project is completed and ready for final inspection.

B. Engineer will make final on-site observation/review within seven (7) days after receipt of certification.

C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Closeout submittals.

D. Should Engineer consider that work is not finally complete:

- 1. He shall notify Contractor, in writing, stating reasons.
- 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
- 3. Engineer will re-review the work.

1.04 FINAL CLEANING UP

The work will not be considered as completed and final payment made until all final cleaning up has been done by the Contractor in a manner satisfactory to the Engineer. See Section 01710 for detailed requirements.

1.05 CLOSEOUT SUBMITTALS

A. Project Record Documents: to requirements of Section 01720.

- B. Warranties: to requirements of particular technical specifications and Section 01740.

1.06 INSTRUCTION

Instruct Owner's personnel in operation of all systems, mechanical, electrical and other equipment.

1.07 FINAL APPLICATION FOR PAYMENT

Contractor shall submit final applications in accordance with requirements of General Conditions.

1.08 FINAL CERTIFICATE FOR PAYMENT

- A. Engineer will issue final certificate in accordance with provisions of General Conditions.
- B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-final Certificate for payment.

END OF SECTION 01700

SECTION 01710 - CLEANING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish, caused by operations.
- B. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

1.02 RELATED REQUIREMENTS

- A. Section 01045 - Cutting and Patching.
- B. Section 01700 - Project Closeout.
- C. Cleaning for Specific Products or Work: Specification Section for that work.

1.03 SAFETY REQUIREMENTS

- A. Hazards control:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on Project site without written permission from the Owner.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute cleaning to ensure that building, grounds and public properties are maintained free from accumulations of waste materials, trash, and rubbish.
- B. Wet down dry materials and rubbish to allay dust and prevent blowing dust.
- C. At reasonable intervals during progress of Work, clean site and public properties. Provide on-site containers for collection of waste materials, debris, trash, and rubbish.
- D. Remove waste materials, debris, trash, and rubbish from site when containers are full, or when directed by the Engineer or Owner's representative, but not less often than once weekly. Legally dispose of all waste materials, debris, trash, and rubbish at dumping areas off of Project site.
- E. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- F. The Contractor shall thoroughly clean all materials and equipment installed.

3.02 FINAL CLEANING

- A. Employ experienced workmen for final cleaning.
- B. In preparation for substantial completion, conduct final inspection of sight-exposed interior and exterior surface, and of concealed spaces.
- C. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- D. Broom clean paved surfaces; rake clean other surfaces of grounds.
- E. Maintain cleaning until Project, or portion thereof, is occupied by Owner.
- F. The Contractor shall restore or replace existing property or structures as promptly and practicable as work progresses.

END OF SECTION 01710

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

- A. General Conditions.
- B. Section 01300 - Submittals.

1.02 MAINTENANCE OF DOCUMENTS

- A. Maintain at job site, one copy of:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Reviewed Shop Drawings.
 - 5. Change Orders.
 - 6. Other Modifications to Contract.
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Engineer and Owner.

1.03 MARKING DEVICES

Provide colored pencil or felt-tip marking pen for all marking.

1.04 RECORDING

- A. Label each document "RECORD DRAWING" in 2-inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:

1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
3. Field changes of dimension and detail.
4. Changes made by Change Order or Field Order.
5. Details not on original Contract Drawings.

E. Specifications and Addenda: Legibly mark up each Section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

F. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after review.

1.05 SUBMITTAL

A. At completion of project, deliver record documents to Engineer.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each record document.
5. Certification that each document as submitted is complete and accurate.
6. Signature of Contractor or his authorized representative.

END OF SECTION 01720

SECTION 01740 - WARRANTIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Compile specified warranties.
- B. Co-execute submittals when required.
- C. Review submittals to verify compliance with Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Performance and Payment Bonds.
- B. Guaranty.
- C. General Warranty of Construction.

1.03 SUBMITTALS REQUIREMENTS

- A. Assemble warranties executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Furnish two (2) original signed copies.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product, equipment or work item.
 - 2. Firm name, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty.
 - 5. Duration of warranty.
 - 6. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty.
 - 7. Contractor name, address and telephone number.

1.04 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.

B. Format:

1. Size 8 1/2-inch x 11 inches, punch sheets for 3-ring binder: Fold larger sheets to fit into binders.
2. Cover: Identify each packet with typed or printed title "WARRANTIES." List:
 - a. Title of Project.
 - b. Name of Contractor.

C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.05 TIME OF SUBMITTALS

- A. Otherwise, make submittals within ten (10) days after date of substantial completion, prior to final request for payment.
- B. For items of work, where acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing the date of acceptance as the start of the warranty period.

1.06 SUBMITTALS REQUIRED

Submit warranties, bonds, service and maintenance contracts as specified in the respective sections of the Specifications. Additionally, the Contractor shall warrant the entire contract, including all concrete and paving to be free from defects in construction and installation for one (1) year from the date of startup. In the event a component fails to perform as specified or is proven defective in service during the warranty period, the Contractor shall repair the defect without cost to the Owner.

END OF SECTION 01740

Division 2 - Site Work

SECTION 02110 - SITE CLEARING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Clear site within construction limits of plant life and grass.
- B. Remove root system of trees and shrubs.
- C. Remove surface debris.

1.02 REGULATORY REQUIREMENTS

Conform to applicable local codes and ordinances for disposal of debris.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXISTING TREES AND OTHER VEGETATION

- A. The Contractor shall not cut or injure any trees or other vegetation outside right-of-way or easement lines and outside areas to be cleared, as indicated on the Drawings, without written permission from the Engineer. The Contractor shall be responsible for all damage done outside these lines.
- B. The Engineer shall designate which trees are to be removed within permanent and temporary easement lines or right-of-way lines.

3.02 CLEARING

- A. From areas to be cleared, the Contractor shall cut or otherwise remove all trees, brush, and other vegetable matter such as snags, bark and refuse. The ground shall be cleared to the width of the permanent easement or right-of-way unless otherwise directed by the Engineer.
- B. Except where clearing is done by uprooting with machinery, trees, stumps, and stubs to be cleared shall be cut as close to the ground surface as practicable, but no more than 6 inches above the ground surface for small trees and 12 inches for larger trees.
- C. Elm bark shall be either buried at least 1 foot deep or burned in suitable incinerators off site with satisfactory antipollution controls and fire prevention controls, to prevent the spread of Dutch Elm disease and as required by applicable laws.

3.03 GRUBBING

From areas to be grubbed, the Contractor shall remove completely all stumps, remove to a depth of 12 inches all roots larger than 3-inch diameter, and remove to a depth of 6 inches all roots larger than 1/2-inch diameter. Such depths shall be measured from the existing ground surface or the proposed finished grade, whichever is lower.

3.04 STRIPPING OF TOPSOIL

Prior to starting general excavation, strip topsoil to a depth of 6 inches or to depths required by the Engineer. Do not strip topsoil in a muddy condition and avoid mixture of subsoil. Stockpile the stripped topsoil within easement or right-of-way lines for use in finish grading and site restoration. Topsoil stockpiled shall be free from trash, brush, stones over 2 inches in diameter and other extraneous material.

3.05 PROTECTION

- A. Protect plant growth and features remaining as final landscaping.
- B. Protect bench marks and existing work from damage or displacement.
- C. Maintain designated site access for vehicle and pedestrian traffic.

3.06 REMOVAL

- A. All material resulting from clearing and grubbing and not scheduled for reuse shall become the property of the Contractor and shall be suitably disposed of off-site, unless otherwise directed by the Engineer, in accordance with all applicable laws, ordinances, rules and regulations.
- B. Such disposal shall be performed as soon as possible after removal of the material and shall not be left until the final period of cleaning up.

END OF SECTION 02110

SECTION 02150 - SHORING AND BRACING

PART 1 - GENERAL

1.01 SUMMARY

- A. Shore and brace sidewalls in excavations with steel sheet piles with wale systems or soldier piles with timber lagging and tie back system as required to protect existing buildings, utilities, roadways, and improvements.
- B. Maintain shoring and bracing during construction activities, and remove shoring and bracing if practical when construction and filling is complete.
- C. Geotechnical investigation borings, if applicable, were drilled for this project where indicated on the drawings in the report. The geotechnical report was not prepared for purposes of bid development and the accuracy of the report is limited. The Contractor should confer with a geotechnical engineer and/or conduct additional study in the area to obtain the specific type of geotechnical information required for construction and for preparation of bids.

1.02 SUBMITTALS

Provide copies of information on methods of the shoring and bracing system proposed for the work, design basis, calculations where applicable, and copies of shop drawings for inclusion in the project and job-site record files.

1.03 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Shoring and bracing system design shall be prepared and sealed by a registered professional engineer or structural engineer. The system design shall provide the sequence and method of installation and removal. Shoring and bracing system design shall be in accordance with Occupational Safety and Health Administration (OSHA) requirements 29 CFR Section 1926.652.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel Sheet Piles: Heavy-gauge steel sheet.
- B. Soldier Piles: Steel H-beams.

- C. Timber Lagging: Heavy timber. Pressure treated with wood preservative for use below water table for extended time period.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in proper relation with adjacent construction. Coordinate with work of other sections.
- B. Locate shoring and bracing to avoid permanent construction. Anchor and brace to prevent collapse.

END OF SECTION 02150

SECTION 02221 - ROCK REMOVAL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall excavate rock, if encountered, as required to perform the required work, and shall dispose of the excavated material, and shall furnish acceptable material for backfill in place of the excavated rock.
- B. In general, rock in pipe trenches shall be excavated so as to be not less than 6 inches from the pipe after it has been laid.

1.02 REFERENCES

- A. NFPA 495 - Code for the Manufacture, Transportation, Storage and use of Explosive Materials.
- B. Commonwealth of Kentucky Department of Mines and Minerals, Laws and Regulations Governing Explosives and Blasting.

1.03 REGULATORY REQUIREMENTS

- A. Conform to Kentucky Department of Mines and Minerals code for explosive disintegration of rock.
- B. Obtain permits from local authorities having jurisdiction before explosives are brought to site or drilling is started.
- C. KRS 351.330
- D. 805 KAR Chapter 4

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Rock definition: Solid mineral material that cannot be removed with a power shovel.
- B. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.
- C. Delay devices: Type recommended by explosives firm and conforming to state regulations.

- D. Blasting mat materials: Type recommended by explosives firm and conforming to state regulations.

PART 3 - EXECUTION

3.01 EXPLOSIVES

- A. The Contractor shall keep explosives on the site only in such quantity as may be needed for the Work under way and only during such time as they are being used. He shall notify the Engineer, in advance, of his intention to store and use explosives. Explosives shall be stored in a secure manner and separate from all tools. Caps or detonators shall be safely stored at a point over 100 feet distance from the explosives. When the need for explosives has ended, all such materials remaining on the Work shall be promptly removed from the premises.
- B. The Contractor shall observe all state, federal and municipal laws, ordinances and regulations relating to the transportation, storage, handling and use of explosives. In the event that any of the above-mentioned laws, ordinances or regulations require a licensed blaster to perform or supervise the Work of blasting, said licensed blaster shall, at all times have his license on the Work and shall permit examination thereof by the Engineer or other officials having jurisdiction.

3.02 BLASTING PRECAUTIONS

- A. No explosives shall be used within 20 feet of:
 - 1. Building and/or structures existing, constructed or under construction.
 - 2. Underground and/or overhead utilities whether existing or partially constructed.
- B. Permission for any deviation from the restriction set forth above shall be secured from the Engineer, in writing; however, permission for any such deviations shall not relieve the Contractor from any responsibility in the event of damage to buildings, structures or utilities.
- C. All operations involving explosives shall be conducted with all possible care to avoid injury to persons and property. Blasting shall be done only with such quantities and strengths of explosives and in such a manner as will break the rock approximately to the intended lines and grades and yet will leave the rock not to be excavated in an unshattered condition. Care shall be taken to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing pipes or other structures and property above or below ground. Rock shall be well covered with logs or mats, or both, where required. Sufficient warning shall be given to all persons in the vicinity of the Work before a charge is exploded.

- D. The Contractor shall be solely responsible for his blasting operations. The Contractor shall not hold the Owner and/or the Engineer liable for any damages resulting from his blasting operations on this project.

3.03 PREBLAST STRUCTURE SURVEY

- A. Perform a preblast survey to determine and document with pictures the condition of adjacent structures, utilities, wells, buried cables, and other features within a minimum of 400 ft. of the blast area unless otherwise required by applicable regulatory authorities. Determine safe distances to structures or other facilities according to NFPA 495, Appendix B. Where facilities are closer than these distances, and natural barriers are not present, or when the amount of explosive cannot be reduced economically, blasting mats shall be used. Provide mats to protect environmentally sensitive areas, trees within 20 feet from the blasting area, streams, and rock formations from throw rock.
- B. Purpose of survey is to document existing condition of structures prior to blasting, and is intended to be used as evidence in ascertaining whether and to what extent damage may have occurred as result of blasting.
- C. Conduct survey prior to start blasting.
- D. Record information for each structure surveyed:
 - 1. Age and type of construction.
 - 2. Location and character of cracks.
 - 3. Evidence of settlement and leakage.
 - 4. Other pertinent information.
- E. Record preblast survey information on forms prepared specifically for preblast surveys.
- F. Supplement written records with photographs or videotape recordings.
- G. Submit copies of written records and photographs or videotapes to respective property owner, as well as, OWNER and ENGINEER, prior to start of blasting.

3.04 BLAST DESIGN

- A. Design each blast to avoid damage to existing facilities, adjacent property, and completed Work. Consider effects of blast-induced vibrations and air blast, and fly rock potential in design of each blast.
- B. Whenever peak particle velocity exceeds vibration limits, change design of subsequent blasts, as necessary to reduce peak particle velocity to within limits established by BIC.
- C. Whenever air blast exceeds limits, change design of subsequent blasts or provide controls necessary to reduce air blast to within specified limits.

3.05 VIBRATION LIMITS

General: Establish appropriate maximum limit for air blast for each structure or facility that is adjacent to or near blast sites. Base maximum limits on expected sensitivity of each structure or facility to air blast, and federal, state, or local regulatory requirements, but not to exceed 0.015 psi peak overpressure (133 decibels).

3.06 AIR-BLAST LIMITS

Establish appropriate maximum limit for air blast for each structure or facility that is adjacent to or near blast sites. Base maximum limits on expected sensitivity of each structure or facility to air blast, and federal, state, or local regulatory requirements, but not to exceed 0.015 psi peak overpressure (133 decibels).

3.07 FLY ROCK CONTAINMENT

Where fly rock may damage existing facilities, adjacent property, or completed Work, cover area to be blasted with blasting mats or provide other means that will contain and prevent scattering of blast debris.

3.08 VIBRATION AND AIR-BLAST MONITORING

- A. Monitor and record blast-induced vibrations and air blast using suitable sensors and recording equipment for each blast.
- B. Contractor shall provide two (2) seismographs during blasting operations capable of the following:
 - 1. Designed for monitoring blast-induced vibrations and air blast. Capable of recording particle velocity in three mutually perpendicular directions in range from 0 to 6 inches per second.
 - 2. Flat vibration frequency response between 4- and 200-Hz.
 - 3. Capable of recording air-blast overpressure up to 140 decibels.
 - 4. Flat air-blast frequency response between 2- and 500-Hz.
- C. Monitor on, or at, structures or other facilities that are closest to point of blasting. Monitoring more distant facilities that are expected to be sensitive to blast-induced vibrations and air blast.
- D. BIC shall supervise establishment of monitoring programs and initial operation of equipment; review interpretation of records and recommend revisions of blast designs.
- E. Include following information in blasting plan.
 - 1. Vibration and air-blast limits as recommended by BIC.
 - 2. Name of qualified BIC who will be responsible for monitoring program and interpretation of records.
 - 3. Types and models of equipment proposed for monitoring.
 - 4. Numbers and locations of proposed monitoring stations.

