CONTRACT DOCUMENTS AND
SPECIFICATIONS FOR THE

Village of Cimarron Water System Improvements

The Village of Cimarron, New Mexico

The Village of Cimarron
356B East 9th Street
P.O. Box 654
Cimarron, New Mexico 87714

Telephone: (505) 376-2232
Fax: (505) 376-2810

Address all communications
regarding this project to:

Contract
Documents
Copy

Nolte Associates Inc., Dale J. Ekberg, P.E. No. 13854
1975 Research Parkway
Suite 165
Colorado Springs, Colorado 80920
719-268-8500
719-268-9200 (fax)
dale.ekberg@nolte.com

All questions and/or inquires to be
submitted in writing.

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Contractor shall obtain the most recent version of the following specifications from New Mexico Standard Specifications for Public Works Construction.

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_____

For and on behalf of Nolte Associates, Inc. Dale J. Ekberg, P.E. No. 13854

SECTION 00020

NOTICE INVITING BIDS

Notice is hereby given that sealed proposals will be received at the Village of Cimarron Main Office until 2:00 p.m. July 1, 2008 for construction of certain public works maintenance designated as:

Village of Cimarron Water System Improvements

Bids will be publicly opened, examined, and read aloud at 2 p.m., July 1, 2008 in the Village of Cimarron main office located at: 356B East 9th Street, Cimarron, NM 87714.

Bids are required for the entire work described herein:

The work consists of furnishing all labor, materials, and equipment required for the installation of approximately 11,600 linear feet of 6-inch and 10-inch PVC potable water transmission line, including all necessary fittings, valves, connections to existing services, and all other work required to make the water transmission line replacement fully functional. The work also includes the installation of a valve vault with 6" DIP, valves, actuators, and miscellaneous equipment as well as radio transmitters and other electrical and control devices used to automate the opening and closing of the valves based on water levels detected in two water storage tanks.

All of said work is to be done at the places and in the particular locations, of the form, sizes and dimensions, of the materials, to the lines and grades, and at the elevations as directed by the engineer and in the plans and specifications.

To demonstrate qualifications to perform the Work, each Bidder must submit with the Bid a written statement of qualifications described in Specification Section 00100 and Section 00200.

Each Bid must conform and be responsive to the invitation, the plans and specifications, and all documents comprising the pertinent contract documents. Copies of the contract documents will be on file and opened to public inspection at: Nolte Associates, Inc. and the Village of Cimarron.

Copies of the contract documents may be obtained by sending a check or money order payable to "Nolte Associates, Inc." in the amount of $150 (non-refundable) to:

Nolte Associates, Inc.
1975 Research Parkway
Suite 165
Colorado Springs, CO 80920

Attention: Mr. Dale J. Ekberg, P.E.

Requests should include: company name, contact person, telephone number, FedEx/UPS and postal addresses.

The Village of Cimarron hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be

discriminated against on the grounds of race, color, sex or national origin in consideration of an award.

Each bid must be accompanied by cash, certified or cashier's check or bidder's bond made payable to the Village of Cimarron, for an amount equal to at least 10% of the amount of the bid, such guaranty to be forfeited should the bidder to whom the contract is awarded fail to enter into the contract. The successful bidder shall furnish a payment bond and a performance bond.

The contractor to whom the contract is awarded shall maintain compensation insurance for employees engaged in the work, complying with the workmen's compensation laws of the State of New Mexico. He shall also maintain liability and builders risk insurance protecting him as well as the Village of Cimarron from claims because of bodily injury (including death), property damage, and any other direct physical losses, arising during this contract.

The Village of Cimarron reserves the right to reject any or all bids, and to determine which proposal is, in its judgement the lowest responsive bid of a responsible bidder and which proposal should be accepted in the best interest of the Village of Cimarron. The Village of Cimarron also reserves the right to waive any informalities in any proposal or bid.

Proposals received after the time announced for the opening will not be considered. No bidder may alter his prices or withdraw his bid after the time announced for the opening or before the award and execution of the contract, unless the award is delayed for a period exceeding ninety (90) days after the time of opening proposals.

By order of the: Village of Cimarron

Date: June 3, 2008

Signed:_____

Published: June 3, 2008; June 10, 2008; June 17, 2008 in:

The Albuquerque Journal, Albuquerque, New Mexico
Daily Journal, Denver, Colorado
Dodge Reports

SECTION 00100

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS

Terms used in these Instructions to Bidders, which are defined in the Standard General Conditions of the Construction Contract (No. 1910-8, 1990 ed.), have the meanings assigned to them in the General Conditions. Other terms used in the Bidding Documents and not defined elsewhere have the following meanings that are applicable to both the singular and plural thereof.

1.1. Bidder. One who submits a Bid directly to OWNER, as distinct from a sub-bidder, who submits a bid to a Bidder.

1.2. Issuing Office. The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

1.3. Successful Bidder. The lowest, qualified, responsible, and responsive Bidder to whom OWNER (on the basis of OWNER'S evaluation as hereinafter provided) makes an award.

1.4 Days. Calendar Days

2. COPIES OF BIDDING DOCUMENTS

2.1. Complete sets of bidding Documents may be obtained as stated in the Invitation to Bid. No partial sets will be issued. The Bidding Documents may be examined at the locations identified in the Invitation to Bid.

2.2. Complete sets of Bidding Documents shall be used in preparing Bids; neither OWNER nor ENGINEER assume any responsibility for errors for 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. QUALIFICATION OF BIDDERS

3.1. To demonstrate qualifications to perform the Work, each Bidder must submit with the Bid a written statement of qualifications including financial data, a summary of previous experience, present commitments, and other such data as may be called for below (or in Supplementary Conditions). 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. The Statement of Qualifications shall be prepared on the form provided by the ENGINEER.

3.2. In determining the Bidder's qualifications, the following factor s will be considered.

3.2.1. Work previously completed by the Bidder and whether the Bidder (a) maintains a permanent place of business, (b) has adequate plant and equipment to do the Work properly and expeditiously, (c) has the financial resources to meet all obligations incident to the Work, and (d) has appropriate technical experience.

3.3. Each Bidder may be required to show that he has handled former work so that no just claims are pending against such work. No Bid will be accepted from a Bidder who is engaged on any other work, which would impair his ability to perform or finance this Work.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

4.1. It is the responsibility of each Bidder, before submitting a Bid, to:

4.1.1. Examine thoroughly the Contract Documents and other related data identified in the Bidding Documents (including "technical data" referred to below).

4.1.2. Visit the site to become familiar with and satisfy Bidder as to the general, local, and site conditions that may in any manner affect cost, progress, performance, or furnishing of the Work.

4.1.3. Consider federal, state, and local laws, ordinances, rules, and regulations that may affect cost, progress, performance, or furnishing of the Work.

4.1.4. Study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data.

4.1.5. Promptly notify ENGINEER of all conflicts, errors, ambiguities, or discrepancies which Bidder has discovered in or between the Contract Documents and such other related 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 the completeness thereof for the purposes of bidding or construction.

4.2.3. Copies of such reports and drawing will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.2 of the General Conditions has been established in Paragraph SC-4.2 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion drawn from any "technical data" or any such data, interpretations, opinions, or information.

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 of 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, other physical conditions, and possible changes in the Contract Documents due to differing conditions appear in Paragraph 4.2 and 4.3 of the General Conditions.

4.5. Before submitting a Bid, each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning 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 or which relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or 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, OWNER will provide each Bidder access to the site to conduct such examinations, investigations, explorations, tests, and studies as each Bidder deems necessary for submission of a Bid. Bidder must fill all holes and clean up and restore the site to its former conditions upon completion of such explorations, investigations, tests, and studies.

4.7. 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 applying the specific means, methods, techniques, sequences, or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Contract Documents; and the written resolutions thereof by ENGINEER are acceptable to Bidder and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.8. The provisions of paragraphs 4.1 through 4.7 above (inclusive) do not apply to asbestos, polychlorinated biphenyls (PCB's), petroleum, hazardous waste, or radioactive material covered by Paragraph 4.5 of the General Conditions.

5. AVAILABILITY OF LANDS FOR WORK, ETC.

5.1. 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 the 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 obtained and paid for by CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Contract Documents.

6. INTERPRETATIONS AND ADDENDA

6.1. All questions about the meaning or intent of the Bidding Documents are to be directed to ENGINEER. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda. Questions received less than **six (6)** days prior to the date for opening of the 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.

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

6.3. Addenda will be mailed or delivered to all parties recorded by ENGINEER as having received the Bidding Documents. No Addenda will be issued later than **four (4)** days prior to the date for receipt of Bids except an Addendum, if necessary, postponing the date for receipt of Bids or withdrawing the request for Bids.

7. BID SECURITY

7.1. The amount of Bid Security is stated in the Invitation to Bid. The required security must be in the form of a certified or bank cashier's check made payable to OWNER or a Bid Bond on the form enclosed herewith. The Bid Bond must be executed by a surety meeting the requirements set forth in the General Conditions for surety bonds.

7.2. The Bid Security of the Successful Bidder will be retained until such Bidder has executed the Agreement, furnished the required contract security, and met the other conditions of the Notice of Award, 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 (15) days of 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 earlier of the seventh (7^{th}) day after the Effective Date of the Agreement or the thirty-sixth (36^{th}) day after the Bid opening, whereupon the Bid Security furnished by such Bidders will be returned. Bid Security with Bids which are not competitive will be returned with **seven (7)** days after the Bid opening.