5. Procedures to be used for coordinating recording of each blast.
6. Steps to be taken if blasting vibrations or air blast exceed limits.

3.09 EXPLOSIVES

The CONTRACTOR shall keep explosives on the site only in such quantity as may be needed for the Work under way and only during such time as they are being used. Notify the OWNER, in advance, of provisions to store and use explosives.

3.10 BLASTING PRECAUTIONS

- A. Permission for any deviation from the blasting plan and other specified restrictions shall be secured from the OWNER and applicable authorities, in writing; however, permission for any such deviations shall not relieve the CONTRACTOR from any responsibility in the event of damage to buildings, structures or utilities.
- B. All operations involving explosives shall be conducted with all possible care to avoid injury to persons and property. Blasting shall be done only with such quantities and strengths of explosives and in such a manner as will break the rock approximately to the intended lines and grades and yet will leave the rock not to be excavated in an unshattered condition. Care shall be taken to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing pipes or other structures and property above or below ground. Rock shall be well covered with logs or mats, or both, where required. Sufficient warning shall be given to all persons in the vicinity of the Work before a charge is exploded.
- C. The CONTRACTOR shall be solely responsible for his blasting operations. The CONTRACTOR shall not hold the OWNER and/or the ENGINEER liable for any damages resulting from his blasting operations on this project.

3.11 BLASTING RECORDS

- A. For each blast, document the following:
 1. Location of blast in relation to Project stationing or state plane coordinate system and elevation.
 2. Date and times of loading and detonation of blast.
 3. Name of person in responsible charge of loading and firing.
 4. Details of blast design, as previously specified.
 5. Vibration records including location and distance of seismograph geophones to blast and to nearest structure, and measured peak particle velocity. Report peak particle velocity in units of inches per second.
 6. Air-blast records. Report peak air blast values in units of pounds per square inch overpressure above atmospheric or in decibels at linear response.
 7. Comments by BIC regarding damage to existing facilities, adjacent property, or completed Work, misfires, fly rock occurrences, unusual results, or unusual effects as required.

3.12 SUSPENSION OF BLASTING

- A. In event damage to existing facilities, adjacent property, or completed Work occurs due to blasting, immediately suspend blasting and report damage to ENGINEER and OWNER. CONTRACTOR shall be responsible for all costs of repairs or replacement due to damage from blasting.
- B. Before resuming blasting operations, adjust design of subsequent blasts, or take other appropriate measures to control effects of blasting, and submit complete description of proposed changes for reducing potential for future damage.
- C. Do not resume blasting until authorized by OWNER and applicable regulatory authorities.

3.13 ROCK REMOVAL – MECHANICAL METHOD

- A. Excavate and remove rock by the mechanical method. Drill holes and utilize mechanical impact to fracture rock.
- B. In utility trenches, excavate 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- C. Stockpile excavated materials and reuse select materials for site landscaping. Remove and dispose of excess materials offsite at approved location.
- D. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 02220.

3.14 PAYMENT

Rock excavation shall be bid as unclassified and will **not** be paid for separately.

END OF SECTION 02221

SECTION 02225 - EXCAVATING, BACKFILLING, AND
COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall make excavations in such widths and depths as will give suitable room for below grade vaults, pump stations, etc., laying pipe to the lines, grades and elevations, furnish, place and compact all backfill materials specified herein or denoted on the Drawings. The materials, equipment, labor, etc., required herein are to be considered as part of the requirements and costs for installing the various pipes, structures and other items they are incidental to.

1.02 RELATED WORK

- A. Section 02221 - Rock Removal.
- B. Section 02610 - Water Pipe and Fittings.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Crushed stone material shall conform with the requirements of the applicable sections of the Kentucky Bureau of Highways Standard Specifications and shall consist of clean, hard, and durable particles or fragments, free from dirt, vegetation or objectionable materials.
- B. Two classes of crushed stone material are used in this Section. The type of material in each class is as follows:
 - 1. Class I - No. 9 Aggregate.
 - 2. Class II - Dense Graded Aggregate (DGA).

PART 3 - EXECUTION

3.01 EXCAVATION OF TRENCHES

- A. Unless otherwise directed by the Engineer, trenches are to be excavated in open cuts.
 - 1. Pipe is to be laid in gravel bedding or concrete cradle. The trench shall be excavated by machinery to, or just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.

- B. Trenches shall be sufficient width to provide working space on each side of the pipe and to permit proper backfilling around the pipe.
 - 1. The Contractor shall remove only as much of any existing pavement as is necessary for the prosecution of the Work (maximum of one lane). The pavement shall be cut with pneumatic tools, without extra compensation to the Contractor, to prevent damage to the remaining road surface. Where pavement is removed in large pieces, it shall be disposed of before proceeding with the excavation.
- C. All excavated materials shall be placed a safe distance back from the edge of the trench.
- D. Unless specifically directed otherwise by the Engineer, not more than 60 feet of trench shall be opened ahead of the pipe laying work of any one crew, and not more than 60 feet of open ditch shall be left behind the pipe laying work of any one crew. Watchmen or barricades, lanterns and other such signs and signals as may be necessary to warn the public of the dangers in connection with open trenches, excavations and other obstructions, shall be provided by and at the expense of the Contractor.
- E. When so required, or when directed by the Engineer, only one-half of street crossings and road crossings shall be excavated before placing temporary bridges over the side excavated, for the convenience of the traveling public. All backfilled ditches shall be maintained in such manner that they will offer no hazard to the passage of traffic. The convenience of the traveling public and the property owners abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled and temporarily restored.
- F. Trench excavation shall include the removal of earth, rock, or other materials encountered in the excavating to the depth and extent shown or indicated on the Drawings.

3.02 WATER PIPE BEDDING

- A. Piping for water mains shall be supported as follows:
 - 1. The trench bottom for water main piping shall be stable, continuous, relatively smooth and free of frozen material, clodded dirt, foreign material and rock or granular material larger than 1/2 inch in diameter. The foundation for water main piping shall be prepared so that the entire load of the backfill on top of the pipe will be carried uniformly on the barrel of the pipe. For all installation areas, the bottom shall be lowered to provide 6 inches of clearance around the pipe. Class I granular bedding shall be used to bring the trench bottom to grade.
- B. After each pipe has been brought to grade, aligned, and placed in final position, granular Class I material shall be deposited and densified under the pipe haunches and on each side of the pipe up to the spring line of the pipe to prevent lateral displacement and hold the pipe in proper position during subsequent pipe jointing, bedding, and backfilling operations.

- C. In wet, yielding and mucky locations where pipe is in danger of sinking below grade or floating out of grade or line, or where backfill materials are of such a fluid nature that such movements of pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective.
- D. Where an unstable (i.e., water, mud, etc.) trench bottom is encountered, stabilization of the trench bottom is required. This is to be accomplished by undercutting the trench depth and replacing to grade with a foundation of crushed stone aggregate.
- E. The depth of the foundation is dependent upon the severity of the trench bottom. The size of stone aggregate used in the foundation will be determined by the condition of the unstable material. Once the trench bottom has been stabilized, the required Class I bedding material can be placed.
- F. No pipe shall be laid on solid or blasted rock.
- G. Pipe bedding as required in Paragraphs A, B, C, and D of this Section is **not** considered a separate pay item.

3.03 WATER PIPE BACKFILLING

A. Initial Backfill:

1. This backfill is defined as that material which is placed over the pipe from the spring line to a point 6 inches above the top of the pipe. For water main piping in areas not subject to vehicular traffic, initial backfill material shall be earth material, free of rocks, acceptable to the Engineer or with granular material (either Class I or acceptable crushed material from trench). For water main piping in paved areas, initial backfill shall be Class I material.
2. Material used, whether earth or Class I, in the initial backfilling is **not** a separate pay item. Payment for the material is included in the unit price per linear foot of water main.
3. In areas where large quantities of rock are excavated and the available excavated earth in the immediate vicinity is insufficient for placing the required amount of backfill over the top of the pipe as set forth in Paragraph A.1, the Contractor shall either haul in earth, crush the material removed from the trench to a suitable gradation (if rock material is acceptable for initial backfill) or haul in Class I material for backfilling over the pipe. Neither the hauling and placement of earth nor the ordering and placement of Class I material to fulfill the backfill requirements set forth herein is considered a separate pay item.

B. Final Backfill:

1. There are two cases where the method of final backfilling varies. The various cases and their trench situations are as follows:
 - a. Case I - Areas not subject to vehicular traffic.

- b. Case II - Paved driveways.
 - c. Case III - Paved roadways (bituminous).
2. In all cases, walking or working on the completed pipelines, except as may be necessary in backfilling, will not be permitted until the trench has been backfilled to a point 6 inches above the top of the pipe. The method of final backfilling for each of the above cases is as follows:
- a. Case I - The trench shall be backfilled from a point 6 inches above the top of the pipe to a point 8 inches below the surface of the ground with earth material free from large rock (greater than 6 inches in the longest dimension), acceptable to the Engineer, or with crushed stone (either Class I or excavated material, if suitable).
 - b. Case II - The trench shall be backfilled from a point 6 inches above the top of the pipe to a point 12 inches below the existing pavement surface with Class I (No. 9 crushed stone aggregate) material. The backfill shall be mechanically tamped in approximately 6-inch layers to obtain the maximum possible compaction. The remaining backfill shall be as follows:

For gravel surfaces - Class II (dense graded aggregate) material mechanically tamped to maximum possible compaction. The trench may be left with a slight mound if permitted by the Engineer.

For bituminous and concrete surfaces - Bituminous and concrete pavement sections as detailed on the Drawings and as specified for Bituminous Pavement Replacement and Concrete Pavement Replacement.
 - c. Class III - The trench shall be backfilled from a point 6 inches above the top of the pipe to subgrade below the existing pavement surface with low strength mortar backfill material (flowable fill). The flowable fill shall have suitable drying time (manufacturer's recommendation) prior to pavement placement. The final grade shall match the original profile and conform with Kentucky Department of Highways.
- 3. Earth and Class I material used in final backfill is not a separate pay item. Payment shall be included in the price of water main.
 - 4. Class II material used in final backfill shall be included in the unit price of the pipe.
- C. A sufficient amount of Class II material shall be stockpiled to insure immediate replacement by the Contractor of any settled areas. No extra payment will be made for the filling in of settled or washed areas by the Contractor.
- D. Excavated materials from trenches, in excess of quantity required for trench backfill, shall be disposed of by the Contractor. It shall be the responsibility of the Contractor to obtain location or permits for its disposal, unless specific waste areas have been designated on the Drawings or noted in these Specifications. The cost of disposal of excess excavated

materials, as set forth herein, no additional compensation being allowed for hauling or overhaul.

3.04 PLACEMENT OF IDENTIFICATION TAPE

- A. Detectable underground marking tape shall be placed over all utility lines. Care shall be taken to insure that the buried marking tape is not broken when installed and shall be Lineguard brand encased aluminum foil, Type III. The identification tape is manufactured by Lineguard, Inc., P.O. Box 426, Wheaton, IL 60187.
- B. The identification tape shall bear the printed identification of the utility line below it, such as "Caution - Buried Below". Tape shall be reverse printed; surface printing will not be acceptable. The tape shall be visible in all types and colors of soil and provide maximum color contrast to the soil. The tape shall meet the APWA color code, and shall be 2 inches in width. Colors are: yellow - gas, green - sewer, red - electric, blue - water, orange - telephone, brown - force main.
- C. The tape shall be the last equipment installed in the trench so as to be first out. The tape shall be buried 4 to 6 inches below top of grade. After trench backfilling, the tape shall be placed in the backfill and allowed to settle into place with the backfill. The tape may be plowed in after final settlement, installed with a tool during the trench backfilling process, unrolled before final restoration or installed in any other way acceptable to the Owner or Engineer.

3.05 PLACEMENT OF LOCATION WIRE

- A. Detectable underground location wire shall be placed above all non-metallic water mains and force mains. Care shall be taken to insure that the buried wire is not broken.
- B. The location wire shall be no smaller than AWG No. 8, soft drawn, 98 percent conductivity copper and insulated with THW insulation.
- C. The location wire shall be continuous from valve box to valve box and shall be terminated (unconnected) with a wire nut and enough "loose" wire to extend 24 inches outside the valve box.

END OF SECTION 02225

SECTION 02228 – DIRECTIONAL BORING

PART 1 - GENERAL

1.01 WORK INCLUDED

The work specified in this section consists of furnishing and installing the transmission main pipe using the directional boring (horizontal directional drilling, HDD) method of installation. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of water main and environmental protection and restoration.

1.02 QUALITY ASSURANCE

The requirements set forth in this document specify a wide range of procedural precautions necessary to ensure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification. Adherence to the specifications contained herein, or the Engineer's approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

1.03 SUBMITTALS

- A. Drill Work Plan: Prior to beginning work, the Contractor must submit to the Engineer and Owner a Drill Work Plan outlining the procedure and schedule to be used to execute the project. The plan should document the thoughtful planning required to successfully complete the project including, but not limited to, the following:
 - 1. The location of each entry and exit point.
 - 2. Equipment and pipe layout areas.
 - 3. Proposed depth of cover (minimum 42 inches).
 - 4. Proposed composition of drilling fluid, viscosity, and density.
 - 5. Proposed drilling fluid pumping capacity, pressure, and flowrate.
 - 6. Type of tracking method/system.
 - 7. Diameter of pilot hole, and number and size of pre-ream/backreams.
 - 8. Crew experience.
- B. Equipment: Contractor shall submit specifications on directional drilling equipment to be used to ensure that the equipment will be adequate to complete the project.
- C. MATERIAL: Specifications on material to be used shall be submitted to Engineer. Material shall include the pipe, fittings and any other item which is to be an installed component of the project.

PART 2 - EQUIPMENT AND MATERIALS

2.01 EQUIPMENT – GENERAL

The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the trenchless installation, a guidance system to accurately guide boring operations and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

2.02 BORING SYSTEM

- A. Directional Bore Machine: The directional boring machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable bore head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations. The rig shall be grounded during drilling and pull-back operations.
- B. Bore Head: The bore head shall be steerable by changing it's rotation and shall provide the necessary cutting surfaces and drilling fluid jets.
- C. Mud Motors (if required): Mud motors shall be of adequate power to turn the required boring tools.
- D. Drill Pipe: Shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

2.03 GUIDANCE SYSTEM

The Guidance System shall be of a proven type and shall be set up and operated by personnel trained and experienced with this system. If using a magnetic system, the operator shall be aware of any magnetic anomalies and shall consider such influences in the operation of the guidance system.

2.04 DRILLING FLUID (MUD) SYSTEM

- A. Mixing System: A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be a minimum of 1000 gallons. Mixing system shall continually agitate the drilling fluid during drilling operations.

- B. Drilling Fluids: Drilling fluid shall be composed of clean water and an appropriate additive. Water shall be from a clean source with a pH of 8.5 - 10. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No hazardous additives may be used. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall.
- C. Delivery System: Drilling mud pressure in the borehole should not exceed that which can be supported by the overburden to prevent heaving or a hydraulic fracturing of the soil. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of.

2.05 OTHER EQUIPMENT

- A. Pipe Rollers: Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe.
- B. Pipe Rammers: Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Engineer.
- C. Restrictions: Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Engineer prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

PART 3 – EXECUTION

3.01 GENERAL

The Engineer must be notified 48 hours in advance of starting work. The directional bore shall not begin until inspection personnel are present at the job site and agree that proper preparations for the operation have been made. Approval by the Engineer for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract. It shall be the responsibility of Engineer to provide inspection personnel at such times as appropriate without causing undue hardship by reason of delay to the Contractor.

3.02 PERSONNEL REQUIREMENTS

All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety.

3.03 DRILLING PROCEDURE

- A. Site Preparation: Prior to any alterations to work-site, contractor shall photograph or video tape entire work area, including entry and exit points. One copy of which shall be given to LWC, one copy to Metro Parks, and one copy to remain with contractor for a period of one year following the completion of the project. Work site as indicated on drawings, within existing easement, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.
- B. Environmental Protection: Contractor shall place silt fence between all boring operations and any drainage, wetland, waterway or other area designated for such protection by contract documents, state, federal and local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. Contractor shall adhere to all applicable environmental regulations. Fuel or oil may not be stored in bulk containers within 200 feet of any water body or wetland.
- C. Safety: Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner. Safety meetings shall be conducted at least weekly with a written record of attendance and topic submitted to Engineer.
- D. Pipe: Pipe shall be welded/fused together in one length, if space permits. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.
- E. Pilot Hole: Pilot hole shall be drilled on bore path with no deviations greater than 5% of depth over a length of 100'. In the event that pilot does deviate from bore path more than 5% of depth in 100', contractor will notify Engineer and Engineer may require contractor to pull-back and re-drill from the location along bore path before the deviation. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and then wait another 30 minutes. If mud fracture or returns loss continues, contractor will cease operations and notify Engineer. Engineer and contractor will discuss additional options and work will then proceed accordingly.
- F. Reaming: Upon successful completion of pilot hole, contractor will ream bore hole to a minimum of 25% greater than outside diameter of pipe using the appropriate tools. Contractor will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.

- G. Pull-Back: After successfully reaming bore hole to the required diameter, contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole. During pull-back operations contractor will not apply more than the maximum safe pipe pull pressure at any time. In the event that pipe becomes stuck, contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, contractor will notify Engineer. Engineer and contractor will discuss options and then work will proceed accordingly.

3.04 PIPE TESTING

Filling and cleaning of the main shall be accomplished in accordance with Disinfection of water mains shall be accomplished in accordance with Section 02675 - Disinfection of Potable Water Pipe.

3.05 SITE RESTORATION

Following drilling operations, contractor will demobilize equipment and restore the worksite to original condition. All excavations will be backfilled and compacted to 95% of original density. Landscaping will be restored to original.

3.06 RECORD KEEPING

- A. Contractor shall maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of project.
- B. Record Drawings will be furnished in accordance with Section 01720, Project Record Documents.

END OF SECTION 02228

SECTION 02505 - CRUSHED STONE PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

Crushed stone paving course, compacted.

1.02 REFERENCES

ASTM C33 - Aggregate for Concrete.

1.03 TESTS

Gradation of stone materials will be performed in accordance with ASTM C33.

PART 2 - PRODUCTS

2.01 MATERIALS

Crushed stone shall conform to ASTM C33, Type No. 57, Type No. 2, and No. 610.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify compacted subgrade.
- B. Verify that gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of existing conditions.

3.02 PLACING STONE PAVING

- A. Spread stone material over prepared base to a total compacted thickness of 12 inches.
- B. Place stone in 6-inch layers and compact.
- C. Level surfaces to elevations and gradients indicated.
- D. Add small quantities of sand to stone mix as appropriate to assist compaction.
- E. Adequately compact placed stone materials.

- F. Add water to assist compaction. With an excess water condition, rework topping and aerate to reduce moisture content.

END OF SECTION 02505

SECTION 02510 - BITUMINOUS PAVEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide bituminous pavement for following applications, with prepared subbase and compacted base.
 - 1. Roads.
 - 2. Parking areas.
 - 3. Driveways.
 - 4. Walkways.
 - 5. Curbs.
- B. Provide striping for parking, roadway, and handicapped markings.

1.02 SUBMITTALS

Submit for approval product data, test reports.

1.03 QUALITY ASSURANCE

Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Prime coat: Cut-back asphalt.
- B. Tack coat: Emulsified asphalt.
- C. Asphaltic cement: AASHTO M226 and as required by local authorities.
- D. Aggregate: Crushed stone or crushed gravel.
- E. Traffic paint: Quick-drying chlorinated-rubber alkyd type, color as approved.
- F. Wheel-stops: Precast concrete of uniform color and texture with steel stakes.

PART 3 - EXECUTION

3.01 TRENCH WIDTH PAVEMENT REPLACEMENT WITH FULL WIDTH OVERLAY

- A. Sections of pavement shall be replaced as required to install the pipelines. Disturbed pavement shall be reconstructed to original lines and grades with bituminous binder as detailed on the Drawings and in such manner as to leave all such surfaces in fully as good or better condition than that which existed prior to these operations.
- B. Prior to trenching, the pavement shall be scored or cut to straight edges along each side of the proposed trench to avoid unnecessary damage to the remainder of the paving. Edges of the existing pavement shall be recut and trimmed as necessary to square, straight edges after the pipe has been installed and prior to placement of the binder course or concrete.
- C. Backfilling of trenches shall be in accordance with the applicable portions of Section 02225.
- D. Bituminous surface shall be one course construction of an appropriate surface JMF prepared and installed in accordance with the requirements of the Kentucky Department of Highways.
 - 1. Placement and compaction of surface course shall be in accordance with the Kentucky Department of Highways Standard Specifications. Minimum thickness after compaction shall be as detailed on the Drawings.
- E. In areas where pipelines are open cut through the roadway, the trench area will be limited to a maximum of one lane. The trench backfill requirements are found in Section 02225. In these areas, the full width of the roadway will be milled and paved prior to final resurfacing. The limits of resurfacing are shown on the drawings. The restored pavement should match the existing profile as much as practical.
- F. Concrete base, as detailed on the Drawings, shall be 4,000 psi conforming to the applicable requirements of Division 3.
- G. Bituminous pavement replacement is a separate pay item.

END OF SECTION 02510

SECTION 02520 - PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide Portland cement concrete paving at following locations, with prepared subbase and compacted base.
 - 1. Driveways and vehicular entrances.
 - 2. Walkways.
 - 3. Curbs.

1.02 SUBMITTALS

Submit for approval product data, mix design, mock-ups, test reports.

1.03 QUALITY ASSURANCE

Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete mix design: Specific mixes as required for sidewalks, curbs, and vehicular ways. Submit mix proposed for use, for approval, as detailed in Division 3.
- B. Exposed aggregate paving:
 - 1. Aggregate to match approved sample.
 - 2. Retarder.
- C. Reinforcing: 6 x 6, 1.9 x 1.9 welded flat wire mesh and ASTM A36 deformed steel bars.
- D. Joints: Preformed joint fillers/sealers.
- E. Finish:
 - 1. Paving: Fine bristled stiff broom.
 - 2. Exposed aggregate finish: Match approved sample.
 - 3. Imprinting: Tools and hardeners by Bomanite Corp.

4. Curbs: Steel form finish.

F. Thickness (Unless shown otherwise on the drawings):

1. Driveways and vehicular entrances - 6 inches.
2. Walkways - 4 inches.
3. Curbs - 6 inches.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Proof roll subbase and check for unstable areas. Report unsatisfactory conditions in writing. Beginning paving work means acceptance of subbase.
- B. Comply with Division 3 for concrete mix, testing, placement, joints, tolerances, curing, repairs, and protection.

END OF SECTION 02520

SECTION 02610 - WATER PIPE AND FITTINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all labor, material, and equipment necessary to install water main piping together with all appurtenances as shown and detailed on the Drawings and specified herein.

1.02 RELATED WORK

- A. Section 02222 - Excavation.
- B. Section 02225 - Excavating, Backfilling and Compacting for Utilities.
- C. Section 02630 - Encasement Pipe.
- D. Section 02640 - Water Valves and Gates.
- E. Section 02675 - Disinfection of Potable Water Pipe.

1.03 SUBMITTALS

Provide full product details, including layout and certifications for the materials proposed, in accordance with Section 01300 - Submittals.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE (DIP) AND FITTINGS

- A. Ductile iron pipe (DIP) shall conform to ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51 Standard. The pipe shall conform to pressure class 350 minimum unless noted otherwise. All fittings and joints should be capable of accommodating pressure of not less than 250 psi.
- B. Fittings shall be ductile iron in accordance with AWWA C153 and have a body thickness and radii of curvature conforming to ANSI A21.10 and shall conform to the details and dimensions shown therein. Fittings shall have rubber gasket joints meeting the requirements of AWWA C111. Fittings shall be cement-mortar lined and bituminous coated to conform to the latest revision of ANSI/AWWA standards.
- C. Ductile iron flanged joint pipe shall conform to ANSI/AWWA C115/A 21.15 Standard and have a thickness Class of 53. The pipe shall have a rated working pressure of 250 psi with Class 125 flanges. Gaskets shall be ring gaskets with a thickness of 1/8 inch. Flange bolts shall conform to ANSI B 16.1.

- D. Flanged fittings shall meet all requirements of ANSI/AWWA C110/A21.10 and have Class 125 flanges. Fittings shall accommodate a working pressure up to 250 psi and be supplied with all accessories.
- E. Ductile iron mechanical joint fittings shall be in accordance with AWWA C153 and have a body thickness and radii of curvature conforming to ANSI A21.10 and have joints in accordance with ANSI/AWWA C111/A21.11. Fittings and joints shall be supplied with all accessories.
- F. Restrained joint pipe shall be a boltless system equal to HP-LOK restraining gaskets as manufactured by US Pipe & Foundry Company. Restrained joint fittings shall be a system equal to TR-FLEX as manufactured by U.S. Pipe & Foundry Company.
- G. Ball and socket restrained joint pipe and fittings shall be a boltless system equivalent to USIFLEX manufactured by U.S. Pipe and Foundry Company or FLEX-LOK manufactured by American Pipe Company. Pipe shall have a working pressure rating of 250 psi and have a maximum joint deflection of 15 degrees. Nominal laying lengths shall be in the range of 18-feet 6-inches to 20-feet 6-inches.
- H. All ductile fittings shall be rated at 250 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast-iron grade 70-50-05 per ASTM Specification A339.
- I. Cement mortar lining and seal coating for pipe and fittings, where applicable shall be in accordance with ANSI/AWWA C104/A21.4. Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 for fittings.
- J. Where indicated, high-density, cross-laminated polyethylene film shall be provided for encasement of ductile iron pipe. The film shall meet the requirements of AWWA C105.
- K. Ductile iron pipe and fittings shall be as manufactured by U.S. Pipe & Foundry Company, American Cast Iron Pipe Company, or approved equivalent.

2.02 WELDED STEEL PIPE

- A. Steel Pipe shall conform to AWWA C200.
- B. Pipe shall be designed for working pressure between 150-250 psi with an additional 40% allowance for surge. Pipe shall be designed with a minimum of 4 ft of cover or greater as shown on the plans. Pipe design shall be in accordance with AWWA M-11.
- C. Pipe shall be bedded and backfilled per the plan.

D. Pipe for use with sleeve-type couplings shall have plain ends at right angles to the axis.

E. Pipe shall be furnished principally in 40 to 50 ft. net laying lengths with special lengths, field trim pieces and closure pieces as required by plan and profile for location of elbows, tees, reducers and other in-line fittings. The pipe fabricator shall prepare a pipe-laying schedule showing the location of each piece by mark number with station and invert elevation at each bell end.

F. Unless otherwise shown on the Plans, all specials and fittings shall conform to the dimensions of AWWA Standard C208. Pipe material used in fittings shall be of the same material and thickness as the pipe. The minimum radius of elbows shall be 2.5 times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed $11 \frac{1}{4}$ degrees (One cut elbow up to $22 \frac{1}{2}$ deg.). If elbow radius is less than $2.5 \times$ pipe diameter, stresses shall be checked per AWWA M-11 and wall thickness or yield strength increased if necessary. Fittings shall be equal in pressure design strength. Specials and fittings, unless otherwise shown on the Plans, shall be made of segmentally welded sections from hydrostatically tested pipe, with ends compatible with the type of joint or coupling specified for the pipe. All welds made after hydrostatic testing of the straight sections of pipe shall be checked per the requirements of AWWA C-200 Section 5.2.2.1

G. Joints:

1. O-ring: the standard joint shall be O-ring unless otherwise noted on the plans. O-ring joints shall conform to AWWA C200 Standard and as shown in Chapter 8 of AWWA M-11. The o-ring gasket shall have sufficient volume to approximately fill the area of the groove and shall conform to AWWA C200. The joint shall be suitable for a safe working pressure equal to the class of pipe furnished and shall operate satisfactorily with a deflection angle, the tangent of which is not to exceed $1.00/D$ where D is the outside diameter of the pipe in inches with a pull-out of 1 inch. O-ring joints may be furnished only by a manufacturer who has furnished pipe with joints of similar design for comparable working pressure. Pipe diameter, pipe length, and wall thickness that has been in successful service for a period of at least 5 years.
2. Lap weld: Lap field welded joints shall be used where tied joints are indicated on the plans. The standard bell shall provide for a $2 \frac{1}{2}$ -inch lap. The minimum lap shall be 1 inch. The design maximum joint deflection or offset shall be a 1" joint pull.
3. Mechanical Couplings: Mechanical couplings where indicated on the plans shall be Smith Blair Style 411, Baker Style 200, Brico Depend-O-Loc or equal. Insulating mechanical couplings where indicated on the plans shall be double insulated Smith Blair Style 416, Baker Style 216, or equal for working pressures up to 150 psi only. Couplings for buried service shall have all metal parts painted with Epoxy paint and conform to AWWA C219. Pipe ends for mechanical couplings shall conform to AWWA C200 and M-11. The shop applied outside coating shall be held back as required for field assembly of the mechanical coupling or to the harness lugs or rings. Harness lugs or rings and pipe ends shall be painted with one shop coat of epoxy conforming to AWWA C210. The inside lining shall be continuous to the end of the pipe.

H. Polyethylene tape Coating:

1. Prefabricated Multi-layer Cold Applied Tape Coating - the coating system for straight-line pipe shall be in accordance with AWWA Standard C214. The system shall consist of three layers of polyethylene material with a nominal thickness of 80 mills when complete.
2. Coating repair shall be made using tape and primer conforming to AWWA Standard C209, Type II. The tape and primer shall be compatible with the tape system used for straight-line pipe.
3. Coating of Fittings, Specials and Joints:
 - a. General - Fittings, specials and joints which cannot be machine coated in accordance with above, shall be coated in accordance with AWWA Standard C209. Prefabricated tape shall be Type II and shall be compatible with the tape system used for straight-line pipe. The system shall consist of 2 layers consisting of 75 mils: Alternate coating methods for fittings specials and field joints would be Shrink sleeves per C-216, or paint per C-210, C-218, or C-222. The field coating shall completely encapsulate the joint bonds on o-ring joints.
 - b. Coating Repair - Coating repair for fittings and specials shall be in accordance with the procedure described above for straight-line pipe.

I. Cement Mortar Lining per AWWA C205:

1. Cement Mortar Lining of Steel Pipe:
 - a. Except as otherwise provided in AWWA Standard C205, interior surface of all steel pipe, fittings and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with AWWA Standard C205.
 - b. The pipe ends shall be left bare where field joints occur as shown on the Plans. Ends of the linings shall be left square and uniform. Feathered or uneven edges will not be permitted.
 - c. Defective linings as identified in AWWA C-205 shall be removed from the pipe wall and shall be replaced to the full thickness required. Defective linings shall be cut back to a square shoulder in order to avoid feather edged joints.
 - d. Cement mortar lining shall be kept moist during storage and shipping.
2. Cement Mortar Lining of Fittings: Fittings shall be lined and coated per AWWA C205.

2.03 PRESTRESSED CONCRETE CYLINDER PIPE

- A. Unless otherwise specified, the design materials and workmanship for pipe shall conform to the requirements of AWWA C301. Core and coating thickness for pipe shall be as specified in AWWA C301.