8. CONTRACT TIMES

8.1. The number of days within which, or the date by which, the Work is to be substantially completed and also completed and ready for final payment (the term "Contract Times" is defined in paragraph 1.12 of the General Conditions) are set forth in the Agreement.

9. LIQUIDATED DAMAGES

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

10. SUBSTITUTE AND "OR EQUAL" ITEMS

10.1. The Contract, if awarded, will be on the basis of material and equipment described on the Drawings or specified in the Specifications without consideration of possible substitute or "or equal" items. Whenever it is indicated on the Drawings or specified in the Specifications that a substitute or "or equal" item of material or equipment may be

furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the effective date of the Agreement. The procedure for submittal of any such application by CONTRACTOR and consideration by ENGINEER is set forth in paragraphs 6.7.1, 6.7.2, and 6.7.3 of the General Conditions which may be supplemented in the General Requirements.

10.2. Federal Register 40 CFR – Part 33, paragraph 33.255 – "Specifications" states that the recipient "need not establish the existence of any source other than the names brand." Hence, the existence of "an equal" is not the burden of the OWNER or the ENGINEER. The OWNER, through the ENGINEER, has the authority to decide what products are equal to those specified as determined in Whitten vs. Paddock as upheld by the Supreme Court.

11. SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.1. The apparent low bidder, and any other Bidder so requested, will within **five (5)** days after the date of the Bid opening submit to OWNER a list of principal subcontractors, suppliers, and other persons and organizations he proposes to use in the Work. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification for each such subcontractor, person, and organization if requested by OWNER.

11.2. Particular consideration will be given to the qualifications of each subcontractor proposed to perform more than five percent (5%) of the Work.

11.3. The list of subcontractors shall also include the suppliers and manufacturers of principal items of materials and equipment the Bidder expects to use in the Work unless such suppliers or manufacturers are named in the Bid Form.

11.4. If OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed subcontractor, either may, before the Notice of Award is given, request the apparent Bidder to submit an acceptable substitute without an increase in Bid price. If the 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. Those 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.

11.5. CONTRACTOR will not be required to employ any subcontractor against whom he has reasonable objection. The use of subcontractors listed by the Bidder and accepted by OWNER prior to the Notice of Award will be required in the performance of the Work.

12. BID FORM

12.1. All blanks on the Bid Form must be completed in ink or typed.

12.2. Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign), and the

corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the corporate name.

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

12.4. Bids by joint ventures shall be signed by each participant in the joint venture or by an authorized agent of each participant. The full name of each person or company interested in the Bid shall be listed on the Bid Form.

12.5. All names must be typed or printed in ink below the signature.

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

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

12.8. Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided in accordance with Paragraph 3 above. A state CONTRACTOR'S license number, if any, must also be shown.

12.9. No alterations in Bids or in the printed forms therefore, by erasures, interpolations, or otherwise will be acceptable unless each such alteration is signed or initialed by the Bidder. If initialed, OWNER may require the Bidder to identify any alteration so initialed.

12.10. The Bid price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances named in the Contract Documents as provided in THE PROVISIONS

13. SUBMISSION OF BIDS

13.1. 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, if applicable, the designated portion of the Project for which the Bid is submitted) 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.

13.2. Bids shall be deposited at the designated location prior to the time and date for receipt of Bids indicated in the Invitation to Bid, or any extension thereof made by Addendum. Bids received after the time and date for receipt of Bids will be returned unopened. Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

13.3. Oral, telephonic, or telegraphic Bids are invalid and will not receive consideration.

13.4. No Bidder may submit more than one (1) Bid. Multiple Bids under different names will not be accepted from one (1) firm or association.

14. MODIFICATION AND WITHDRAWAL OF BIDS

14.1. Bids may be modified or withdrawn by an appropriate document duly executed (in a 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.

14.2. Bids may also be modified or withdrawn in Person by the Bidder or an authorized representative provided he can prove his identity and authority.

14.3. Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

14.4. If, within twenty-four (24) hours after Bids are opened, any Bidder files a duly-signed, written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid; and the Bid Security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

15. OPENING OF BIDS

15.1. Bids will be opened and (unless obviously non-responsive) read aloud publicly as indicated in the Invitation to Bid. An abstract of the amounts of the base Bids and major alternates (if any) will be made available after the opening of Bids.

16. BIDS TO REMAIN OPEN SUBJECT TO ACCEPTANCE

16.1. All Bids shall remain subject to acceptance for **thirty-five (35)** days after the day of the Bid opening; but OWNER may, in his sole discretion, release a Bid and return the Bid Security prior to that date.

17. AWARD OF CONTRACT

17.1. OWNER reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Bids and to reject the Bid of any Bidder if OWNER believes that it would not be in the best interest of the Project to made 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. OWNER also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful bidder. 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.

17.2. 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.

17.3. 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. 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.

17.4. 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 the Bidder's proposed subcontractors and other persons and organizations to do the Work in accordance with the Contract Documents to OWNER'S satisfaction within the prescribed time.

17.5. 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 interest of the Project.

17.6. If the contract is to be awarded, OWNER will give the Successful Bidder a Notice of Award within the number of days specified above during which the Bids are to remain open.

18. CONTRACT SECURITY

18.1. Paragraph 5.1 of the General Conditions and the Supplementary Conditions set forth OWNER'S requirements as to Construction Performance and Construction Payment Bonds. When the Successful Bidder delivers the executed Agreement to OWNER, it shall be accompanied by the required Construction Performance and Construction Payment Bonds.

19. SIGNING OF AGREEMENT

19.1. 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 (15)** 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 (10)** days thereafter, OWNER shall deliver one (1) fully-signed counterpart to CONTRACTOR. Each counterpart is to be accompanied by a complete set of the Drawings with appropriate identification.

20. SALES AND USE TAXES

20.1. OWNER is exempt from New Mexico State Sales and Use Taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Contract Price.

21. RETAINAGE

21.1. Provisions concerning retainage and CONTRACTOR'S rights to deposit securities in lieu of retainage are set forth in the Agreement.

22. SPECIAL LEGAL REQUIREMENTS

22.1. OWNER'S Finances. Owner has made adequate financial arrangements for the completion of all Work required by the Contract Documents and welcomes inquiries from prospective Bidders on the prime contract. OWNER will make a preliminary determination of the inquiring firm's qualifications; and if satisfied that the prospective Bidder may prove to be an acceptable prime CONTRACTOR, OWNER will furnish appropriate financial information to him.

SECTION 00200

PROPOSAL
VILLAGE OF CIMARRON WATER SYSTEM IMPROVEMENTS

BID FORM

Proposal of _____

(herein after called "BIDDER"), organized and existing under the laws of the State of _____New Mexico_____

doing business as _____ to the VILLAGE OF CIMARRON (hereinafter called "Owner").

BIDDER hereby proposes to perform all WORK for the construction of the "VILLAGE OF CIMARRON WATER SYSTEM IMPROVEMENTS," VILLAGE OF CIMARRON, CIMARRON, NEW MEXICO, in strict accordance with the CONTRACT DOCUMENTS, the time set forth therein, and at the prices stated on the BID SCHEDULE.

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

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete this project by the date specified in the Agreement.

BIDDER further agrees to pay as liquidated damages as specified in SECTION 00510 AGREEMENT, unless time extensions have been agreed to, as provided in SECTION 108.8 of the GENERAL CONDITIONS.

BIDDER acknowledges receipt of the following ADDENDUM:

_____

_____

_____

_____

*Insert "a corporation," "a partnership," "an individual," as applicable.

The Bidder may use the following breakdown of bid items in compiling his bid for the work proposed under this project, as herein specified and as shown on the drawings. This list may not be all-inclusive. It is the Contractor's responsibility to ensure that his bid amount includes all the components necessary to produce a complete and fully functioning project.

Owner reserves the right to award bid in any combination of schedules listed on bid forms to one or more contractors.

BID FORM

Schedule A - Water Transmission Line STA 9+55 to 79+05

ITEM NO.	ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
1	Mobilization	LS	1		
2	Site Prep	LS	1		
3	Pipe, 6" PVC	LF	6,988		
4	6"x6"x6" Tee	EA	8		
5	6" 90 Deg. Bend	EA	4		
6	6" 45 Deg. Bend	EA	1		
7	6" 22.5 Deg. Bend	EA	4		
8	6" 11.25 Deg. Bend	EA	3		
9	6" Blind Flange	EA	1		
10	6" Gate Valve	EA	21		
11	6" Air Release Valve and Vault	EA	2		
12	6" Blow Off Valve	EA	1		
13	6"x2" Reducer	EA	1		
14	Pipe, 2" Copper	LF	5		
15	1-1/2" Service Tapping Saddle with Corp Stop	EA	1		
16	Fire Hydrant Assembly	EA	2		
17	Salvage Fire Hydrant Assembly	EA	3		
18	Connect to Ex. 2"	EA	2		
19	Connect to Ex. 6"	EA	3		
20	Connect 3/4" Water Service (Avg. 35 LF/Connection)	LF	875		
21	Concrete Reverse Anchors	EA	12		
22	Asphalt Repair from Open Trenching	LS	1		

IF USING ENGINEER'S SUGGESTED QUANTITIES ABOVE:

SCHEDULE A

TOTAL BASE BID $ _____

TOTAL BASE BID (WORDS) _____

Schedule B - Water Transmission Line STA 91+85 to 106+17

ITEM NO.	ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
23	Mobilization	LS	1		
24	Site Prep	LS	1		
25	Pipe, 6" PVC	LF	717		
26	Bid Both Items (Items 27 & 28)				
27	Pipe, 6" PVC (Open Cut Alternative)	LF	715		
28	Pipe, 6" PVC (Directionally Drilled Alternative)	LF	715		
29	6" [illegible]	EA			
[illegible]	6" [illegible]	EA			
[illegible]	6" [illegible]	EA			
[illegible]	Gate Valve	[illegible]			
33	6" Air Release Valve and Vault	EA	1		
34	6" Blow Off Valve	EA	2		
35	6"x1.25" Reducer	EA	1		
36	Connect to Ex. Water Service	EA	1		
37	Connect to Ex. 6"	EA	1		
38	Connect 3/4" Water Service (Avg. 35 LF/Connection)	LF	315		
39	Concrete Reverse Anchors	EA	9		

IF USING ENGINEER'S SUGGESTED QUANTITIES ABOVE:

BID BOTH (SCHEDULE B.1 & B.2)

SCHEDULE B.1 - OPEN CUT ALTERNATIVE - USING LINE ITEM #27

TOTAL BASE BID $ _____

TOTAL BASE BID (WORDS) _____

SCHEDULE B.2 - DIRECTIONALLY DRILLED ALTERNATIVE - USING LINE ITEM #28

TOTAL BASE BID $ _____

TOTAL BASE BID (WORDS) _____

Schedule C - 10" Water Transmission Line STA 106+19 to 116+60

ITEM NO.	ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
40	Mobilization	LS	1		
41	Site Prep	LS	1		
42	Pipe, 10" PVC	LF	1,041		
43	10"x6" Cross	EA	2		
44	10"x6" Tee	EA	1		
45	10" Gate Valve	EA	2		
46	10" x 45 Degree Bend	EA	2		
47	10" x 22.5 Degree Bend	EA	2		
48	10" Blow Off Valve	EA	1		
49	Fire Hydrant Assembly	EA	2		
50	Connect to Ex. 6"	EA	3		
51	Connect to Ex. 10"	EA	2		
52	Connect 3/4" Water Service (Avg. 35 LF/Connection)	LF	70		
53	Concrete Reverse Anchors	EA	5		
54	Asphalt Repair from Open Trenching	LS	1		

IF USING ENGINEER'S SUGGESTED QUANTITIES ABOVE:

SCHEDULE C

TOTAL BASE BID $ _____

TOTAL BASE BID (WORDS) _____

Schedule D - Electromagnetic Meter Vault

ITEM NO.	ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
55	Mobilization	LS	1		
56	Site Prep	LS	1		
57	Electromagnetic Meter Assembly	LS	1		

IF USING ENGINEER'S SUGGESTED QUANTITIES ABOVE:

SCHEDULE D

TOTAL BASE BID $ _____

TOTAL BASE BID (WORDS) _____

Schedule E - Raw Water Automation

ITEM NO.	ITEM DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
58	Mobilization	LS	1		
59	Site Prep	LS	1		
60	Concrete Vault	LS	1		
61	3'x3' Hatch	EA	1		
62	Concrete Block for Tee	EA	1		
63	Pipe, 6" Ductile Iron	LF	15		
64	6" Tee, DIP	EA	1		
65	6" 90 Deg. Bend DIP	EA	3		
66	6" Flanged Coupling Adaptor	EA	3		
67	6" Link-Seal	EA	4		
68	6" Butterfly Valve with Pneumatic Actuator	EA	2		
69	6" Check Valve	EA	1		
70	6" Gate Valve	EA	1		
71	Pipe, 2" HDPE	LF	100		
72	2" [illegible]	EA			
73	2" [illegible]	EA			
74	2" [illegible]	EA			
75	2" Saddle				
76	2" Curb Stop and Valve Riser	EA	1		
77	1/4 HP Sump Pump in Pit	LS	1		
78	Electrical Items	LS	1		
79	Mechanical Items	LS	1		
80	Pipe, 6" C900 PVC	LF	65		
81	6" 90 Deg. Bend PVC	EA	5		
82	6" Tee, PVC	EA	1		
83	6" DIP to PVC Transition Couplings	EA	3		
84	6" Guard Post	EA	4		

IF USING ENGINEER'S SUGGESTED QUANTITIES ABOVE:

SCHEDULE E

TOTAL BASE BID $ _____

TOTAL BASE BID (WORDS) _____

TOTAL COMBINED BID AMOUNT, IF AWARDED COMBINATION OF SCHEDULES

LIST SCHEDULES:_____

SCHEDULES (PLEASE LIST _____)

TOTAL COMBINED BID $

TOTAL COMBINED BID (WORDS)

_____

_____

RESPECTIVELY SUBMITTED:

BY:_____ ADDRESS:_____
(SIGNATURE)

TITLE:_____ DATE:_____

(SEAL IF BID IS SUBMITTED BY A CORPORATION)

ATTEST:_____

Note: The Village of Cimarron reserves the right to award bid in any combination of Schedules listed on bid forms to one or more contractors.
If one Contractor is awarded any combination of Schedules, the contractor shall receive compensation for only one mobilization.

BID BOND (TO ACCOMPANY PROPOSAL)

KNOW ALL MEN BY THESE PRESENTS,

THAT WE, the undersigned _____ as Principal, and _____ as Surety, are hereby held and firmly bound unto the VILLAGE OF CIMARRON, as Owner, in the sum of $_____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors, and assigns.

THE CONDITION of this obligation is such that whereas the Principal has submitted to the VILLAGE OF CIMARRON the accompanying BID and hereby made a part hereof to enter into a Construction Agreement for the construction VILLAGE OF CIMARRON WATER SYSTEM IMPROVEMENTS.

NOW THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a Contract in the form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said Contract, and for payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void; otherwise the same shall remain in force and effect, it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

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

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals this ___ day of _____, 20____, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

PRINCIPAL	**SURETY**
Name:_____	Name:_____
Address:_____	Address:_____
_____	_____
_____	_____
By:_____	By:_____
Title:_____	Title:_____
ATTEST:	ATTEST:
By:_____	By:_____
(SEAL)	(SEAL)

NOTE: Surety Companies executing bonds must be authorized to transact business in the State of New Mexico, and be accepted by the Owner.

END OF BID BOND

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the date given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information they desire.

1. Name of Bidder:_____

2. Permanent main office address:_____

_____

3. When organized:_____

4. If a corporation, where incorporated:_____

5. How many years have you been engaged in the contracting business under your present firm or trade name?_____

6. Contracts on hand: (Schedule these, showing amount of each contract and the anticipated dates of completion.) List the location and type of construction, name of your superintendent on the project, Owner and the Engineer with their telephone numbers where each may be contacted.

_____

_____

_____

_____

_____

_____

_____

_____

_____

7. General character/type of work performed by your company:

_____

_____

8. Have you ever failed to complete any work awarded to you?_____

_____

_____

9. Have you ever defaulted on a contract?_____

If so, where and why?_____

_____

Have you ever had any project terminated by the Owner?_____

If so, where and why?_____

10. List the more important projects recently completed by your company, stating the approximate cost of each, the month and year completed, location and type of construction, name of superintendent on the project, owner and engineer for each project with the telephone numbers where each may be contacted. Do not list projects that are listed under 6 above.

_____

_____

_____

_____

_____

_____

_____

_____

11. List your major equipment available for this contract.

_____

_____

_____

_____

12. Experience in construction work similar in scope to this project. For projects completed in the last five years, list the same information as is requested for item 10 above.

_____

_____

_____

_____

13. Background and experience of the principal members of your organization, including officers.

_____

_____

_____

_____

14. Credit available. $_____

15. Bank reference. List the Bank name, Contact person, and telephone number:

_____

_____

16. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Owner? _____

17. Are you licensed as an excavator, pipeline constructor or any other title? If yes, in what city, county, or state?

_____

18. Do you anticipate subcontracting work under this contract? _____
If yes, what percent of the total contract price? _____

List the type of work subcontracted, the names and addresses of the subcontractors to be used, and the amount to be subcontracted to each subcontractor

_____

_____

_____

_____

_____

_____

19. Are you involved in any lawsuits or are any lawsuits pending at the present time? _____

If yes, give details _____

_____

_____

20. What are the limits of your public liability? _____

21. What are your company's bonding limitations? _____

22. Name of the proposed Superintendent for this project. Said person shall be required on the project unless agreed upon otherwise in writing by Owner._____

The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information requested by the Owner in verification of the recital comprising this Statement of Bidder's Qualifications. The undersigned further agrees that they will not bring suit in a court of law for any information that is furnished to Owner in good faith by said parties or persons responding to Owner's requests for information concerning Bidder's qualifications.

Dated this _____ day of _____, 20_____

_____
Name of Bidder

By:_____

Title:_____

State of _____

County of _____

_____ being duly sworn deposes and says the he or she

is _____ of _____
(Name of organization)

and that the answers to the foregoing questions and all statements therein contained are true and correct.

Subscribed and sworn to before me this _____ day of _____, 20_____.

_____
(Notary Public)

My commission expires _____.

SECTION 00500

NOTICE OF AWARD

Dated: _____

TO: _____

Project: **Village of Cimarron Water System Improvements**

ENGINEER'S Project No.: CSB070000

OWNER: **The Village of Cimarron**

You are hereby notified that your Bid dated _____, 2008 for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a contract for construction of the

Village of Cimarron Water System Improvements

The Contract Price of your contract is _____ Dollars ($ _____).