B. Prestressed concrete cylinder pipe and fittings shall be manufactured by Price Brothers Company, Dayton, OH or equal.

C. The pipe shall be of USA manufacture.

D. Design Conditions

1. Pipe shall be designed in accordance with the AWWA C304 Standard, using the following design conditions; these conditions shall also be used in designing fittings that include a Portland cement mortar interior and exterior coating of the steel cylinder:

a. External Loading:

(1) The earth load shall be taken as the greater of the following:

- (a) Depth from existing ground level to top of pipe as shown on plans, or
- (b) Five feet minimum in all cases.

(2) Earth loads shall be computed assuming the trench width that gives the maximum load on the pipe (transition width) for the following parameters:

- (a) Unit Soil Weight = 120 pounds per cubic foot
- (b) TYPE R___ Bedding

(3) Live loads shall be calculated as:

- (a) Pipe in streets and other paved areas: AASHTO HS-20 for two trucks passing
- (b) Pipe within railroad right-of-way: AREA Cooper E-80
- (c) Both HS-20 and E-80 live loads shall be computed in accordance with the *American Concrete Pipe Association* "Concrete Pipe Design Manual" or "Concrete Pipe Handbook".

b. Internal Pressure:

- (1) Design working pressure (P_w) shall be between 150-250 psi
- (2) Surge Pressure (P_s) shall be an additional 40% of operating pressure

E. Fittings:

- 1. Steel thickness of all fittings shall be designed in accordance with Chapter 8 of the AWWA M9 Manual. Fittings shall be designed for the same conditions as the adjacent pipe.
- 2. Fabrication of the fittings shall be as per AWWA M9 Manual and C301.
- 3. Interior and exterior concrete/mortar coating shall be as per AWWA C301.

- F. The date of manufacture or a serial number traceable to the date of manufacture and the design strength classification shall be clearly marked by stencil with waterproof paint at the end of the pipe barrel. Unsatisfactory or damaged pipe will be permanently rejected, repaired in the field if permitted by the Engineer, or returned for minor repairs. Pits, blisters, rough spots, minor concrete or mortar breakage, and other imperfections may be repaired unless prohibited by the Engineer. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 3,000 psi at the end of 7 days and 4,500 psi at the end of 28 days, when tested in cylinders stored in the standard manner. Major breakage or spalling from interior of pipe may be reason for the rejection of pipe. Pipe may be repaired under unloaded conditions (removal of prestressing wire). Cement mortar used for repair shall have a minimum compressive strength of 3,000 psi at 7 days and 4,500 psi at 28 days when tested as standard cylinders. New prestressing wire may be applied when the compressive strength as determined by cylinder testing equals or exceeds the strength required for prestressing as stated in AWWA C301.
- G. Cement shall be Type II and shall be in accordance with ASTM C150.
- H. The pipe core shall be manufactured by the centrifugal method or the vertical casting method.
- I. Wire shall be a minimum of No.6 gauge and shall meet the requirements of ASTM A648, Class III. Wire of a class strength greater than Class III will not be permitted.
- J. Steel cylinders shall be No. 16 gauge minimum and shall be hot rolled.
- K. Mortar coating shall consist of one part cement to a maximum of three parts fine aggregate by weight. Rebound not to exceed one fourth of the total mix weight may be used provided the rebound is treated as fine aggregate.
- L. Bell and spigot joint rings shall be steel, self-centering type, and otherwise specified in AWWA C301. Surfaces of the joint rings that will be exposed after fabrication is complete shall receive a zinc metalized coating of 4 mils thickness (0.004"). In areas of the alignment where the pipe will be subject to unbalanced hydrostatic thrust forces (bends, tees, bulkheads, wyes, and valves), the pipe joints shall be mechanically restrained (harnessed).

The maximum longitudinal stress in the steel cylinder of harnessed pipe sections shall not exceed 13,500 pounds per square inch when subjected to the internal working pressure or 17,000 pounds per square inch when subjected to the test pressure and shall be based on the deflection angle as described in the AWWA M9 Manual. The steel cylinder thickness in pipe sections between the location of the maximum thrust force and the end of the harnessed section can be prorated on the basis of zero longitudinal thrust at the end of the harnessed section.

Two acceptable types of harnessed or restrained joints are the harness clamp and Snap Ring® types of flexible restrained joints. The clamp type consists of two semicircular steel

clamps which fit over steel lugs that are factory welded or rolled into the steel bell and spigot sections. The semicircular clamps are drawn together by bolts at the springline on both sides of the pipe to form a flexible restrained joint.

The Snap Ring® type of flexible restrained joint consists of a split steel ring which is recessed in the special steel bell section of the pipe until the joint is made. Once the joint is made, the split steel ring is drawn down into position to form a lock between the bell and spigot by tightening a single steel bolt.

Both joint types shall be capable of transmitting the longitudinal thrust forces due to working pressure and test pressure and must be encased in grout after the joint has been completed and before the line is pressurized using special grout bands supplied by the pipe manufacturer.

Field welding of the joints for restraint during initial installation will not be allowed except where connecting to existing pipe or where follower ring closure assemblies are installed into restrained joint areas unless otherwise permitted by the Engineer.

- M. The rubber gaskets shall be in accordance with AWWA C301 and shall be designed and manufactured so that the completed joint will withstand an internal water pressure in excess of the highest pressure to which the pipe will be subjected without showing any leakage by the gasket or displacement of it.
- N. Bell and spigot wall fittings shall be manufacturer's standard design. Wall fittings shall be supplied with adequate bracing to keep them round and true during transportation and installation.
- O. Alignment for long-radius, curved sections as specified on the drawings may be produced by joint deflections of standard joints not to exceed that recommended by the manufacturer. Deflections required which are in excess of those recommendations shall be produced by beveling the spigot ends of the pipe.
- P. Submit shop drawings to the Engineer for review in accordance with Section 01300 showing details of reinforcement, concrete, and joint dimensions for all pipe and fittings. Submit a tabulated laying schedule which references stationing and elevations as shown on the drawings as well as all fittings, bevels, restrained joints, and specials, along with the manufacturer's drawings indicating details of all items. The laying schedule shall show code numbers for all pipe, fittings, and specials. These code numbers shall correspond to markings on the pipe, fitting, or special. The above shall be submitted to the Engineer for review before manufacture and shipment. The locations of all pipes shall conform to the locations indicated on the drawings. Pipe supplied from inventory shall be authorized by the Engineer.
- Q. Submit anticipated production and delivery schedule.
- R. Submit Design Data:

1. Design specification data sheets listing all parameters used in the pipe design.

a. Type of Pipe:

- (1) Lined Cylinder
- (2) Embedded Cylinder

b. Cylinder Data: Thickness and Diameter

c. Prestressing Wire Data:

- (1) ASTM Designation and Class
- (2) Size
- (3) Area
- (4) Wire spacing
- (5) Minimum ultimate strength
- (6) Wrapping stress

d. Concrete/Mortar Data:

- (1) Concrete proportions
- (2) Minimum Compressive Strength at Time of Wrapping
- (3) Minimum Compressive Strength at 28 days
- (4) Core thickness
- (5) Coating thickness

2. Submit design calculations in accordance with AWWA C304. Calculations shall include the burst pressure (P_b). Clearly indicate all calculation constants for this specific project.

S. Submit the following Test Reports:

- 1. Shop test results for steel, cement, and gasket rubber
- 2. Field pressure/leakage tests

T. Certificates: Prior to shipment of pipe, submit a certified affidavit of compliance stating that the pipe for this contract was manufactured, inspected, and tested in accordance with the AWWA standards specified herein.

PART 3 - EXECUTION

3.01 LAYING DEPTHS

In general, water mains shall be laid with a minimum cover of 48 inches, except as otherwise indicated on the Drawings.

3.02 SEWER/CONTAMINANT PIPE CROSSING CONCRETE ENCASEMENT

- A. At locations shown on the Drawings, required by the Specifications, or as directed by the Engineer, concrete encasement shall be used when the clearance between the proposed water pipe and any existing sewer or contaminant carrying pipe is 18 inches or less. Contaminant carrying pipe includes underground petroleum, slurry, food processing, and other pipe as determined by the Engineer.
- B. Whether the proposed water pipe is above or below the existing sewer/contaminant pipe, the concrete shall fully encase the sewer/contaminant pipe and extend to the spring line of the water pipe. Encasement shall extend in each direction along the sewer/contaminant pipe until the encased sewer/contaminant pipe is 10 feet from the proposed water main, measured perpendicular to the water main.
- C. Concrete shall be 3,000 psi and shall be mixed sufficiently wet to permit it to flow between and under the pipes to form a continuous bridge. In tamping the concrete, care shall be taken not to disturb the grade or line of either pipe or damage the joints.
- D. Concrete for this Work is not a separate pay item and will be considered incidental to water pipe installation.

3.03 PIPE LAYING

A. Slip Jointed Pipe:

1. All pipe shall be laid with ends abutting and true to the lines and grades indicated on the plans. Pipe shall be fitted and matched so that when laid in the Work, it will provide a smooth and uniform invert. Supporting of pipe shall be as set out in Section 02225 and in no case shall the supporting of pipe on blocks be permitted.
2. Before each piece of pipe is lowered into the trench, it shall be thoroughly swabbed out to insure it being clean. Any piece of pipe or fitting which is known to be defective shall not be laid or placed in the lines. If any defective pipe or fittings shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe. Bevel can be made with hand or power tools.
3. The interior of the pipe, as the Work progresses, shall be cleaned of dirt, jointing materials, and superfluous materials of every description. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood plug fitted so as to exclude earth or other material and precautions taken to prevent floatation of pipe by runoff into trench.
4. Anchorage of Bends:
 - a. At all tees, plugs, caps and bends of 11-1/4 degrees and over, and at reducers or in fittings where changes in pipe diameter occur, movement shall be prevented by using suitable harness, thrust blocks or ballast. Thrust blocks shall be as shown on the Drawings, with sufficient volumes of concrete being provided; however, care shall be taken to leave weep holes unobstructed and allow for future tightening of all nearby joints. Unless otherwise directed by

- the Engineer, thrust blocks shall be placed so that pipe and fitting joints will be accessible for repair.
- b. Bridles, harness or pipe ballasting shall meet with the approval of the Engineer. Steel rods and clamps shall be galvanized or otherwise rust-proofed or painted.
 - c. No extra pay shall be allowed for work on proper anchorage of pipe, fittings or other appurtenances. Such items shall be included in the price bid for the supported item.
5. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has the opportunity to make an inspection of the joints, alignment and grade in the section laid, but such inspection shall not relieve the Contractor of further liability in case of defective joints, misalignment caused by backfilling and other such deficiencies that are noted later.
6. All joint surfaces shall be cleaned immediately before jointing the pipe. The joint shall be lubricated in accordance with the pipe manufacturer's recommendations. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. All pipe shall be provided with home marks to insure proper gasket seating. Details of gasket installation and joint assembly shall follow the manufacturer's direction for the joint type and material of the pipe. The resulting joints shall be watertight and flexible.

3.04 TESTING OF WATER PIPE

- A. The completed work shall comply with the provisions listed herein, or similar requirements which will insure equal or better results. Suitable test plugs, water pump or other equipment and apparatus, and all labor required to properly conduct the tests shall be furnished by the Contractor at no expense to the Owner.
- B. Water main piping shall be pressure tested to 250 percent of the normal system operating pressure or to 100 percent of the rated working pressure of the pipe, whichever is less. At no time shall the test pressure exceed 100 percent of the pipe's rated working pressure. A pipe section shall be accepted if the test pressure does not fall more than 5 psi during the minimum 2-hour test period. The pipe shall be tested for allowable leakage according to AWWA C-600, when applicable, concurrently with the pressure test.
- C. Where practicable, pipelines shall be tested between line valves or plugs in lengths of not more than 6,000 feet. Testing shall proceed from the source of water toward the termination of the line. The line shall be tested upon the completion of the first 6,000 feet. After the completion of two (2) consecutive tests without failure, the Contractor, at his option and with the Engineer's approval, may discontinue testing until the system is complete.
- D. All pipe, fittings and other materials found to be defective under test shall be removed and replaced at the Contractor's expense.

- E. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves and hydrants. If permanent air vents are not located at high points within the test section, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water.
- F. All piping shall be tested for leakage at a pressure no less than that specified for the pressure test. The leakage shall be defined as the quantity of water that must be supplied to the tested section to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. The leakage shall be less than an allowable amount determined by the following equation:

$$L = \frac{SD (P)^{1/2}}{133,200}$$

Where: L = allowable leakage (gallons/hour)
S = length of pipe tested, in feet
D = nominal diameter of pipe (inches)
P = test pressure (psig)

- G. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing the leaks and retesting as the Engineer may require without additional compensation. All visible leaks are to be repaired regardless of the amount of leakage.
- H. If in the judgement of the Engineer, it is impracticable to follow the foregoing procedures for any reason, modifications in the procedures shall be made as required and as acceptable to the Engineer, but in any event, the Contractor shall be responsible for the ultimate tightness of the line within the above test requirements.

3.05 PLACEMENT OF IDENTIFICATION TAPE

Detectable underground marking tape shall be placed over all water mains as specified in Section 02225.

3.06 PLACEMENT OF LOCATION WIRE

Detectable underground location wire shall be placed above all non-metallic water main as specified in Section 02225.

END OF SECTION 02610

SECTION 02630 - ENCASEMENT PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all labor, material, and equipment necessary to install encasement pipe together with all appurtenances as shown and detailed on the Drawings and specified herein.

1.02 RELATED WORK

- A. Section 02225 - Excavating, Backfilling and Compacting for Utilities.
- B. Section 02610 - Water Pipe and Fittings.
- C. Section 02731 - Gravity Sewers.
- D. Section 02732 - Sewage Force Mains.

PART 2 - PRODUCTS

2.01 STEEL PIPE

- A. Steel seamless pipe shall be new Grade B steel material, with a minimum yield of 35,000 psi and a wall thickness as shown below unless otherwise required by a permitting authority. The material shall conform to the chemical and mechanical requirements of the latest revision of ASTM A139 "Electric-Fusion (ARC) - Welded Steel Pipe (NPS 4 and Over)," unless otherwise stated herein.
- B. The minimum wall thickness shall be in accordance with the following table:

Steel Casing Pipe Wall Thickness

Casing Diameter (inches)	(Minimum Wall Thickness Under Railroads (inches)	Minimum Wall Thickness All Other Uses (inches)
16 and under	0.250	0.250
18	0.281	0.250
20 and 22	0.312	0.281
24	0.344	0.312
26	0.375	0.344
28	0.406	0.375
30	0.438	0.406
32	0.469	0.438
34 and 36	0.500	0.469

Casing Diameter (inches)	(Minimum Wall Thickness Under Railroads (inches)	Minimum Wall Thickness All Other Uses (inches)
38	0.531	0.500
40	0.563	0.531
42	0.594	0.563
44 and 46	0.625	0.594
48	0.656	0.625
50	0.688	0.656
52	0.719	0.688
54	0.750	0.719
56 and 58	0.781	0.750
60	0.813	0.781
62	0.844	0.813
64	0.875	0.844
66 and 68	0.906	0.875
70	0.938	0.906
72	0.938	0.938

- C. Welds of the steel casing pipe shall be solid butt-welds with a smooth non-obstructing joint inside and conform to all specifications as required by American Welding Society (AWS). The casing pipe shall be installed without bends. All welders and welding operators shall be qualified as prescribed by AWS requirements.
- D. The wall thickness at any point shall be within 12.5% inches of the nominal metal thickness specified.
- E. Hydrostatic testing shall not be necessary.
- F. A protective coating shall be applied to each length of pipe. Following an SSPC SP-7 "Brush-Off Blast Cleaning" surface preparation, 3 (dry) mils of Tnemec-Primer 10-99 (red), or Porter International Primer 260FD (red), or an equivalent thickness of an approved equivalent paint shall be applied in the manner recommended by the respective paint manufacturer.
- G. Each length of pipe shall be legibly marked, stating: manufacturer, diameter, wall thickness and primer.
- H. Precaution shall be taken to avoid deforming the pipe and damaging the primer during shipping.

2.02 CARRIER PIPE SPACERS

- A. Carrier pipes installed inside encasement pipes shall be centered throughout the length of encasement pipe. Centering shall be accomplished by the installation of polyethylene pipeline spacers attached to the carrier pipe in such manner as to prevent the dislodgement of the spacers as the carrier pipe is pulled or pushed through the encasement pipe.

Spacers shall be of such dimensions to provide: full supportive load capacity of the pipe and contents; of such thickness to allow installation and/or removal of the pipe; and to allow no greater than 1/2 inch movement of the carrier pipe within the cover pipe after carrier pipe is installed.

- B. Spacers shall be located immediately behind each bell and at a maximum spacing distance as follows:

Carrier Pipe Diameter (inches)	Maximum Spacing (feet)
2 - 2-1/2	4
3 - 8	7
10 - 26	10
28	9
30	8
32	7
34	6
36 - 38	5.5
40 - 44	5
46 - 48	4

The materials and spacing to be used shall be accepted by the Engineer prior to installation. The polyethylene pipeline spacers shall be manufactured by Pipeline Seal and Insulator, Inc. (PSI), Raci Spacers, Inc., or equivalent. Installation shall be in accordance with manufacturer's recommendations.

2.03 ENCASEMENT PIPE END SEALS

After installation of the carrier pipe within the encasement pipe, the ends of the casing shall be sealed with either a wraparound or a pull-on casing end seals fabricated of minimum 1/8-inch thick neoprene rubber. The seals shall be attached to the encasement pipe and the carrier pipe by 304 stainless steel band clamps not less than 1/2-inch wide. The casing end seals shall be as manufactured by Advance Products & Systems, Inc., or approved equivalent.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Where shown on the Drawings, the Contractor shall install encasement pipe. Install encasement pipe to maintain alignment, grade and the circular shape of the encasement pipe. The encasement pipe shall be straight and true in alignment; and any significant deviation from line or grade, in the opinion of the Engineer or permitting authority, shall be sufficient cause for disapproving or rejecting the installation.

B. Two methods of installation are designated, the open-cut method and the boring method.

1. The open-cut method shall consist of placing the encasement pipe in the excavated trench, then installing the carrier pipe inside the encasement pipe. Excavation, bedding and backfilling shall be in accordance with Section 02225.
2. The boring and jacking method consists of pushing or jacking the encasement pipe into the subsurface material as an auger cuts out the material or after the auger has completed the bore. Where designated on the drawings, crossings beneath state maintained roads, railroads, or other surfaces not to be disturbed, shall be installed by boring and jacking of steel casing pipe followed by installation of the carrier pipe within the casing pipe. The Contractor shall provide a jacking pit, bore through the earth, and/or rock, jack the casing pipe into proper line and grade and then install the carrier pipe within the casing pipe. The approach trench shall be large enough to accommodate one section of casing pipe, the jacks and blocking. The Contractor shall furnish and use adequate equipment to maintain the line and grade.

C. The carrier pipe shall be ductile iron, polyvinyl chloride, or polyethylene pipe as designated on the Drawings. The carrier pipe shall be installed using pipe spacers as described in this Section. Carrier pipe will not be permitted to rest on bells or couplings.

D. Following installation of the carrier pipe, the ends of the encasement pipe shall be sealed with products of the type described in this Section.

3.02 DAMAGE

The cost of repairing damage to the highway or railroad which is caused by a boring and jacking installation shall be borne by the Contractor.

END OF SECTION 02630

SECTION 02640 - WATER VALVES AND GATES

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all labor, material, and equipment necessary to install valves together with all appurtenances as shown and detailed on the Drawings and specified herein.

1.02 RELATED WORK

- A. Section 02225 - Excavating, Backfilling and Compacting for Utilities.
- B. Section 02610 - Water Pipe and Fittings.
- C. Section 02645 - Hydrants.

1.03 SUBMITTALS

- A. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer in accordance with the requirements of Section 01300.
- B. The manufacturer shall furnish the Engineer two (2) copies of an affidavit stating that the valve and all materials used in its construction conform to the applicable requirements of the latest revision of the applicable AWWA Standard, and that all tests specified therein have been performed and that all test requirements have been met.
- C. The Engineer shall be furnished two (2) copies of an affidavit that the "Valve Protection Testing" has been done and that all test requirements have been met.
- D. The Engineer shall be furnished with two (2) copies of an affidavit that inspection, testing and rejection are in accordance with the latest revision of the applicable AWWA Standard.

PART 2 - PRODUCTS

2.01 GATE VALVES

- A. All gate valves shall be of the resilient seat type in accordance with the latest revision of AWWA C509 Standard. The valve body, bonnet and gate castings shall be ductile iron or cast iron. The valve shall have a non-rising stem (NRS), fully bronze mounted or stainless steel with o-ring seals. Valve body and bonnet, inside and out, shall be fully coated with fusion bonded epoxy coating in accordance with AWWA C550 Standard. Valves shall have a rated working pressure of 200 psi.

- B. Gate valves for buried service shall be furnished with mechanical joint end connections, unless otherwise shown on the Drawings or specified herein. The end connection shall be suitable to receive ductile iron or PVC pipe.
- C. Gate valves for meter pits, pump stations, or other installations as shown on the Drawings shall be furnished with flanged joint and connections, outside screw and yoke and handwheel operator. The gate valve shall have the direction of opening cast on the rim of the handwheel and provided with chain and lock.
- D. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.
- E. Buried service gate valves shall be provided with a 2-inch square operating nut and shall be opened by turning to the left (counterclockwise).
- F. Buried service gate valves shall be installed in a vertical position with valve box as detailed on the Drawings. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street.
- G. Valves shall be those manufactured by Mueller, M & H Valve Company, American or approved equivalent.

2.02 TAPPING VALVES

- A. All tapping valves shall be of the resilient seat, gate valve type in accordance with the latest revision of AWWA C509 Standard. The valve body, bonnet and gate castings shall be cast iron. The valve shall have a non-rising stem (NRS), fully bronze mounted with o-ring seals. Valve body and bonnet, inside and out, shall be fully coated with fusion bonded epoxy coating in accordance with AWWA C550 Standard. Valves shall have a rated working pressure of 200 psi.
- B. Valve shall be furnished with ANSI B16.1 flanged end with centering ring on tapping side. Outlet side shall be mechanical joint. All valves through 12 inches shall mate all sleeves through 12-inch outlet regardless of manufacturer.
- C. All cast iron shall conform to ASTM A126, Class B. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of such defects will be allowed. Bolts shall be electric-zinc plated steel with hex heads and hex nuts in accordance with ASTM A-307 and A-563.
- D. Stems shall be manganese bronze having a minimum tensile strength of 60,000 psi, a minimum yield of 20,000 psi. NRS stem collars shall be cast integral with them and machined to size. The housing for the valve stem collar shall be machined. All thrust bearing shall be incorporated as required, to optimize operating torques. NRS valves shall be furnished with two (2) o-ring stem seals located above the thrust collar and one (1) below. O-rings shall be set in grooves in the stem. The o-ring grooves shall not be less than the root diameter of the stem threads.

- E. Gates for valve shall be totally encapsulated in rubber, be field replaceable, and provide a dual seal on the mating body seat. Valve shall be capable of installation in any position with rated sealing in both directions. Rubber sets of specially compounded SBR materials shall be utilized and be capable of sealing even under conditions of normal wear. The valve body shall have integral guide engaging lugs in the gate in a tongue-and-groove manner, supporting the gate throughout the entire open/close travel.
- F. Tapping valves shall be capable of making taps by using a cutter not less than 1/4-inch smaller than nominal pipe size.
- G. All tapping valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.
- H. Tapping valves shall be provided with a 2-inch square operating nut and shall be opened by turning to the left counterclockwise).
- I. Tapping valves shall be installed in a vertical position with valve box as detailed on the Drawings. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street.
- J. Valves shall be those manufactured by Mueller, M & H Valve Company, American or approved equivalent.

2.03 TAPPING SLEEVES

- A. Tapping sleeves shall be mechanical joint suitable for use with ductile iron, welded steel, or prestressed concrete pressure pipe.
- B. Sleeve shall be rated at 250 psi working pressure.
- C. Flanged throat section of mechanical joint sleeves through 12-inch size shall conform to MSS SP60 Standard. For throat sections larger than 12 inches, flanged section shall mate valves of same manufacture as sleeves.
- D. Tapping sleeves shall be fully coated with fusion bonded epoxy coating in accordance with AWWA C550 Standard.
- E. Sleeves shall be marked with the name of the manufacturer and size (run x branch).
- F. Tapping sleeve shall be manufactured by Mueller, M & H Valve Company, or approved equivalent.

2.04 COMBINATION AIR RELEASE VALVES (WATER)

- A. The combination air/vacuum valves shall be the size noted on the Drawings and equivalent to APCO Series 140C as manufactured by Valve and Primer Corp.

2.05 VALVE BOXES

- A. Each buried stop and valve shall be provided with a suitable valve box. Boxes shall be of the adjustable, telescoping, heavy-pattern type with the lower part of cast iron and the upper part of steel or cast iron. They shall be so designed and constructed as to prevent the direct transmission of traffic loads to the pipe or valve.
- B. The upper or sliding section of the box shall be provided with a flange having sufficient bearing area to prevent undue settlement. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and rest on the valve bonnet.
- C. The boxes shall be adjustable through at least 6 inches vertically without reduction of the lap between sections to less than 4 inches.
- D. The inside diameter of boxes for valves shall be at least 4-1/2 inches, and the lengths shall be as necessary for the depths of the valves or stops with which the boxes are to be used.
- E. Covers for valves shall be close fitting and substantially dirt-tight.
- F. The top of the cover shall be flush with the top of the box rim. An arrow and the word OPEN to indicate the direction of turning to open the valve shall be cast in the top of the valve covers.

2.06 FIBERGLASS LINE MARKER FOR BURIED VALVES

A. General:

- 1. Design: The continuous fiberglass reinforced composite line marker shall be a single piece marker capable of simple, permanent installation by one person using a manual driving tool. The marker, upon proper installation, shall resist displacement from wind and vehicle impact forces. The marker shall be of a constant flat "T" cross-sectional design with reinforcing support ribs incorporated longitudinally along each edge to provide sheeting protection and structural rigidity. The bottom end of the marker shall be pointed for ease of ground penetration.
- 2. Material: The marker shall be constructed of a durable, UV resistant, continuous glass fiber and marble reinforced, thermosetting composite material which is resistant to impact, ozone, and hydrocarbons within a service temperature range of -40° F to +140° F.
- 3. Workmanship: The marker shall exhibit good workmanship and shall be free of burns, discoloration, cracks, bulges or other objectionable marks which would adversely affect the marker's performance or serviceability.
- 4. Marking: Each marker shall be permanently marked "Water Line Below." The letters shall be a minimum of 2 inches in height. A black line shall be stamped horizontally across the front of the marker near the bottom to indicate proper burial depth as shown in the standard detail. The marker shall be a CRM-375 as manufactured by Carsonite International, or approved equivalent.

B. Physical and Mechanical Requirements:

1. Dimensions: The marker shall conform to the shape and overall dimensions shown in the standard detail.
2. Mechanical Properties: The marker shall have the minimum mechanical properties as follows:

Property	ASTM Test Method	Minimum Value
Ultimate Tensile Strength	D-638	50,000 psi
Ultimate Compressive Strength	D-638	45,000 psi
Specific Gravity	D-792	1.7
Weight % Glass Reinforcement	D-2584	50%
Barcol Hardness	D-2583	47

3. Color Fastness: The marker shall be pigmented throughout the entire cross-section so as to produce a uniform color which is an integral part of the material. Ultraviolet resistant materials shall be incorporated in the construction to inhibit fading or cracking of the delineator upon field exposure.
4. Vehicle Impact Resistance: The marker shall be capable of self-erecting and remain functional after being subjected to a series of ten head on impacts by a typical passenger sedan at 35 miles per hour. The marker shall retain a minimum of 60 percent of its sheeting.

C. Reflectors:

1. The reflector shall be of impact resistant, pressure sensitive retro-reflective sheeting which shall be subject to approval by the Engineer. The sheeting shall be of appropriate color to meet MUTCD requirements.
2. Mounting: The retro-reflective sheeting shall consist of a minimum of a 3-inch wide strip placed a maximum of 2 inches from the top of the post unless otherwise specified.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Valves shall be installed as nearly as possible in the positions indicated on the Drawings consistent with conveniences of operating the handwheel or wrench. All valves shall be carefully erected and supported in their respective positions free from all distortion and strain on appurtenances during handling and installation.
- B. All material shall be carefully inspected for defects in workmanship and material, all debris and foreign material cleaned out of valve openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness.
- C. Valves and other equipment which do not operate easily or are otherwise defective shall

be repaired or replaced at the Contractor's expense.

- D. Valves shall not be installed with stems below the horizontal.
- E. Valves shall be set plumb and supported adequately in conformance with the instructions of the manufacturer.
- F. Valves shall be provided with extension stems where required for convenience of operation. Extension stems shall be provided for valves installed underground and elsewhere so that the operating wrench does not exceed 6 feet in length.

3.02 PAINTING

Valves shall be factory primed and fully coated, inside and out, with fusion bonded epoxy in accordance with the latest revision of AWWA C550 Standard.

END OF SECTION 02640

SECTION 02675 - DISINFECTION OF POTABLE WATER PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all labor, material and water necessary to disinfect the potable water pipe as shown on the Drawings and specified herein.

1.02 RELATED WORK

- A. Section 02225 - Excavating, Backfilling and Compacting for Utilities.
- B. Section 02610 - Water Pipe and Fittings.
- C. Section 02640 - Water Valves and Gates
- D. Section 02660 - Domestic Water Distribution Connections

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 DISINFECTION OF WATER LINES

- A. Sterilization of pipe line shall be in accordance with the American Water Works Association Specification C601-68 using liquid chlorine. The pipe line shall be disinfected by using a 50 mg/l chlorine solution for a contact period of 24 hours. At the end of the 24 hour retention period, the required residual shall be 25 ppm. Pipes shall be thoroughly flushed upon meeting the chlorine residual requirements.
- B. Before the pipes are placed in service, samples of the water must be taken by the Contractor and submitted to the public health agency for testing. No pipes shall be placed in service until the samples have been approved by the agency. The Contractor shall bear all the cost of sampling, testing, and postage.
- C. Sampling locations shall be approved by the Engineer and the public health agency having jurisdiction.
- D. A satisfactory report for the section(s) under test must be submitted to the owner and the Engineer before authorizing domestic consumption of the water.
- E. Sterilization procedures shall be continued until approved samples have been obtained.

END OF SECTION 02675

SECTION 02930 - RESTORATION OF LAWNS AND GRASSES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

The work covered by this section shall include the establishment or restoration of all ground cover including areas to be seeded and/or sodded. This work shall include the supply of all materials, labor, superintendence and maintenance as outlined in these specifications.

1.02 RELATED WORK

- A. Section 02222 - Excavation.
- B. 01565 - Erosion and Sediment Control

1.03 SCOPE OF THE WORK

Restoration of Lawns and Grasses by seeding and/or sod placement shall be performed on all areas which are not occupied by structures, roads, curbs and gutters, sidewalks, and concrete slab walls, etc.