Three (3) copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award. Three (3) sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within fifteen (15) days of the date of this Notice of Award, that is by _____, 2008.

1. You must deliver to the OWNER three (3) fully-executed counterparts of the Agreement, including all the Contract Documents. This includes the sets of Drawings. Each of the Contract Documents must bear your signature on the cover of the page.

2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Instructions to Bidders, General Conditions (paragraph 5.1), and Supplementary Conditions.

Failure to comply with these conditions within the time specified will entitle OWNER to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited.

Within ten (10) days after you comply with those conditions, OWNER will return to you one (1) fully-signed counterpart of the Agreement with the Contract Documents attached.

OWNER: _____

By: _____

CONTRACT DOCUMENTS

SECTION 00510

AGREEMENT

STATE OF _____)
)ss.
COUNTY OF_____)

THIS AGREEMENT AND FORMAL CONTRACT, made and entered into this ____ day of _____, 20___, by and between **VILLAGE OF CIMARRON**, party of the first part, hereinafter called the "OWNER", and _____, a _____, (Individual, Partnership, or Corporation) of the City of _____, County of _____, State of _____, hereinafter called the "CONTRACTOR", party of the second part,

WITNESSETH, that whereas the OWNER intends to construct **VILLAGE OF CIMARRON WATER SYSTEM IMPROVEMENTS** hereinafter called the Work, in accordance with the Drawings, Specifications, and other Contract Documents prepared by **NOLTE ASSOCIATES, INC**. entitled **VILLAGE OF CIMARRON WATER SYSTEM IMPROVEMENTS** and dated _____.

NOW, THEREFORE, the OWNER and CONTRACTOR for the considerations hereinafter set forth, agree as follows:

1. The CONTRACTOR agrees to furnish all the necessary labor, materials, equipment, tools and services necessary to perform and complete in a workmanlike manner all work required for the construction of the Work, in strict compliance with the Contract Documents herein mentioned, which are hereby made a part of the Agreement, including the following Addenda:

Addendum No.	Date
_____	_____
_____	_____
_____	_____

   a) Contract Time: The CONTRACTOR agrees to commence work under this Contract in accordance with the written Notice to Proceed, and to finally complete the Work as defined in Section 01015 Contract Time.

   b) Sub-Contractors: The CONTRACTOR agrees to bind every sub-contractor by the terms of the Contract Documents. The Contract Documents shall not be construed as creating any contractual relation between the Sub-Contractor and the OWNER.

2. The Owner agrees to pay, and the CONTRACTOR agrees to accept, in full payment for the performance completed of this Agreement, and in accordance with Section 00200 of the Contract Documents, the Contract Amount of: _____ dollars ($_____), plus any and all sums to be added and/or deducted resulting from all extra and/or omitted work in connection therewith, as

authorized under the terms as stated in the General and Supplementary Conditions, all in accordance with the terms as stated in the Contract Documents.

a) Progress Payments will be made in accordance with the General and Supplementary Conditions of the Contract Documents.

b) Progress Payments will be in the amount equal to ninety percent (90%) of the calculated value of the Work completed until fifty percent (50%) of the work required by the Contract Documents has been completed. At such time, OWNER shall have retained funds to ten percent (10%) of the total Contract Amount. The amount retained as provided above will be withheld by the OWNER until completion of the Agreement to ensure faithful completion of the Work under the terms of the Contract Documents.

c) Upon completion and final acceptance of the Work in accordance with the Contract Documents, OWNER shall pay the remainder of the Contract Amount after publication by the OWNER in accordance with New Mexico statutory requirements.

3. Contract Documents

It is hereby mutually agreed that the following list of instruments, plans, specifications, and documents which are attached hereto, bound herewith or incorporated herein by reference shall constitute the Contract Documents, all of which are made a part hereof, and collectively evidenced and constitute the Agreement between the parties hereto, and they are fully a part of the Agreement as if they were set out verbatim and in full herein, and are designated as follows:

a) Instructions to Bidders
b) Bid Proposal
c) Bid Bond
d) Notice of Award
e) Agreement
f) Performance and Payment Bonds
g) Certificates of Insurance, Policy Endorsement
h) Notice to Proceed
i) General Conditions
j) Supplementary Conditions
k) Technical Specifications
l) Drawings
m) Addenda
n) Supplemental Technical Specifications

4. Liquidated Damages

OWNER and CONTRACTOR recognize that time is of the essence in this Agreement and that the OWNER will suffer financial loss if the Work is not complete within the time specified in paragraph 1.a) above, plus any extensions thereof allowed in accordance with the General Conditions. They also recognize the delays, expense and difficulties involved in proving, in a legal proceeding, the actual loss suffered by OWNER if the Work is not complete 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 **$1,000.00** for each calendar day that expires after the time specified in paragraph 1.a) (except as modified by agreement) for substantial completion and **$500.00** for each calendar day that expires after the time specified in paragraph 1.a) (except as modified by agreement) for final completion until the Work is complete.

5. Contractor Representations

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

a) CONTRACTOR has familiarized himself with the nature and extent of the Contract Documents, Work, locality, and with all local conditions and federal, state, and local laws, ordinances, rules and regulation that in any manner may affect cost, progress or performance of the Work.

b) CONTRACTOR has studied carefully the Contract Documents and all other items otherwise affecting cost, progress or performance of the Work which were relied upon by the Engineer in the preparation of the Contract Drawings and Specifications and which have been identified in the Supplementary Conditions as a part of the Contract Documents.

c) CONTRACTOR has made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to in paragraph 5.b) as he deems necessary for the performance of the Work at the Contract Amount, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are or will be required by CONTRACTOR for such purposes.

d) CONTRACTOR has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

e) 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.

6. Miscellaneous

a) Terms used in this Formal Contract which are defined in Article 1 of the General Conditions shall have the meanings indicated in the General Conditions.

b) 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.

c) OWNER and CONTRACTOR each binds himself, his partners, successors, assigns, and legal representatives to the other party hereto, his partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

d) No mechanic, contractor, sub-contractor, materialman or other person can or will contract for or in any manner have or acquire any lien upon the Work covered by this Agreement, or the land upon which the same is situated.

SIGNATURES:

OWNER:_____ DATE:_____

BY:_____ TITLE:_____

ATTEST:_____ TITLE:_____

Address for giving notices:

_____

_____

_____

_____

CONTRACTOR: _____ DATE:_____

BY: _____ TITLE:_____

ATTEST:_____ TITLE:_____

Address for giving notices:

_____

_____

_____

_____

END OF SECTION

SECTION 00610

PERFORMANCE BOND

Bond No. _____

KNOW ALL MEN BY THESE PRESENTS: that

(Firm)_____

(Address)_____

_____ (a Corporation), hereinafter referred to as "the Principal", and

(Firm)_____

(Address)_____

hereinafter referred to as "the Surety", are held and firmly bound unto _____

a Municipal Corporation hereinafter referred to as "the Owner", in the penal sum of _____

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

THE CONDITIONS OF THIS OBLIGATION are such that whereas the Principal entered into a certain Agreement

with the Owner, dated the _____ day of_____, 20_____, a copy of which is hereto attached and made a

part hereof for the performance of the Work, _____

_____

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

PROVIDED, FURTHER, that the said Surety, for value received, herby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the Work to be performed thereunder of the Contract Documents accompanying the same shall in any way affect its obligation on this bond; and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the Work or to the Contract Documents.

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

IN WITNESS WHEREOF, this instrument is executed in five (5) counterparts, each one of which shall be deemed

an original, this _____ day of_____, 20_____.

PRINCIPAL

ATTEST: Principal: _____

By: _____ By: _____

Title: _____ Title: _____

_____

_____

(Corporate Seal)

SURETY

Surety: _____

By: _____ By: _____

_____ Title: _____

_____

_____

(Address)

(Surety Seal)

NOTE: Date of Bond must not be prior to date of Agreement.

IMPORTANT: Surety Company must be authorized to transact business in the State of New Mexico and be acceptable to the Owner.

SECTION 00615

PAYMENT BOND

Bond No. _____

KNOW ALL MEN BY THESE PRESENTS: that

(Firm)_____

(Address)_____

_____ (a Corporation), hereinafter referred to as "the Principal, and

(Firm)_____

(Address)_____

hereinafter referred to as "the Surety", are held and firmly bound unto _____

a Municipal Corporation, hereinafter referred to as "the Owner", in the penal sum of _____ _____ Dollars in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATIONS are such that whereas the Principal entered into a certain Agreement

with the Owner, dated the _____ day of_____, 20_____, a copy of which is hereto attached and

made a part hereof for the performance of the Work, _____

_____

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

PROVIDED, FURTHER, that the said Surety, for value received, herby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the Work to be performed thereunder or the Contract Documents accompanying the same shall in any way affect its obligation on this Bond; and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the Work or to the Contract Documents.

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

IN WITNESS WHEREOF, this instrument is executed in five (5) counterparts, each one of which shall be deemed

an original, this _____ day of _____, 20_____.

PRINCIPAL

ATTEST: Principal: _____

By: _____ By: _____

Title: _____ Title: _____

_____

_____

(Corporate Seal)

SURETY

Surety: _____

By: _____ By: _____

_____ Title: _____

_____

_____

(Address)

(Surety Seal)

NOTE: Date of Bond must not be prior to date of Agreement.

IMPORTANT: Surety Company must be authorized to transact business in the State of New Mexico and be acceptable to the Owner.

SECTION 00620

CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE: _____

TO:_____

DESCRIPTION OF WORK:_____

DATE OF AGREEMENT:_____

OWNER:_____

The Work performed under this Agreement has been reviewed by authorized representatives of the Owner, Contractor, and the Engineer and the Work (or specified part of the Work, as indicated above) is hereby declared to be substantially complete on the above stated date.

A tentative list of items to be completed or corrected is appended hereto. This list may not be fully inclusive, and the failure to include an item on it does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents.

ENGINEER: _____ DATE: _____

BY: _____ TITLE:_____

The Contractor accepts this Certificate of Substantial Completion and agrees to complete and correct the items on the tentative list within the time indicated.

CONTRACTOR: _____ DATE: _____

BY: _____ TITLE:_____

The Owner accepts the Work or specified parts of the Work as substantially complete and assumes full possession of the Work or specified part of the Work as of the date stated above. The responsibility for utilities, security, and insurance under the Contract Documents shall be as set forth under "Remarks" below.

OWNER: _____ DATE: _____

BY: _____ TITLE:_____

REMARKS: _____

_____

_____

SECTION 00625

CERTIFICATE OF FINAL ACCEPTANCE AND PAYMENT

DATE: _____

TO: _____

DESCRIPTION OF WORK: _____

DATE OF AGREEMENT: _____

OWNER: _____

You are hereby notified that, as of the above stated date, the Owner has accepted the Work.

A check is attached hereto in the amount of _____ ($) as final payment for all work done, subject to the terms of the Contract Documents.

In conformance with the Contract Documents for the Work, your obligations and warranty period will continue for the specified time from the date as set forth herein above, until _____ day of _____ , 20_____ per the Supplementary Conditions.

Sincerely,

OWNER: _____

BY: _____

TITLE: _____

ATTEST: _____

TITLE: _____

SECTION 00630

CONSENT OF SURETY

TO: **Village of Cimarron** (hereinafter referred to as "the OWNER").

CONTRACTOR:_____ (hereinafter referred to as "the CONTRACTOR").

PROJECT: **Village of Cimarron Water System Improvements**

CONTRACT DATE:

In accordance with the provisions of the Contract between the OWNER and the CONTRACTOR, as indicated above, for the **Village of Cimarron Water System Improvements** on bond of (Surety)

_____

hereby approves of the final payment to the CONTRACTOR and agrees that final payment to the CONTRACTOR shall not relieve the Surety Company of any of its obligations to the OWNER, as set forth in the said Surety Company's Bond.

IN WITNESS WHEREOF, the Surety Company has hereunto set its hand this _____ day of _____ _____, 2008.

(Surety Company)

By: _____

Attach: Power of Attorney and Certificate of Authority of Attorney(s)-in-Fact.

SECTION 00640

LIEN WAIVER RELEASE

TO: **Village of Cimarron** (hereinafter referred to as OWNER)

FROM: _____

PROJECT: **Village of Cimarron Water System Improvements**

1. The undersigned does hereby release all Mechanics Liens, Rights, Miller Act Claims (40 USCA 270), Stop Notice, Equitable Liens, and Labor and Material Bond rights resulting from labor and/or materials, subcontract work, equipment, or other work, rentals, services, or supplies heretofore furnished in and for the construction, design, improvement, alteration, additions to, or repair of the above-described project.

2. This release is given for an in consideration of the sum of _____ Dollars ($_____) and other good and valuable consideration. If no dollar consideration is herein recited, it is acknowledged that other adequate consideration has been received by the undersigned for this release.

3. In further consideration of the payment made or to be made as above set forth and to induce the CONTRACTOR to make said payment, the undersigned agrees to defend and hold harmless the OWNER, CONTRACTOR, and/or lender, and/or the principal and surety from any claim or claims hereinafter made by the undersigned and/or its material suppliers, subcontractors, or employees, servants, agents, or assigns of such persons against the project. The undersigned agrees to indemnify or reimburse all persons against the project. The undersigned agrees to indemnify or reimburse all persons so relying upon this release for any and all sums, including attorney's fees and costs, which may be incurred as the result of any such claims.

4. It is acknowledged that the designation of the above project constitutes an adequate description of the property and improvements for which the undersigned has received consideration for this release.

5. It is further warranted and represented that all such claims against the undersigned or the undersigned's subcontractors and/or material suppliers have been paid or that arrangements, satisfactory to the OWNER and CONTRACTOR, have been made for such payments.

6. It is acknowledged that this release is for the benefit of and may be relied upon by the OWNER, the CONTRACTOR, any construction lender, and the principal and surety on any Labor and Material Bond for the project.

7. In addition to the foregoing, this instrument shall constitute a full, final, and complete release of all rights, claims, and demands of the undersigned against the CONTRACTOR arising out of or pertaining to the above-referenced project. If partial, all rights and claims on the project are released up to and including the _____ day of _____, 2008.

Dated this _____day of _____, 2008.

FIRM: _____
Name of firm or person giving release

By: _____

Title: _____

STATE OF _____)
) ss.
COUNTY OF _____)

The foregoing release was subscribed and sworn to before me this _____ day of _____,

2008 by _____(as _____ of _____).

My Commission expires: _____

_____
Notary Public

SECTION 00670

NOTICE TO PROCEED

Dated: _____

TO: _____
(CONTRACTOR)

PROJECT: **Village of Cimarron Water System Improvements**

Engineer's Project No. CSB070000

Agreement Date: _____

OWNER: **The Village of Cimarron**

You are notified that the Contract Time under the above contract will commence to run on _____ _____, 2008. By that date, you are to start performing the Work and your other obligations under the Contract Documents. The dates of Substantial Completion and Final Completion are set forth in the Agreement; they are _____, 2008 and _____, 2008 respectively.

Before you may start any work at the site, you and OWNER must each deliver to the other (with copies to ENGINEER) Certificates of Insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Work at the site may be started by _____, 2008 as indicated in the Contract Documents.

OWNER: **The Village of Cimarron**

By _____

Copy to ENGINEER

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT FUNDING AGENCY EDITION

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

ACEC
American Council of Engineering Companies

National Society of Professional Engineers
Professional Engineers in Private Practice

ASCE American Society of Civil Engineers

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
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NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

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This document has been approved and endorsed by

The Associated General Contractors of America

and the

Construction Specification Institute

Knowledge for Creating and Sustaining the Built Environment

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Funding Agency Edition No. C-521 (2002 Edition). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001, 2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800, 2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda* – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agency* – The Federal or state agency named as such in the Agreement.

3. *Agreement* – The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

4. Application for Payment – The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

5. *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.

6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

7. *Bidder* – The individual or entity who submits a Bid directly to Owner.

8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).

9. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

10. *Change Order* – A document recommended by Engineer which is signed by Contractor and Owner and Agency 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.

11. *Claim* – A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

12. *Contract* – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

13. *Contract Documents* – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's

submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

14. *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 11.03 in the case of Unit Price Work).

15. *Contract Times* – The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

16. *Contractor* – The individual or entity with whom Owner has entered into the Agreement.

17. *Cost of the Work* – See Paragraph 11.01.A for definition.

18. *Drawings* – That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

19. *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.

20. *Engineer* – The individual or entity named as such in the Agreement.

21. *Field Order* – A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition* – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

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

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

26. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

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

28. *Notice of Award* – The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

29. *Notice to Proceed* – A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

30. *Owner* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

31. *PCBs* – Polychlorinated biphenyls.

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

33. *Progress Schedule* – A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

35. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *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.

37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.

38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.

39. *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.

40. *Schedule of Submittals* – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

41. *Schedule of Values* – A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

42. *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.

43. *Site* – Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

44. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

45. *Subcontractor* – An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

46. *Substantial Completion* – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.

49. *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.

50. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

51. Unit Price Work – Work to be paid for on the basis of unit prices.

52. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered 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.

1.02 *Terminology*

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents, or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

c. 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 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* 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 Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. 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 30 days after the Effective Date of the Agreement.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review**:**

1. a preliminary Progress Schedule;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, Agency, 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 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. 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 labor, documentation, services, 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 provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the 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.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein 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.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, 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:

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

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

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

    1. A Field Order;

    2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or

    3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

    1. 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 consultants, including electronic media editions; or

    2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current 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 or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

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

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

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

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

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

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

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

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

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of

engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *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, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy 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 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy 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 on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument 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 or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

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

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

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition 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. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly 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 condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor 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 on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such 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 the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment 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 Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. 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 Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. 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.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

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

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

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

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

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

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

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.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

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

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. 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 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

    a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

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

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

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

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, 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.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Contractor as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

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

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Contractor and made payable to Contractor as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Contractor shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof.

B. Contractor 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 15 days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, Contractor 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, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. 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. Contractor shall not be responsible for the negligence of Owner or Engineer in the

design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

A. 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.

B. 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 stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, 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 performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required 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 source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to

establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

    a. in the exercise of reasonable judgment Engineer determines that:

        1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

        2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

        3) it has a proven record of performance and availability of responsive service; and

    b. Contractor certifies that, if approved and incorporated into the Work:

        1) there will be no increase in cost to the Owner or increase in Contract Times, and

        2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

    a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

    b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

    c. The procedure requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

    d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

        1) shall certify that the proposed substitute item will:

            a) will perform adequately the functions and achieve the results called for by the general design,

            b) be similar in substance to that specified, and

            c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified , and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner

may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner'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 individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

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

G. 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 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. 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.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to 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.