PART 2 - PRODUCTS

1.01 SEED

- A. The seed mixture furnished shall be in the following proportions:

Common Name	Proportion By Weight	Percent of Purity	Percent of Germination
Kentucky Bluegrass	40	90	85
Chewings Fescue	25	90	85
Italian Rye Grass	20	90	85
Red Top	10	90	85
White Clover	05	95	90

- B. All seed shall be fresh and clean and shall be delivered mixed, in unopened packages, bearing a guaranteed analysis of the seed and mixture.

1.02 SOD

- A. Sod shall be bluegrass or fine fescue sod strongly rooted and free of pernicious weeds. It shall be a uniform thickness of not more than 1-½ inches and shall have not less than

¾ inches of soil. All sod shall be grown on a commercial turf farm and no pasture sod shall be acceptable. The source of the sod must be approved by the Engineer before it is cut for delivery.

- B. The sod shall be delivered and installed within 48 hours of being harvested by the producer.

1.03 FERTILIZER

A complete commercial fertilizer with a 1:2:2 ratio of nitrogen, phosphorus, and potassium shall be furnished. It shall be free flowing and suitable for application with approved equipment. The material shall conform to State fertilizer laws. Bagged fertilizer shall be delivered in sealed standard containers and shall bear the name, trademark, and warranty of the producer.

1.04 LIME

Lime shall be agricultural grade limestone crushed so that no less than 85% will pass a No. 10 sieve.

PART 3 - EXECUTION

3.01 SEQUENCE OF WORK

All finish grading in a general area shall be complete before fertilizing and seeding or sodding begins.

3.02 SOIL PREPARATION AND SEEDING

- A. The work consists of furnishing all labor, equipment, and materials in all operations in connection with the fertilizing and seeding of all the finished graded areas not occupied by structures, roads, concrete slabs, sidewalks, walls, etc., and including grassed areas destroyed or damaged by the Contractor.
- B. The areas to be seeded shall be thoroughly tilled to a depth of at least 4 inches by discing, harrowing, or other approved methods until the condition of the soil is acceptable to the Engineer or, in the event of work on an existing utility easement, to the satisfaction of the easement holder. After harrowing or discing, the seed bed shall be dragged and/or hand raked to finish grade.
- C. The incorporation of the fertilizer and the agricultural lime may be a part of the tillage operation and shall be applied not less than 24 hours nor more than 48 hours before the seed is to be sown. Fertilizer shall be applied at a rate to provide not less than 2 ½ pounds of nitrogen, 5 pounds of phosphorus, and 5 pounds of potash per 1,000 square feet. Agricultural limestone shall be applied at a rate of not less than 100 pounds per 1,000 square feet.

D. Seed shall be broadcast either by hand or approved sowing equipment at the rate of ninety pounds per acre (two pounds per 1,000 square feet), uniformly distributed over the area. Broadcasting seed during high winds will not be permitted. The seed shall be drilled or raked into a depth of approximately ½ inch and the seeded areas shall be lightly raked to cover the seed and rolled. Drill seeding shall be done with approved equipment with drills not more than 3 inches apart. All ridges shall be smoothed out, and all furrows and wheel tracks shall be removed.

E. Seed may be sown during the following periods:

February 1 to April 15
August 15 to October 15

F. Seed may not be sown at any other time except with the written approval of Owner.

G. After the seed has been sown, the areas so seeded shall be mulched with clean straw at the rate of one bale per 2,000 square feet (approximately 1-inch loose depth). Mulch on slopes exceeding 20% shall be held in place with binder twine staked down at approximately 18-inch centers or by other equally acceptable means.

H. Areas seeded shall be protected until a uniform stand develops, when it will be accepted and the Contractor relieved of further responsibility for maintenance. Displaced mulch shall be replaced or any damage to the seeded area shall be repaired promptly, both in a manner to cause minimum disturbance to the existing stand of grass. If necessary to obtain a uniform stand, the Contractor shall fertilize, seed, and mulch again as needed. Scattered bare spots up to one square yard in size will be allowed up to a maximum of ten percent (10%) of any area.

2.03 SOIL PREPARATION AND SOD PLACEMENT

A. This work consists of furnishing all labor, equipment, and materials and all operations in connection with the placement of sod on all of the finished graded areas not occupied by structures, roads, concrete slabs, sidewalks, walls, etc., and including grassed areas destroyed or damaged by the Contractor.

B. The areas where sod is to be placed shall be thoroughly tilled to a depth of at least 4 inches by discing, harrowing, or other approved methods until the condition of the soil is acceptable to the Engineer or, in the event of work on an existing utility easement, to the satisfaction of the easement holder. After harrowing or discing, the sod bed shall be dragged and/or hand raked to 1/2" below finish grade.

C. The incorporation of the fertilizer and the agricultural lime may be a part of the tillage operation and shall be applied not less than 24 hours nor more than 48 hours before the sod is to be placed. Fertilizer shall be applied at a rate to provide not less than 2 1/2 pounds of nitrogen, 5 pounds of phosphorus, and 5 pounds of potash per 1,000 square feet. Agricultural limestone shall be applied at a rate of not less than 100 pounds per 1,000 square feet.

- D. Prior to the sod being placed, the area to be sodded shall be lightly watered to moisten the soil surface. The sod shall be carefully unrolled and trimmed to fit irregular areas, with the edges of the sod strips placed tightly together in such a manner as to conceal the joints between the strips. Following placement, the sod shall be lightly watered (approximately a 1/4" application) and rolled with a medium weight lawn roller to minimize any ridging at the seams.
- E. Sod may be placed whenever the sod is not dormant, and the ground is not frozen or muddy. Sod may not be placed at any other time.
- F. For a period of first two weeks following placement, the sod shall be maintained by thoroughly watering the entire area covered by the sod every second day, with a 1/2" minimum application by sprinklers or a misting hose. Lawn watering gauges shall be used to measure the application. Flooding or sheet watering will not be allowed. For the third through sixth weeks following placement, the sod shall be maintained by thoroughly watering the entire area covered by the sod twice weekly (three to four days apart), with a 1/2" minimum application by sprinklers or a misting hose. Lawn watering gauges shall be used to measure the application. Flooding or sheet watering will not be allowed.
- G. Actual rainfall event amounts received during the period of watering may be counted towards the required application totals when the amount of the rainfall exceeds 1/4" per event.
- H. In the third through sixth week following placement, the Contractor shall maintain the sodded areas by mowing to a height of not less than three inches, prior to water applications. Contractor shall not allow sod blade height to exceed five inches during this period.
- I. Following the six-week watering period, the area covered by the sod will be rolled one additional time with a medium weight lawn roller, and shall be inspected by the Owner for acceptance.

END OF SECTION 02930

Division 3 - Concrete

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Formwork.
- B. Reinforcing Steel.
- C. Expansion and Contraction Joints.
- D. Waterstops
- E. Concrete.

1.02 RELATED REQUIREMENTS

- A. Section 00710 - General Conditions.
- B. Section 02222 - Excavation.

1.03 REFERENCES

- A. ACI 350R Environmental Engineering Concrete Structures.
- B. ACI318 - Building Code Requirements for Reinforced Concrete.
- C. ACI347 - Recommended Practice for Concrete Formwork.
- D. CRSI - Manual of Standard Practice.
- E. CRSI - Placing Reinforcing Bars.
- F. ASTM - A-615, A-120, A-185, C-31, C-39

1.04 SUBMITTALS

The Contractor shall submit the following data to the Engineer for review:

1. Mix designs for all mixes proposed or required to be used, including all mixes containing admixtures.
2. Certification by the manufacturer that cement meets the Specification contained herein.
3. Shop drawing for reinforcing steel showing bar schedules, location, and splices.
4. Reports on laboratory compression tests of cylinders taken during concrete placement.
5. Manufacturer's cut sheets for all other concrete related products.

PART 2 - PRODUCTS

2.01 CLASSES OF CONCRETE AND USAGE

- A. Structural concrete of the various classes required shall be proportioned to produce the following 28-day compressive strengths:
1. Selection of Proportions for 4,500 psi Concrete:
 - a. 4,500 psi compressive for strength at 28 days.
 - b. Type I/II cement plus air.
 - c. Maximum water/cement ratio - 0.42.
 - d. Minimum cement content - 564 lbs. (6.0 bags)/cubic yard concrete.
 - e. Nominal maximum size coarse aggregate - No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
 - f. Air content - 5% plus or minus 1% by volume.
 - g. Slump - 4 inches in accordance with ASTM C-143, when measured with only an air entraining admixture. Additional slump is allowed by use of water reducing or superplasticizing admixtures.
 2. Selection of Proportions for 3,000 psi Concrete:
 - a. 3,000 psi compressive strength at 28 days.
 - b. Type I/II cement plus air.
 - c. Maximum water/cement ratio - 0.56.
 - d. Minimum cement content - 470 lbs. (5.0 bags)/cubic yard concrete.
 - e. Nominal maximum size coarse aggregate - No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
 - f. Air content - 5% plus or minus 1% by volume.
 - g. Slump - 4 inches in accordance with ASTM C-143, when measured with only an air entraining admixture.
- B. Concrete shall be used as follows:
1. 4,500 psi concrete for all concrete work except as noted below.
 2. 3,000 psi concrete for encasement of piping where indicated, and thrust blocking.
- C. All testing of aggregates and determination of proportions shall be or have been performed by a recognized independent testing laboratory.
- D. Cement for exposed concrete shall have a uniform color classification.
- E. Type I/II cement conforming to ASTM C-150 shall be used in all concrete.
- F. Coarse aggregate shall be crushed stone having clean, hard, uncoated particles, and shall be free from injurious amount of soft, friable, thin, elongated or laminated pieces. Coarse aggregates shall conform to all requirements of ASTM C-33.

- G. Fine aggregates shall be natural sand having clean, hard, uncoated grains, free from injurious amounts of clay, dust, organic matter or other deleterious substances, and shall conform to ASTM C-33.
- H. Water for concrete shall be clean, fresh, and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

2.02 ADMIXTURES

- A. An air entraining admixture shall be used on all concrete and shall be the neutralized vinsol resin type such as Master Builders MB-VR, Euclid Chemical Company AIR-MIX or equivalent. The admixture shall meet the requirements of ASTM C-260.
- B. Other admixtures (water reducing agents, accelerating agents, retarding agents, superplasticizing agents) shall be considered where necessary to meet the needs of construction.
- B. Admixtures shall be used in concrete design mixes in the same manner and proportions as in the field so that the effects of the admixtures are included in preliminary test submitted to the Engineer for review prior to the start of construction.

2.03 REINFORCEMENT

- A. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A-615. All bar reinforcement shall be deformed.
- B. Welded wire fabric shall conform to ASTM A-185 and shall be of weight and gauge as indicated on the Drawings.
- C. Reinforcement supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall be of stainless steel or shall have approved high-density polyethylene tips so that the metal portion shall be at least one-quarter of an inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks.

2.04 FORMS

- A. Forms shall be of suitable material, design, and construction so as to be rigid, tight enough to prevent the passage of mortar, and plane surfaces with a tolerance of 1/16-inch in 4 feet.
- B. For surfaces to be given burlap-rubbed finish, the form surface in contact with the concrete shall be made of heavy gauge metal, new plywood (used plywood which, in the opinion of the Engineer, is substantially equal to new plywood may be used), tempered wood fiberboards with smooth surface, or similar materials. Metal forms or form linings shall have square edges so that the concrete will not have fins or fluting. Forms shall not

be pieced out by use of materials different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface.

- C. For surfaces other than those to be given burlap-rubbed finish, forms shall be made of wood, metal, or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be reasonable good, as accepted. Metal forms shall be of an acceptable type for the work involved. Edges of forms in contact with concrete shall be flush within 1/16-inch.
- D. Form for walls, columns, or piers shall have removable panels at the bottom for cleaning, inspection, and scrubbing-in of bonding grout. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete, and so that construction joints can be properly keyed and treated.
- E. Forms for exposed surfaces shall be built with 3/4-inch chamfer strips attached to produce smooth, straight chamfers at all sharp edges of concrete.
- F. Form ties to be encased in concrete shall not be made of through-bolts or common wire, but shall be of a well-established type, so made and installed as to embody the following features:
 - 1. After removal of the protruding part of the tie, there shall be no metal nearer than 1 inch to the face of the concrete.
 - 2. That part of the tie which is to be removed shall be at least 1/2-inch in diameter, or if smaller, it shall be provided with a wood or metal cone 1 inch long placed against the inside of the forms. Cones shall be carefully removed from the concrete after the forms have been stripped.
 - 3. Ties which pass through walls subject to hydrostatic pressure shall be provided with acceptable water stops, such as washers, securely fastened to the ties.

2.05 OTHER MATERIALS

- A. Anchorage items shall be of standard manufacture and of type required to engage with the anchors to be installed therein under other sections of the Specifications and shall be subject to approval by the Engineer.
- B. Premolded expansion-joint filler strips shall conform to ASTM D-1752 and shall be 3/8-inch thick unless otherwise shown.
- C. Joint sealants shall conform to ANSI 116.1. The following joint sealants are acceptable:
 - 1. Colma by Sika Corporation.
 - 2. Hornflex by A. C. Horn, Inc.
 - 3. Sonolastic by Sonneborn Division of Contech, Inc.

D. GROUT

1. Precision-support grout shall consist of a non-shrink, ready-to-use, precision grout material; proportioned, pre-mixed and packaged at the factory; delivered to the job site to place with only the addition of water; forming, placing and curing as stipulated by the manufacturer.
2. Grouts which depend upon aluminum powders, chemicals, or other agents which produce gas for expansion are not acceptable.
3. Precision-support grout shall also meet the following requirements:
 - a. Free of gas producing agents.
 - b. Free of oxidizing catalysts.
 - c. Free of inorganic accelerators, including chlorides.

E. Construction Joint Waterstops:

1. Polyvinylchloride (PVC) Waterstops:

- a. Provide PVC waterstops complying with Corps of Engineers CRD-C572.
- b. Provide serrated type with a minimum thickness of 3/8 inch by a minimum width of 6 inches may be provided in specific applications as approved by the ENGINEER.
- c. Provide PVC waterstops as manufactured by Greenstreak Plastic Products company; Vynlex Corporation, or equivalent product.

2. Adhesive Waterstop:

- a. Provide pre-formed adhesive waterstop in construction joint locations where shown, or as alternative to PVC waterstop where appropriate.
- b. The preformed waterstop shall meet or exceed all requirements of Federal Specifications SS-S-210A, "Sealing Compounds for Expansion Joints".
- c. Provide adhesive waterstops as manufactured by Synko-Flex Products, Division of Henry Products, Inc.; or equivalent product.

3. Hydrophilic Waterstops:

- a. Hydrophilic waterstop may be used as an alternate to the adhesive waterstop.
- b. Provide waterstops as manufactured by Greenstreak Plastic Products Company; Adeka, Inc.; or equivalent product.

F. Membrane Forming Curing compound: ASTM C 309, Type I-D.

1. Provide without fugitive dye when requested by Engineer.

- G. Epoxy Bonding Agent: Provide two-component epoxy resin bonding agent as manufactured by Sika Chemical Corporation; A.C. Horn, Incorporated; or equivalent product.
- H. Adhesive Dowels:
1. Drilling equipment used and installation of adhesive dowels shall be in accordance with manufacturer's instructions.
 2. Assure that embedded items are protected from damage and are not filled in with concrete.
 3. Unless otherwise shown or approved by Engineer, embedment depths shall be based on a compressive strength of 2,500 psi when embedded into existing concrete.)
 4. The Contractor shall comply with the adhesive material manufacturer's installation instructions on the hole diameter. The Contractor shall properly clean out the hole utilizing a synthetic brush and compressed air to remove all loose material from the hole, prior to installing adhesive capsules or material. Proper mixing of the two-component system shall be done to the manufacturer's recommendations.
 5. Adhesive material manufacturer's representative shall observe and demonstrate the proper installation procedures for the adhesive dowels and adhesive material at no additional expense to the Owner. Each installer shall be certified in writing by the manufacturer to be qualified to install the adhesive dowels.
 6. Provide two-component dowel installation adhesive as manufactured by Hilti Corporation, or approved equivalent product.