6.08 *Permits*

A. 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. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the 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.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. 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.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas 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.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work, Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* 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.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show 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.

6.13 *Safety and Protection*

A. Contractor shall be solely 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:

1. all persons on the Site or who may be affected by the Work;

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

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

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property 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 other 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.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform 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 , 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 individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor 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 or are required as a result thereof. 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.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings*

a. Submit number of copies specified in the General Requirements.

b. 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 services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, 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.

C. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

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

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

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. 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.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs

incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. 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.

6.18 *Continuing the Work*

A. 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 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

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

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A 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 individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and

other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly 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.

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

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

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

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

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. 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 performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

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

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. 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 will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. 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, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site 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 observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities

and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to 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 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

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

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

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. 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 performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, subject to written approval by Agency at any time or from time to time, order additions, deletions, or revisions in the Work by 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).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. 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, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; 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 6.18.A.

10.04 *Notification to Surety*

A. 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. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. 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 11.01.B.

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 outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed 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 acceptable. 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 this Paragraph 11.01.

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.

5. Supplemental costs including the following:

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

b. 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.

c. 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, assembly, dismantling, and removal thereof. All such costs shall be 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.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. 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.

f. 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 of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages 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.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

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.

4. 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.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. 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 performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. Cash Allowances

1. Contractor agrees that:

a. the cash 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

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

C. *Contingency Allowance*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

11.03 *Unit Price Work*

A. 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 unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. 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 subject to the provisions of Paragraph 9.07.

C. 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.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

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

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

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. 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:

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 Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

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 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

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:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. 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 Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor

under Paragraphs 11.01.A.1 and 11.01.A.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;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

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

f. 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 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. 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.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.B.

1. delays caused by or within the control of Contractor; or

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

A. 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.

B. 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:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

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

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

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

F. Uncovering Work as provided in Paragraph 13.03.E 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.

13.04 *Uncovering Work*

A. 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.

B. 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.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered 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 both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to 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, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed 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, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

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

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, 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.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. 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, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. 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 13.06.A, 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 or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site,

take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 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. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A 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.

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 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.

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

    a. the Work has progressed to the point indicated;

    b. 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 9.07, and to any other qualifications stated in the recommendation); and

    c. 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.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

    a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

    b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work, or

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

    d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. the Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;

d. there are other items entitling Owner to a set-off against the amount recommended; or

e. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. 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.

14.04 *Substantial Completion*

A. 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.

B. Promptly after Contractor's notification, Owner, Agency, Contractor, and Engineer shall make a prefinal 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.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 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 14 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.

D. 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, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. 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.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 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.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner, Agency, and Contractor and will notify Contractor in writing of all

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

14.07 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

   b. consent of the surety, if any, to final payment;

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

   d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment 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 for Payment.

C. *Payment Becomes Due*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. 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 (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, 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 5.01, 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. The remaining balance of any sum included in the final Application for Payment but held by OWNER for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

14.09 *Waiver of Claims*

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

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 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive 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 granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure 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 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. 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),

2. 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

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. 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.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. 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;

2. 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;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

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

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 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 Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Owner and Contractor may mutually request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process hall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. 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

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. 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.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto 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. 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.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 *Agency Not a Party*

A. This Contract is expected to be funded in part with funds provided by Agency. Neither Agency, nor any of its departments, entities, or employees is a party to this Contract.

18.02 *Contract Approval*

A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the following "Certificate of Owner's Attorney" (Exhibit GC-A) before Owner submits the executed Contract Documents to Agency for approval.

B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

18.03 *Conflict of Interest*

A. Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.

B. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee,

officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

18.04 *Gratuities*

A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.

B. In the event this Contract is terminated as provided in paragraph 18.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

A. For all negotiated contracts and negotiated modifications (except those of $10,000 or less), Owner, Agency, the Comptroller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. Contractor shall maintain all required records for three years after final payment is made and all other pending matters are closed.

18.06 *Small, Minority and Women's Businesses*

A. If Contractor intends to let any subcontracts for a portion of the work, Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) Contractor is encouraged to procure goods and services from labor surplus area firms.

18.07 *Anti-Kickback*

A. Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to Agency.

18.08 *Clean Air and Pollution Control Acts*

A. If this Contract exceeds $100,000, Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq*.) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq*.). Contractor will report violations to the Agency and the Regional Office of the EPA.

18.09 *State Energy Policy*

A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.10 *Equal Opportunity Requirements*

A. If this Contract exceeds $10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

C. Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

18.11 *Restrictions on Lobbying*

A. Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 319) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed $100,000 at any tier under a Federal loan that exceeds $150,000 or a Federal grant that exceeds $100,000. If applicable, Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 USC 1352. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.

18.12 *Environmental Requirements*

A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:

1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.

2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.

3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).

4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

EXHIBIT GC-A

Certificate of Owner's Attorney

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

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

_____

Date: _____

SECTION 00800

SUPPLEMENTARY CONDITIONS

1. CONDITIONS OF THE CONTRACT

These Supplementary Conditions amend or supplement the Standard GENERAL CONDITIONS of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

General Conditions

The line of communication regarding questions, field execution concerns, requests for information, or proposed change orders by the utility personnel and/or the contractor should flow to the engineer and the Construction Programs Bureau with final direction from the owner after proper review and approval by the engineer and Construction Programs Bureau.

SC-1. Technical Specifications

The Technical Specifications shall include, as a reference, the New Mexico Standard Specifications for Public Works Construction.

SC-1.1 New Mexico Standard Specification Section 501 – Excavation and Backfill for Structures Parts 501.4.1 and 501.4.5 shall be amended to exclude the use of Class I and Class IV for backfill material.

SC-1.2 New Mexico Standard Specification Section 701 – Trenching, Excavation and Backfill Parts 701.12 and 701.13 shall be amended to exclude the use of Class I or Class IV soils.

SC-1.3 New Mexico Standard Specification 801 – Installation of Water Transmission, Collector, and Distribution Lines Part 801.9.5 shall be amended to allow PVC deflection at joints using "Certain Teed Fluid-Tite 'HD' (High Deflection)" or equal PVC restrained joint municipal water pipe to create a minimum deflection radius of 300 feet.

END OF SECTION

SECTION 00950
CHANGE ORDER NO.

DATE: _____

CONTRACT FOR: **Village of Cimarron Water System Improvements**

Engineer's Project No.: CSB070000

Agreement Date:

Owner: **The Village of Cimarron**

Contractor:

The Following Changes are hereby made to the Contract Documents:

Description:

Purpose:

Attachments:

ADJUSTMENT TO CONTRACT PRICE:	
Original Contract Price	$_____
Net Change Previous Change Orders	$_____
Contract Price before this Change Order	$_____
Net Adjustment resulting from this Change Order	$_____
Current Contract Price including this Change Order	$_____

ADJUSTMENT TO CONTRACT TIME	
Original Contract Time (Final completion date)	_____
Net Change Previous Change Orders	_____
Contract Time Prior to this Change Order (date)	_____
Net Adjustment Resulting From this Change Order (days)	_____
Current Contract time including this Change Order (date)	_____

Recommended: Engineer Nolte Associates, Inc.	Approved: Contractor	Approved: Owner Village of Cimarron
By:_____	By:_____	By:_____
Date:_____	Date:_____	Date:_____

PREVAILING WAGE RATES

Responsibilities of Contracting Agencies and/or their Agents

as stated in the "PUBLIC WORKS MINIMUM WAGE ACT POLICY MANUAL"

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*The **contracting agency or its agent** is responsible for filling out the Notification of Award, and Subcontractor List (including updates to the Subcontractor List) and sending it to the Public Works Bureau.*

11.1.2.10.B (3) The contracting agency or its agent; i.e., architect or engineer, shall upon award of the project, or if the project is canceled, promptly fill out and return to the office of the director of the labor and industrial division the notification of award and list of subcontractors forms. Any changes or additions of subcontractors shall also be promptly mailed to the director by the contracting agency or its agent; i.e., architect or engineer.

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*The **contracting agency** is responsible for including in the advertised specifications and contract between the agency and the contractor, a provision requiring the contractor and all tiers of subcontractors to submit certified weekly payrolls records to the contracting agency biweekly, and to the Public Works Director if requested.*

11.1.2.10.C (2) In order to ensure compliance by the contractor and his subcontract to all tiers of subcontractors with the wage decisions, contracting agencies subject to the New Mexico Public Works Minimum Wage Act shall include in the advertised specifications and the contract between the agency and the contractor for all work subject to the terms of the Public Works Minimum Wage Act a provision requiring the contractor and all tiers of subcontractors to submit certified weekly payroll records to: (1) the contracting agency (biweekly), and (2) the director, when requested by the director or an interested party such as contractors, contracting agencies, labor organizations and contractor associations (the director may require disclosure of any information necessary to ensure compliance by all contractors at all tiers with the requirements of the New Mexico Public Works Minimum Wage Act).

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*The **contracting agency** is responsible for insuring that it has received a Statement of Intent to Pay Prevailing Wages before any payment is made to a contractor. The contracting agency is responsible for insuring that it has received an Affidavit of Wages Paid from a contractor before final payment is made to a contractor, and before bond monies and retainage are released to the contractor. The **contracting agency** and prime contractor must retain all certified payroll records for at least four years after the completion of the project.*

11.1.2.10.C (2) (e) Contractors and all contracting tiers on the project must file a statement of intent to pay prevailing wages (intent), and an affidavit of wages paid (affidavit). The intent form must be filed with the contracting agency within three (3) business days of the award of each respective contract. Payments will not be made to a non-compliant contractor until an intent form is filed.

11.1.2.10.C (2) (f) The affidavit form must be filed prior to the final payment to a contractor. Bond monies and retainage will be released only to contractors who have filed affidavits pursuant to the provisions of these regulations. Any contractor or subcontractor who files a false statement or refuses to file any statement or record required to be filed under these regulations, shall be considered as non-compliant and shall be subject to debarment proceedings. The contracting agency and the prime contractor shall keep all certified payroll records for a period of time not less than four (4) years after the completion of the contract.

The contracting agency or its agent is responsible for informing the Public Works Bureau of any change orders to the original contract of a Public Works project which is subject to the Minimum Wage Act, which will exceed $1,000,000 or when the total cumulative value of the change orders on a project is greater than 50% of the original contract.

NEW MEXICO DEPARTMENT OF WORKFORCE SOLUTIONS - PUBLIC WORKS BUREAU

QUESTIONS?? Call OR E-mail:

Camille Vigil @ (505) 222-4782 OR camille.vigil@state.nm.us Michael Fanestiel @ (505) 222-4783 OR michael.fanestiel@state.nm.us
Mary Sanchez @ (505) 222-4784 OR mary.sanchez@state.nm.us

Contracting Agency/Owner	County	Decision Date	Decision No.
Construction Programs Bureau	Colfax	03/03/08	CO-08-0342 A
		Expires for Bids	
Type of Construction: A		07/01/08	

Description of Work: Village of Cimarron Water System Improvements

Installation of approximately 11,600 linear feet of 6 inch and 10 inch PVC potable water transmission line. The work also includes the installation of a valve vault with 6 inch DIP, valves, actuators, and miscellaneous equipment as well as radio transmitters and other electrical and control devices.

***REMINDER* to those preparing BID documents:** If bids are not opened by the above "Expires for Bids" date, a **NEW** wage decision may be required. If bids are NOT submitted before new wage rates go into effect, a NEW wage decision WILL be required. Call the Public Works Bureau at (505) 222-4669 to check status of new wage rates.

NOTICES

ALL contractors **MUST** have an active registration with the Labor Enforcement Fund before bidding on any public works project. Bids from contractors who are not registered will be considered **INVALID**.

The General/Prime Contractor selected for this project **MUST** submit a completed Statement of Intent to Pay Prevailing Wages to the Contracting Agency (or it's agent) before any work is started.

Sub-contractors & 2nd/3rd Tier Contractors **MUST** also submit Statements through their General/Prime before they start work. The General/Prime is responsible for informing the Contracting Agency or it's agent whenever there is a change to the subcontractors on the project.

The Contracting Agency or it's agent **MUST** fill out and submit the Notification of Award and Subcontractor list to the Public Works Bureau and forward the remainder of this wage decision package to the General/Prime Contractor that is awarded the project contract. That contractor is also responsible for making certain that all subcontractors have copies of the wage decision and other needed forms.

The General/Prime Contractor **MUST** post the wage rate table at the job site outside the Superintendent's trailer/office in an easily accessible place.

Workers **MUST** be classified & paid according to the work they perform, regardless of qualifications.

These wage rates are good for the life of a project.

STATEMENT OF INTENT TO PAY PREVAILING WAGES

To be filled ***Before*** construction starts

Please type or print in ink. Incomplete forms will be returned.

Mail or fax to: the contracting agency or its agent (architect or engineer)

GENERAL CONTRACTOR INFORMATION

Company Name:		Labor Enforcement Fund: ☐
Address:		
City:	State:	Zip:
Phone:	Fax:	
Estimated Start Date:	**State Wage Dec. #:**	
Project Title:	Project Physical Address:	
Total Contract Amt:	Estimated Completion Date:	
PRINT NAME:	SIGNATURE:	

SUBCONTRACTOR:	**Subcontract amount:** $	Start date of work on this project:
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	
PRINT NAME:	SIGNATURE:	

2ND. TIER SUB	**2nd Tier Contract amount :** $	Start date of work on this project:
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	
PRINT NAME:	SIGNATURE:	

My signature above certifies that the above information is correct and that all workers I employ on this public works project were paid no less than the Prevailing Wage Rates (s) as determined by the Department of Workforce Solutions, Public Works Bureau for this project as identified by the State Wage Decision No. I understand that contractors who violate Prevailing Wage Laws (i.e., incorrect job classification, improper payment of prevailing wages, and/or overtime, etc.), are subject to debarment procedures and shall be required to pay any back wages due to workers. (Ref. LID Public Works Minimum Wage Act Policy Manual (11.1.2 NMAC & Public Minimum Wage Act (13-4-11 through 13-4-18, NMSA 78)).

NOTE: After 7/01/04, ALL tiers of contractors with contracts over $50,000, MUST be registered with the Department of Workforce Solutions, Public Works Bureau. The registration form is available on our web page at www.dws.state.nm.us under Public Works and Additional Forms. Fill in the Labor Enforcement Fund form and mail to the post office box listed at the top of the form. Go to the same page that the form is on to check the list of Registered Contractors.

(See IMPORTANT information on back!)

Revised 9/12/07

INSTRUCTIONS FOR FILLING OUT STATEMENT OF INTENT

FOR GENERAL CONTRACTOR:

1. Fill in general contractor information and provide signature.
2. State Wage Dec. No. as listed in bid documents. (example: BE-07-0123 B)
3. Project Title - Listed in bid documents. Whatever the project is.
4. Project Physical Address - Exact location of project (job site).
5. Estimated Start & Completion Dates of project
6. General Contractor's Contract Amount - Project cost .
7. Check for Labor Enforcement Fund compliance.

FOR SUBCONTRACTOR:

1. Fill in general contractor information, but general contractor signature is not needed.
2. Fill in subcontractor section as indicated and provide signature. Send to GC. Sub-contract amount – list subcontract amount. PLEASE NOTE: A SEPARATE SIGNED FORM IS NEEDED FOR EACH CONTRACTOR.
3. Check for Labor Enforcement Fund compliance.

FOR 2ND. TIER SUB:

1. Fill in general contractor information, but general contractor signature is not needed.
2. Fill in subcontractor section; subcontractor signature not needed. Send to GC.
3. Fill in 2nd. Tier sub section and provide signature.
4. 2nd Tier contract amount – list amount.
5. Check for Labor Enforcement Fund compliance.

For 3rd TIER & HIGHER: Attach a copy of this completed form & list the 3rd tier contractor info under the 2nd tier contractor with a note.

Effective July 1, 2004 - ALL contractors bidding on public works contracts for $50,000 or more MUST be registered with the Labor & Industrial Division prior to bidding the project. The registration form may be found on the DOL web page at www.dws.state.nm.us under Public Works and Additional Forms. Print the Labor Enforcement Fund Form and mail it along with a check for $200 to the address at the top of the form. A list of registered contractors may be reviewed on the same page as the registration form. Registration is good for one year, and after registration, contractors may bid as many contracts as they want. Upon expiration of the registration, contractors may complete projects, but in order to bid new ones after the expiration, they must register again.

NOTE: All Statements of Intent to Pay Prevailing Wages must go to the GC to submit to the contracting agency or its agent (architect or engineer).

NOTE: If form is faxed, the originals are not required to be sent.

AFFIDAVIT OF WAGES PAID

To be filled ***After*** construction is complete
Please type or print in ink. Incomplete forms will be returned.

Mail or fax to: the contracting agency or its agent (architect or engineer)

GENERAL CONTRACTOR INFORMATION		
Company Name:		Labor Enforcement Fund: ☐
Address:		
City:	State:	Zip:
Phone:	Fax:	
Estimated Completion Date:	**State Wage Dec. #:**	
Project Title:	Project Physical Address:	
PRINT NAME:	SIGNATURE:	

SUBCONTRACTOR: **Subcontract amount:**		Date you completed work on this project:
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	
PRINT NAME:	SIGNATURE:	

2ND. TIER SUB **2nd Tier Contract amount**		Date you completed work on this project:
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	
PRINT NAME:	SIGNATURE:	

My signature above certifies that the above information is correct and that all workers I employ on this public works project were paid no less than the Prevailing Wage Rates (s) as determined by the Department of Workforce Solutions, Public Works Bureau for this project as identified by the State Wage Decision No. I understand that contractors who violate Prevailing Wage Laws (i.e., incorrect job classification, improper payment of prevailing wages, and/or overtime, etc.), are subject to debarment procedures and shall be required to pay any back wages due to workers. (Ref. LID Public Works Minimum Wage Act Policy Manual (11.1.2 NMAC & Public Minimum Wage Act (13-4-11 through 13-4-18, NMSA 78)).

NOTE: After 7/01/04, ALL tiers of contractors with contracts over $50,000, MUST be registered with the Department of Workforce Solutions, Public Works Bureau. The registration form is available on our web page at www.dws.state.nm.us under Public Works and Additional Forms. Fill in the Labor Enforcement Fund form and mail to the post office box listed at the top of the form. Go to the same page that the form is on to check the list of Registered Contractors.

(See IMPORTANT information on back!)