PART 3 - EXECUTION

3.01 FORMING

- A. Forms shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions and to the elevations indicated on the Drawings or specified, and exposed concrete will be substantially free from board or grain marks, poorly matched joints, and other irregularities or defects.
- B. Forms shall be sufficiently rigid to prevent displacement or sagging between supports, and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.
- C. All falsework to support structural slabs, beams, girders, etc., shall be designed to safely and adequately support the concrete and forms during placement and curing. The adequacy and safety of the falsework shall be the sole responsibility of the Contractor.
- D. All forms shall be oiled with an acceptable nonstaining oil or liquid form coating before reinforcement is placed.
- E. Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged places repaired, and all projecting nails withdrawn.

- F. Except as otherwise specifically authorized by the Engineer, forms shall not be removed until the concrete has aged for the following number of days-degrees*:
1. Beams and slabs: 500 day-degrees.
 2. Walls and vertical surfaces: 100 day-degrees.
 3. *Day-degree: Total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily average temperature of 60 degrees F, equals 300 day-degrees.
- G. Shores under beams and slabs shall not be removed until the concrete has attained at least 60 percent of the specified compressive strength and also sufficient strength to support safely its own weight and the construction live loads upon it.

3.02 PLACING REINFORCEMENT

- A. Reinforcement shall be bent cold to the dimensions and shapes shown on the Drawings and within tolerances specified in the CRSI Manual of Standard Practice.
- B. Before being placed in position, reinforcement shall be cleaned of loose mill and rust scale, dirt and other coatings that will interfere with development of proper bond.
- C. Reinforcement shall be accurately placed in positions shown on the Drawings and firmly held in place during placement and hardening of concrete by using annealed wire ties. Bars shall be tied at all intersections except where spacing is less than one foot in both directions, then alternate intersections may be tied.
- D. Distance from the forms shall be maintained by means of stays, blocks, ties, hangers or other approved supports. Blocks for holding the reinforcement from contact with the forms shall be precast mortar blocks or approved metal chairs. Layers of bars will be separated by precast mortar blocks or other equally suitable devices; the use of pebbles, pieces of broken stone or brick, metal pipe and other such blocks will not be permitted. If fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.
- E. Before any concrete is placed, the Engineer shall have inspected the placing of the steel reinforcement and given permission to deposit the concrete. Concrete placed in violation of this provision will be rejected and thereupon shall be removed.
- F. Unless otherwise specified, reinforcement shall be furnished in the full lengths indicated on the plans. Splicing of bars, except where shown on the plans, will not be permitted without the approval of the Engineer. Where splices are made, they shall be staggered insofar as possible.

3.03 TESTING AGGREGATES AND DETERMINING PROPORTIONS

- A. No concrete shall be used in the work until the materials and mix design have been accepted by the Engineer.

- B. The conformity of aggregates to the Specifications hereinbefore given shall be demonstrated and determined by tests per ASTM C-33 made with representative samples of the materials to be used on the work.
- C. The actual proportions of cement, aggregates, admixtures and water necessary to produce concrete conforming to the requirements set forth herein shall be determined by making test cylinders using representative samples of the materials to be used in the work. A set of four standard 6-inch cylinders shall be made and cured per ASTM C-31. Two shall be tested at 7 days and two at 28 days per ASTM C-39. The slump shall not be less than the greatest slump expected to be used in the work.
- D. Reports on the tests and a statement of the proportions proposed for the concrete mixture, shall be submitted in triplicate to the Engineer for review as soon as possible, but not less than five days prior to the proposed beginning of the concrete work. If the Contractor furnishes in writing, similar, reliable detailed information from an acceptable source, and of date not more than four months prior to the time when concrete will be used on this project, the above requirements for laboratory test may be modified by the Engineer. Such data shall derive from mixtures containing constituents, including the admixtures where used, of the same types and from the same sources as will be used on this project.
- E. The Engineer shall have the right to make check tests of aggregates and concrete, using the same materials, and to order changes as may be necessary to meet the specified requirements.
- F. The Contractor may request permission to add water at the job site; and when the addition of water is permitted by the Engineer, the quantity added shall be the responsibility of the Contractor and in no case shall the total water per bag of cement exceed the ratio set forth herein.
- G. If concrete of the required characteristics is not being produced as the work progresses, the Engineer may order such changes in proportions or materials or both, as may be necessary to secure concrete of the specified quality. The Contractor shall make such changes at his own expense and no extra compensation will be allowed because of such changes.

3.04 MIXING

- A. All central-plant and rolling-stock equipment and methods shall conform to the Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready Mixed Concrete Association, as well as the ACI Standards for measuring, Mixing and Placing Concrete (ACI 614), and with the ASTM Standard Specification for Ready-Mixed Concrete, Designation C94, insofar as applicable.
- B. Ready-mixed concrete shall be transported to the site in watertight agitator or mixer trucks. The quantity of concrete to be mixed or delivered in any one batch shall not exceed the rated capacity of the mixer or agitator for the respective conditions as stated on the nameplates.

- C. Central-mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch, and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the premixed concrete is placed in the truck and shall continue without interruption until discharge. For transit-mixed concrete the major portion of the mixing water shall be added and mixing started immediately after the truck is charged.
- D. The amount of water initially added shall be recorded on the delivery slip for the Engineer's information; no additional water shall be added, either in transit or at the site, except as directed. Mixing (at mixing speed) shall be continued for at least 10 minutes followed by agitation without interruption until discharge. Concrete shall be discharged at the site within 1-1/2 hours after water was first added to the mix, and shall be mixed at least 5 minutes after all water has been added.
- E. Concrete which has become compacted or segregated during transportation to or in the site of the work shall be satisfactorily remixed just prior to being placed in the forms.
- F. Partially hardened concrete shall not be deposited in the forms. The retempering of concrete which has partially hardened (that is, the remixing of concrete with or without additional cement, aggregate, or water) will not be permitted.

3.05 COMPRESSION TESTS

- A. During the progress of the work, at least one (1) set of four (4) compression test cylinders shall be made for each 50 cubic yards of concrete or major fraction thereof, and not less than one such set for each type of concrete for each day's pouring. Cylinders made in the field shall be made and cured in accordance with the ASTM Standard Method of Making and Curing Concrete Test Specimens in the Field, Designation C31, except that wherever possible molds shall be left on the cylinders until they have reached the laboratory. Testing services to satisfy the requirements of ACI shall be paid for by the Contractor at his expense. Testing lab must be approved by the Engineer.
- B. One cylinder of each set shall be broken in accordance with ASTM C-39 at seven (7) days and the other two at twenty-eight (28) days. Two copies of these test results shall be submitted to the Engineer on the same day of the tests.
- C. On evidence of these tests, any concrete that fails to meet the specified strength requirements shall be strengthened or replaced as directed by the Engineer at the Contractor's expense.

3.06 METALWORK IN CONCRETE

- A. All trades shall be notified, at the proper time, to install items to be embedded in concrete.
- B. All castings, inserts, conduits, and other metalwork shall be accurately built into or encased in the concrete by the Contractor as directed, and all necessary precautions shall be taken to prevent the metalwork from being displaced or deformed.
- C. Anchor bolts shall be set by means of substantial templates.

3.07 PLACING AND COMPACTING CONCRETE

- A. At least twenty-four (24) hours before the Contractor proposes to make any placement of concrete, he shall notify the Engineer of his intention and planned procedure. Unless otherwise permitted, the work shall be so executed that a section begun on any day shall be completed during daylight of the same day.
- B. No concrete shall be placed until the subgrade has been accepted in accordance with the requirements of Section 01400, Quality Control, nor shall it be placed on frozen subgrade or in water. Placement of concrete shall not be scheduled until the forms, , reinforcing, and preliminary work have been accepted. No concrete shall be placed until all materials to be built into the concrete have been set and have been accepted by the various trades and by the Engineer. All such materials shall be thoroughly clean and free from rust, scale, oil, or any other foreign matter.
- C. Forms and excavations shall be free from water and all dirt, debris, and foreign matter when concrete is placed. Except as otherwise directed, wood forms and embedded wood called for or allowed shall be thorough wetted just prior to placement of concrete.
- D. Concrete placed at air temperatures below 40 degrees shall have a minimum temperature of 50 degrees F. and a maximum of 70 degrees F. when placed.
- E. Concrete shall be transported from the mixer to the place of final deposit as rapidly as practicable and by methods which will prevent separation of ingredients and avoid rehandling.
- F. Chutes for conveying concrete shall be metal or metal-lined and of such size, design, and slope as to ensure a continuous flow of concrete without segregation. The slope of chutes shall be not flatter than 1 on 2 and all parts of a chute shall have approximately the same slope. The discharge end of the chute shall be provided with a baffle, or, if required, a spout; and the end of the chute or spout shall be kept as close as practicable to, but in no event more than 5 feet above the surface of the fresh concrete. When the operation is intermittent, the chute shall discharge into a hopper.
- G. In thin sections of considerable height (such as walls and columns), concrete shall be placed in such a manner as will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the mass of concrete being placed. To achieve this end, suitable hoppers, spouts with restricted outlets, etc., shall be used as required or permitted unless the forms are provided with suitable openings.
- H. Chutes, hoppers, spouts, etc., shall be thoroughly cleaned before and after each run and the water and debris shall not be discharge inside the form.
- I. For any one placement, concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section, and so as to maintain, until the completion of the unit, an approximately horizontal, plastic surface.

- J. No wooden spreaders shall be left in the concrete.
- K. During and immediately after being deposited, concrete shall be thoroughly compacted by means of suitable tools and methods, such as internal-type mechanical vibrators operating at not less than 5,000 rpm., or other tool spading, to produce the required density and quality of finish. Vibration shall be done only by experienced operators under close supervision and shall be carried on in such a manner and only long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents, "pumping" of air, or other objectionable results. All vibrators shall be supplemented by proper spade puddling approximately 2 to 3 inches away from forms to remove included bubbles and honeycomb. Excessive spading against the forms, causing the deposition of weak mortar at the surface, shall be avoided.
- L. The concrete shall be thoroughly rodded and tamped about embedded materials so as to secure perfect adhesion and prevent leakage. Care shall be taken to prevent the displacement of such materials during concreting.

3.08 BONDING CONCRETE AT CONSTRUCTION JOINTS

- A. In order to secure full bond at construction joints, the surface of the concrete previously placed (including vertical, inclined, and substantially horizontal areas) shall be thoroughly cleaned of foreign materials and laitance, if any, and then roughened.
- B. The previously placed concrete at the joint shall be saturated with clean water and kept thoroughly wet overnight, after which all pools shall be removed. After free or glistening water disappears, the concrete shall be given a thorough coating of neat cement mixed to a suitable consistency. The coating shall be 1/8-inch thick on vertical surfaces and 1/4-inch thick on horizontal surfaces, and shall be well scrubbed in by means of stiff bristle brushes wherever possible. New concrete shall be deposited before the neat cement dries.

3.09 CURING AND PROTECTION

- A. All concrete, particularly slabs and including finished surfaces, shall be treated immediately after concreting or cement finishing is completed, to provide continuous moist curing for at least seven days, regardless of the adjacent air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or kept moist by other acceptable means. Horizontal surfaces, slab, etc., shall be ponded to a depth of 1/2-inch wherever practicable, or kept continuously wet by the use of lawn sprinklers, a complete covering of continuously saturated burlap, or by other acceptable means.
- B. For at least seven (7) days after having been placed, all concrete shall be so protected that the temperature at the surface will not fall below 45 degrees F.
 - 1. No manure, salt, or other chemicals shall be used for protection.
 - 2. Wherever practicable, finished slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

3.10 TRIMMING AND REPAIRS

- A. The Contractor shall use suitable forms, mixture of concrete, and workmanship so that concrete surfaces, when exposed, will require no patching.
- B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled, and surface defects which do not impair structural strength shall be repaired.
- C. Defective concrete shall be cut perpendicular to the surface until sound concrete is reached, but less than 1 inch deep. The remaining concrete shall be thoroughly roughened and cleaned. Concrete around the cavity or the form-tie recess shall be thoroughly wetted and promptly painted with a 1/16-inch brush coat of neat cement mixed to the consistency of lead paint. The hole shall then be filled with mortar.
 - 1. Mortar shall be 1:1-1/2 cement and sand mix with sufficient white cement, or fine limestone screenings in lieu of sand, to produce a surface matching the adjoining work. Cement and sand shall be from the same sources as in the parent concrete.
 - 2. For filling form-tie recesses, the mortar shall be mixed slightly damp to the touch (just short of "balling"), hammered into the recess until it is dense and an excess of paste appears on the surface, and then troweled smooth. Mortar in patches shall be applied so that after partial set it can be compressed and rubbed to produce a finish flush and uniform in texture with the adjoining work. All patches shall be warm-moist cured as above specified.
- D. The use of mortar patching as above specified shall be confined to the repair of small defects in relatively green concrete. If substantial repairs are required, the defective portions shall be cut out to sound concrete and the masonry replaced by means of a cement gun, or the masonry shall be taken down and rebuilt, all as the Engineer may decide or direct.

3.11 SURFACE FINISH

- A. Fins and irregularities on formed surfaces to receive no other finish shall be smoothed.
- B. The top of concrete on which other concrete or unit masonry will later be placed shall be struck off true at the surface indicated on the Drawings or as permitted by the Engineer, as the concrete is being placed. As soon thereafter as the condition of the concrete permits and before it has hardened appreciably (normally within 2 hours after being deposited), all water, scum, laitance, and loose aggregate shall be removed from the surface by means of wire or bristle brooms in such a manner as to leave the coarse aggregate slightly exposed and the surface clean.
- C. Concrete surfaces shall be finished as follows, except as otherwise required by various sections of the Specifications or shown on the Drawings.
 - 1. Wood-float finish shall be given to all top, substantially horizontal, exposed surfaces.

2. Burlap-rubbed finish shall be given to all interior and exterior surfaces placed against forms which will be exposed to view on completion of the work. (Finish shall be to one foot below ground and below normal liquid surface elevations).
3. All surfaces shaped without forms and over which liquids will flow shall be given a steel-trowel finish.
4. Concrete surfaces to which roof insulation or roofing are to be applied shall be finished sufficiently smooth to receive the roofing material, as obtained by steel trowel or very smooth wood-float finish.

3.12 METHOD OF FINISHING

A. Broomed Finish:

1. Surfaces to be given broomed finish shall first be given a steel-trowel finish. Immediately after troweling, the surface shall be lightly brushed in one direction with a hair broom to produce a nonslip surface of uniformly good appearance.

B. Wood-float Finish:

1. Surfaces to be given a wood-float finish shall be finished by tamping with special tools to force aggregates away from the surface, and screeding with straight edges to bring the surface to the required line.
2. As soon after the condition of concrete permits and before it has hardened appreciably, all water, film, and foreign material which may work to the surface shall be removed. Rough finishing shall be done with straight edges and derbies. Machine floating if used, shall not be started until the surface will support the float adequately without digging in and bringing excess fines to the surface. At such time, a minimum of machine and hand floating with a wood float shall be employed to bring the finish to a true and uniform surface with no coarse aggregate visible.
3. Under no circumstances will sprinkling with water or dusting with cement be permitted during finishing of the slab.

C. Steel Trowel Finish: Surfaces to be given a steel-trowel finish shall first be given a wood-float finish. This shall be followed by hand troweling with steel trowels to bring the surface to a uniform, smooth, hard, impervious surface free from marks and blemishes. Troweling shall not be started until all water has disappeared from the surface. Over-troweling shall be avoided. Dusting with dry cement or other mixtures or sprinkling with water will not be permitted in finishing.

D. Burlap Rubbed Finish:

1. Immediately after the forms have been stripped and before the concrete has changed in color, all fins and other projections shall be carefully removed by use of a hammer or other suitable means, and imperfections shall be repaired as hereinbefore specified under "Trimming and Repairs". While the surface is still damp, a thin coat of cement slurry of medium consistency shall be applied by means of bristle brushes to provide a bonding coat within pits and minor blemishes

in the parent concrete; the coating of large areas of the surface with this slurry shall be avoided.

2. Before the slurry has dried or changed color, a dry (almost crumbly) grout composed of 1 volume of cement to 1-1/2 volumes of masonry sand shall be applied. The sand shall have a fineness modulus of approximately 2.25 and comply with the gradation requirements of the ASTM Standard Specifications for Aggregate for Masonry Mortar, Designation C144-76.
3. The grout shall be uniformly applied by means of damp (neither dripping wet nor dry) pads of burlap of convenient size (approximately 6 inches square) and shall be allowed to harden for one to two hours, depending on the weather. In hot, dry weather the surface shall be kept damp by means of a fine fog spray during the hardening period.
4. When the grout has hardened sufficiently, but before it becomes so hard as to be difficult to remove, excess grout shall be scraped from the surface of the parent concrete by the edge of a steel trowel, without removing the grout from the imperfections. Thereafter, the surface shall be allowed to dry thoroughly and then be rubbed vigorously with burlap to remove all dried grout so that no visible film remains on the surface after the rubbing. The entire cleaning operation for any area shall be so planned that sufficient time is allowed for the grout to dry and be rubbed after it has been cut with the trowel.
5. On the day following the grouting and burlap rubbing, the concrete surface shall again be rubbed clean with a dry burlap to remove inadvertent dust. If any built-up film remains on the parent surface, it shall be removed by being rubbed with a fine abrasive stone without breaking through the surface film of the original concrete. Such rubbing shall be light and sufficient only to remove excess material without working up a lather of mortar or changing the texture of the concrete. Following the final rubbing with burlap or abrasive stone, the surface shall be thoroughly washed with stiff bristle brushes (worked only along parallel lines) to remove extraneous materials from the surface. The surface shall then be sprayed with a fine fog spray to maintain a continually damp condition for at least three (3) days after application of the grout.
6. When the burlap-rubbed finish has been completed, the concrete surface shall be smooth, free from discolorations and stains, and of uniformly good appearance.

3.13 HOT WEATHER CONDITIONS

Placing of concrete under conditions of high temperature, low humidity or wind shall be done in accordance with the American Concrete Institute "Hot Weather Conditions" (latest edition).

3.14 COLD WEATHER CONDITIONS

Cold weather concreting procedures precautions shall conform with American Concrete Institute "Cold Weather Concreting" (latest edition).

END OF SECTION 03300

Divisions 4 through 8 - Not Used

Division 9 - Finishes

SECTION 09800 - SPECIAL COATINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

Provide all labor, materials, equipment and services required for accomplishing special coatings on metals and other surfaces designated in the Contract Documents (Drawings and/or Specifications).

1.02 SPECIAL NOTICE

On this project, special coatings for protecting metals and other surfaces are required. The service requirements of the coatings are harsh and only products with an extended history of successful application will be acceptable.

1.03 RELATED WORK

- A. Division 1 - General Requirements.

1.04 ACCEPTABLE PRODUCTS

Unless otherwise noted, the coating products shall be as manufactured by The Tnemec Company, The Sherwin-Williams Company, or an approved equivalent. Coating products must be applied in strict accordance with the manufacturer's recommendations.

1.05 ITEMS REQUIRING SPECIAL COATING

Refer to Coating Schedules for each structure and building on the Contract Drawings for all items that are to be coated.

1.06 ITEMS NOT REQUIRING SPECIAL COATING

The metal surfaces of stainless steel, chromium plate, galvanized and aluminum that are not now coated, will not require field coating. Do not apply coating over any code required labels, glass items, gauges, and name plates. It is also important not to coat any moving parts or operating units, valves or stems, or any mechanical and electrical parts such as valve and damper operators, linkages, sensing devices, motor and fan shafts and other similar fixtures. Surfaces not specifically identified to be coated shall not be coated. It is the contractors responsibility to protect any surface that is not to receive a coating.

1.07 SUBMITTALS

- A. Manufacturer Name: Contractor shall submit manufacturer's name and brand of coating materials proposed to be used for coating on this project in accordance with Section 01300.

B. Materials List:

1. Before any materials are delivered to the job site, submit to the Engineer a complete list of all materials proposed to be furnished including approximate quantities, types and descriptions of coating for each part of the project. Material list shall make reference to the specified coating systems and the coating schedules for each coating product proposed to be used. In cases where coating materials other than those described in the Specifications are proposed, a materials list will not be considered as acceptance of such substitute materials; further data will be required as specified herein.
2. Two (2) copies of the full range of colors available in each of the proposed products shall be submitted with the materials list.

C. Manufacturer's Data:

In any case where material is of a manufacturer other than those specifically identified in Acceptable Products (Article 1.04), the Contractor shall submit the following data to the Engineer for review prior to placing the material order.

1. Example of past performance of coatings under similar conditions (case histories).
2. Types of coatings.
3. Percentage of solids by volume.
4. Recommended usage.
5. Current recommended method of application published by manufacturer, (Product Data Sheets and Material Safety Data Sheets).

D. Color Samples:

1. Where standard stock chart colors are not satisfactory, furnish color samples. All tinting and matching shall be to the satisfaction of the Engineer.
2. Color samples shall be provided to the Engineer's office.

E. Experience Records:

1. The Contractor shall submit experience records of the coating applicator and that of the coating manufacturer.
 - a. The Contractor shall submit a list of not less than five (5) utility or industrial installations which the applicator has coated during the last five (5) years. This list shall include the names of the owners, the installations coated, responsible officials, architects or engineers of record for the project, and the manufacturer of the coating systems applied.
 - b. The Contractor shall submit a list of not less than five (5) utility or industrial installations where the manufacturer's coatings have been applied during the last five (5) years, if not included in the applicator's listing. This list shall include the names of the owners, the installations coated, responsible officials, architects or engineers of record for the project, and the applicator performing the work.

2. Applicators and/or manufacturers whose submissions indicate, in the judgement of the Engineer, that they have not had the experience required to perform the Work will not be acceptable.

1.08 QUALITY ASSURANCE

- A. Qualification of Coating Applicators: All coatings shall be applied by qualified, skilled, experienced craftsmen. In the acceptance or rejection of completed coatings, no allowance will be made for lack of skills on the part of the craftsmen.
- B. Coating Labels: Labels on coating containers shall include the following:
 1. Manufacturer's name.
 2. Generic type of coat.
 3. Manufacturer's stock number.
 4. Manufacturer's batch number
 5. Color.
 6. Instructions for thinning where applicable.
- C. Compatibility:
 1. The Contractor shall be responsible for the compatibility of all coatings used in the Work. A compatible coating will be considered a coat which precludes adverse effects related to bonding, adhesion strength, drying, delamination, scaling, lifting, and bleeding.
 2. In cases where shop-applied primers and coatings on materials and equipment furnished by suppliers are products different from those described in the Specifications, the Contractor shall verify compatibility with the specified field-applied coating system.
 3. Where thinning is necessary, only the products of the manufacturer furnishing the coating, and products for thinning purposes only, will be allowed.
- E. Thickness and Spreading Rates:
 1. Minimum dry mil thicknesses per coat and/or spreading rates in square feet per gallon shall be governed by the manufacturer's current data sheets or literature containing recommendations or instructions regarding these values. These recommended dry mil thickness and/or spreading rate values will be considered requirements to be met as if set out within the Contract Documents and must be included with material list submittals before Engineer grants approval to use any coating materials. Do not exceed manufacturer's recommended coverage rates. If dry film thickness is found to be less than that stipulated in the manufacturer's literature, or coverage is not uniform, the Contractor shall apply or remove coatings to correct thickness or appearance at no additional cost to Owner.
 2. The number of coats to be applied are specified herein, and shall be the minimum number of coats to be provided. Each coat shall be applied at a rate consistent with the manufacturer's recommended application. Where the accepted coating manufacturer's system requires more coats than the number listed, the additional coats shall be applied to provide a complete system.

- F. Technical Services: The Contractor shall provide assurance that a qualified representative of the coating manufacturer makes periodic visits to the project site during coating to verify proper application procedures, quality and progress of work.

1.09 PRODUCT DELIVERY, HANDLING AND STORAGE

- A. Delivery: All materials shall be brought to the job site in the original sealed and labeled containers of the coating manufacturer. All labels shall be legible and intact at time of use
- B. Manufacturer's Instructions: Coating manufacturer's written instructions for mixing, thinning, application and drying shall be furnished with the coating and strictly followed. Coating manufacturer's written instructions for surface preparation shall be met, if more stringent than the surface preparations specified for the surface and coating listing within the specifications.
- C. Storage of Materials:
1. Store only acceptable materials on project site
 2. Store only in a suitable and designated area restricted to the storage of coating materials and related equipment.
 3. Comply with all applicable health and fire regulations regarding the storage of coating materials.
 4. Storage of material shall comply with the manufacturer's specifications; however, storage shall be at a **minimum temperature of 40 degrees F.**
- D. Protection of Materials:
1. Take all necessary precautions to ensure the safe storage and use of coating materials and the prompt and safe disposal of waste.
 2. Coating wastes shall be properly deposited in containers made for this purpose.
 3. Take all necessary precautions to protect coating materials before, during and after application and to protect the finished work.
- E. Replacement: In the event of damage to coating materials, immediately make all replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
- F. Product delivery, handling and storage shall be in accordance with Part 1 of this Section and the manufacturer's recommendations.

1.10 JOB CONDITIONS

- A. Environmental Requirements:
1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.
 2. Do not apply finish in areas where dust and/or mist is being generated.
- B. Climatic Conditions: Coating shall not be applied if:

1. The ambient temperature or temperature of the surface to be coated is below 50 degrees F or below the temperature recommended by the coating manufacturer.
2. The surface temperature is less than 5 degrees F above the dew point.
3. The relative humidity is above 85 percent.
4. The relative humidity is such that the coating will not dry properly in accordance with the manufacturer's instructions.

C. Protection:

1. Protect with drop cloths, masking or other acceptable means all surfaces which could be damaged in function or appearance by coating, including surfaces not being coated concurrently and surfaces not to be coated.
2. Hardware, accessories, fixtures and similar items shall be removed and replaced after completion of coating.
3. Spray coating will not be permitted when it will cause damage to adjacent or otherwise located surfaces.
4. All coating splatters on glass shall be wiped off immediately.

PART 2 - PRODUCTS

2.01 COATING SYSTEMS

All coating system products used shall be the of the highest quality, industrial grade products of the manufacturer.

A. System A - Submerged Ferrous Metal (Potable Water):

1. Surface Preparation: SSPC-SP 10 Near White Blast Cleaning.
2. Prime Coat: Apply one (1) coat of a two-component, NSF 61 certified, zinc-rich urethane primer.
3. Intermediate Coat: Apply one (1) coat of a two-component, NSF 61 certified epoxy, approved for the appropriate tankage size.
4. Finish Coat: Apply one (1) coat of a two-component, NSF 61 certified epoxy, approved for the appropriate tankage size.

B. System E - Buried Ferrous Metal

1. Surface Preparation: SSPC-SP 10 Near White Blast Cleaning.
2. Prime Coat: Apply one (1) coat of a two-component, chemical resistant epoxy or one (1) coat of two-component coal tar epoxy.
3. Finish Coat: Apply one (1) coat of a two-component coal tar epoxy.

2.02 COLORS

- A. The manufacturer shall be able to furnish all coats for exposed surfaces in a wide range of colors and lighter and darker shades of these colors from which the Engineer may select the colors required on the various surfaces, if not included in the following codes:

1. Safety Color Codes: Comply with Occupational Safety and Health Administration Standards, as applicable, regarding safety color codes.
2. Piping Color Codes: Colors for process pipe coding shall be in accordance with the latest edition of Recommended Standards for Water Works and/or Recommended Standards for Wastewater Facilities, or as selected by the Engineer. Pumps, meters, valves, etc., shall be coated the same color as the line in which they are a part.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine surfaces scheduled to receive coating for conditions that will adversely affect application, permanence or quality of work and which cannot be put into an acceptable condition through surface preparation.
- B. Do not proceed with surface preparation or coating application until conditions are suitable.
- C. If surfaces are not thoroughly dry or if they cannot be put in proper condition to receive coating by customary cleaning methods, the coating applicators shall notify the Contractor in writing, requesting necessary corrections.
- D. Review the specified or approved painting and coating systems and bring any questions or doubts as to the proper performance in writing to the Engineer at least fifteen (15) calendar days prior to commencing work. Otherwise, the Contractor shall assume the responsibility for providing the desired results.

3.02 ACCEPTANCE OF SURFACES

The commencement of coating work in any area or space will be construed as acceptance of the surface as being satisfactory.

3.03 PREPARATION AND APPLICATION

Preparation and application shall be in accordance with the requirements of Article 2.01, Coating Systems.

3.04 CONTRACTOR'S FIELD QUALITY CONTROL

- A. Required Inspections and Documentation:
 1. Verify coatings and other materials are as specified.
 2. Verify that environmental conditions are as required by the specifications or coating system manufacturer, whichever is more restrictive.
 3. Verify surface preparation prior to coating application.
 4. Verify dry film thickness (DFT) of each coat and total DFT of each coating system are as specified using dry film gauges. DFT shall be measured in accordance with SSPC-PA2.

5. Check coatings for film characteristics or defects that would adversely affect performance of appearance of coating systems.
 - a. Inspect for holidays on steel immersion surfaces using a holiday detector in accordance with NACE RP0188.
6. Reports:
 - a. Submit written reports describing inspections made and actions taken to correct non-conforming work.
 - b. Describe non-conforming work not corrected.
 - c. Submit copies of reports to Engineer.

3.04 FINAL INSPECTION

- A. Protect all coated surfaces against damage until the date of final acceptance of the Work.
- B. The Engineer will conduct a final inspection of all coating work and the Contractor will be required to recoat or retouch any areas or surfaces found deficient in complying with these Specifications.

3.05 PIPING IDENTIFICATION

- A. All visible piping 3/4-inch and greater which is accessible for maintenance and operations shall be color coded and identified with appropriate stenciling or semi-rigid identification markers equivalent to SETMARK Pipe Markers as manufactured by Seton Name Plate Corporation, New Haven, CT; T&B/Westline, Los Angeles, CA. Direction of flow arrows are to be included with each identification mark unless otherwise specified.
- B. Each marker background is to be appropriately color coded and have a clearly printed legend to identify the contents of the pipe in conformance with ANSI 13.1.
- C. Locations for pipe markers to be as follows:
 1. Adjacent to each valve and fitting (except as plumbing fixtures and equipment)
 2. At each branch and riser take-off.
 3. At each pipe passage through wall, floor and ceiling construction.
 4. At each pipe passage to underground.
 5. On all horizontal pipe runs, marked every 10 feet.

3.06 STENCILING

- A. For visible piping not receiving a semi-rigid identification marker, the Contractor shall supply all materials and labor necessary for stenciling of legends and pipes. The legend shall show the name of the contents of the pipe. Review by the Engineer of the legends will be required. Names shall be "plainly visible". Arrows showing the direction of flow shall also be stenciled on pipes. "Stick-on" labels are not acceptable.

END OF SECTION 09800

Divisions 10 through 16 - Not Used