Revised 9/12/07

INSTRUCTIONS FOR FILLING OUT AFFIDAVIT OF WAGES PAID

FOR GENERAL CONTRACTOR:

1. Fill in general contractor information and provide signature.
2. State Wage Dec. No. as listed in bid documents. (example: BE-07-0123 B)
3. Project Title - Listed in bid documents. Whatever the project is.
4. Project Physical Address - Exact location of project (job site).
5. Estimated Completion Date of project
6. Check for Labor Enforcement Fund compliance.

FOR SUBCONTRACTOR:

1. Fill in general contractor information, but general contractor signature is not needed.
2. Fill in subcontractor section as indicated and provide signature. Send to GC. Sub-contract amount – list subcontract amount. PLEASE NOTE: A SEPARATE SIGNED FORM IS NEEDED FOR EACH CONTRACTOR.
3. Check for Labor Enforcement Fund compliance.

FOR 2ND. TIER SUB:

1. Fill in general contractor information, but general contractor signature is not needed.
2. Fill in subcontractor section; subcontractor signature not needed. Send to GC.
3. Fill in 2nd. Tier sub section and provide signature.
4. 2nd Tier contract amount – list amount.
5. Check for Labor Enforcement Fund compliance.

For 3rd TIER & HIGHER: Attach a copy of this completed form & list the 3rd tier contractor info under the 2nd tier contractor with a note.

Effective July 1, 2004 - ALL contractors bidding on public works contracts for $50,000 or more MUST be registered with the Labor & Industrial Division prior to bidding the project. The registration form may be found on the DOL web page at www.dws.state.nm.us under Public Works and Additional Forms. Print the Labor Enforcement Fund Form and mail it along with a check for $200 to the address at the top of the form. A list of registered contractors may be reviewed on the same page as the registration form. Registration is good for one year, and after registration, contractors may bid as many contracts as they want. Upon expiration of the registration, contractors may complete projects, but in order to bid new ones after the expiration, they must register again.

NOTE: All Affidavits of Wages Paid must go to the GC to submit to the contracting agency or its agent (architect or engineer).

NOTE: If form is faxed, the originals are not required to be sent.

New Mexico Department of Workforce Solutions
Public Works Bureau
501 Mountain Road NE, Albuquerque, NM 87102
Camille Vigil @ (505) 222-4782 OR camille.vigil@state.nm.us Michael Fanestiel @ (505) 222-4783 OR michael.fanestiel@state.nm.us
Mary Sanchez (505) 222-4784 OR mary.sanchez@state.nm.us
fax (505) 222-4780

Wage Decision # CO-08-0342 A
NOTIFICATION OF AWARD (NOA)

***Description and Location of Work*: Village of Cimarron Water System Improvements**

Installation of approximately 11,600 linear feet of 6 inch and 10 inch PVC potable water transmission line. The work also includes the installation of a valve vault with 6 inch DIP, valves, actuators, and miscellaneous equipment as well as radio transmitters and other electrical and control devices.

City of Cimarron Colfax County 356B East 9th Street

REMINDER for Agency Conducting BID Process: **If bids are NOT submitted before new wage rates go into effect, a NEW wage decision WILL be required.**

When the Contract is awarded for this project the Wage Rate Poster and the Wage Rate Packet, excluding this NOA and Subcontractor List, must be delivered to the ***GENERAL/PRIME CONTRACTOR.*** The Contracting Agency or its agent must complete this form (including the next page listing all of the subcontractors including 2nd tier subcontractors) and fax or mail it to the address above. ***If the project is canceled,*** this form must be completed by the agency conducting the bid process. Failure to submit the NOA in a timely manner is a violation of paragraph 11.1.2.10.B (3) of the Public Works Minimum Wage Act Policy Manual.

General/Prime Contractor Company Name:_____ License#:_____

Address:_____ City:_____ State:_____ Zip:_____

Telephone: _____ Fax:_____

Project Contact's name:_____E-Mail:_____

Approximate Date Work to Start:_____

Estimated Completion Date:_____

Estimated Cost of Project:_____

Bid Opening Date:_____

Note: The General/Prime Contractor MUST mail/fax in their Statement of Intent to Pay Prevailing Wages to the Contracting Agency or its agent before beginning work on the project. Each Subcontractor (and all tiers of subcontractors) **MUST** also mail/fax their Statement of Intent to Pay Prevailing Wages through the General/Prime Contractor before they start work. After work on the project is completed **(but before final payments),** subcontractors and all tiers of subcontractors must mail/fax (through the General/Prime Contractor) an Affidavit of Wages Paid.

Signature for Contracting Agency (or agent) _____
Printed Name_____
Date _____

SUBCONTRACTOR LIST

Do NOT list suppliers or professional services (such as surveyors)

INCLUDE individual subcontractor dollar amount for project

Please include **2nd & 3rd Tier** subcontractors. Make extra copies of form if necessary.

General Contractor: Wage Dec. # CO-08-0342 A

Company Name:_____

Address:_____ City:_____ State:____ Zip:_____

E-Mail Address:_____ License No.:_____

Phone No.:_____ Fax No.:_____ Sub ____ 2nd TIER ____ (To Whom) 3rd TIER ___ (To Whom)

Work to be performed: Amount ($):

Company Name:_____

Address:_____ City:_____ State:____ Zip:_____

E-Mail Address:_____ License No.:_____

Phone No.:_____ Fax No.:_____ Sub ____ 2nd TIER ____ (To Whom) 3rd TIER ___ (To Whom)

Work to be performed: Amount ($):

Company Name:_____

Address:_____ City:_____ State:____ Zip:_____

E-Mail Address:_____ License No.:_____

Phone No.:_____ Fax No.:_____ Sub ____ 2ne TIER ____ (To Whom) 3rd TIER ___ (To Whom)

Work to be performed: Amount ($):

Company Name:_____

Address:_____ City:_____ State:____ Zip:_____

E-Mail Address:_____ License No.:_____

Phone No.:_____ Fax No.:_____ Sub ____ 2nd TIER ____ (To Whom) 3rd TIER ___ (To Whom)

Work to be performed: Amount ($):

Company Name:_____

Address:_____ City:_____ State:____ Zip:_____

E-Mail Address:_____ License No.:_____

Phone No.:_____ Fax No.:_____ Sub ____ 2nd TIER ____ (To Whom) 3rd TIER ___ (To Whom)

Work to be performed: Amount ($):

Company Name:_____

Address:_____ City:_____ State:____ Zip:_____

E-Mail Address:_____ License No.:_____

Phone No.:_____ Fax No.:_____ Sub ____ 2ne TIER ____ (To Whom) 3rd TIER ___ (To Whom)

Work to be performed: Amount ($):

TYPE "A" - STREET, HIGHWAY, UTILITY & LIGHT ENGINEERING

Effective February 22, 2008

Trade Classification	Base Rate	Fringe Rate
Bricklayer/Blocklayer/Stonemason	9.71	0.26
Carpenter/Lather	12.23	0.44
Cement Mason	15.58	0.26
Ironworker	21.77	6.03
Painter (Brush/Roller/Spray)	16.13	0.44
Electricians (outside)		
Groundman	24.46	10.88
Equipment Operator	27.28	10.88
Lineman/Wireman or Tech	27.87	10.88
Cable Splicer	29.05	10.88
Plumber/Pipefitter	21.38	4.33
Laborers		
Group I	12.56	0.35
Group II	12.86	0.35
Group III	13.26	0.35
Operators		
Group I	15.73	0.26
Group II	15.93	0.26
Group III	16.51	0.26
Group IV	16.53	0.26
Group V	16.53	0.26
Group VI	16.68	0.26
Group VII	16.73	0.26
Group VIII	16.88	0.26
Group IX	17.38	0.26
Group X	18.18	0.26
Truck Drivers		
Group I	12.84	0.26
Group II	13.04	0.26
Group III	13.24	0.26
Group IV	13.44	0.26

NOTE: SUBSISTENCE AND INCENTIVE PAY DO NOT APPLY TO TYPE "A" CONSTRUCTION.

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010

LOCATION AND SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL

This section consists of a description of the items of work included in the base bid and additive bid items of the contract, and the location of the work.

1.02 PROJECT LOCATION

The project area is located in the vicinity of the Village of Cimarron water treatment plant, the Lambert Heights potable water storage tank, and the area between the water treatment plant and the Cimarron Main potable water storage tank in Cimarron, New Mexico.

1.03 WORK INCLUDED AS BASE BID ITEMS

The work included under the base bid items listed in Section 00200, BID FORM of this contract consists of the following project elements.

Schedule A Water Transmission Line Station 9+55 to 79+05

The lump sum price includes all labor, materials, and equipment required for the installation of 6-inch potable water transmission line installed by open cut, including all necessary concrete anchors, fittings, valves, items necessary for connecting to existing services, and all other work required to make the water transmission line replacement fully functional as a replacement of the existing transmission line.

Schedule B Water Transmission Line Station 91+85 to 106+17

The lump sum price includes all labor, materials, and equipment required for the installation of 6-inch potable water transmission line, a portion of which shall be installed by open cut or directional drilling. Work shall include all necessary concrete anchors, fittings, valves, items necessary for connecting to existing services, and all other work required to make the water transmission line replacement fully functional as a replacement of the existing transmission line.

Schedule C 10” Water Transmission Line Station 106+19 to 116+60

The lump sum price includes all labor, materials, and equipment required for the installation of 10-inch potable water transmission line installed by open cut, including all necessary fittings, valves, items necessary for connecting to existing services, and all other work required to make the water transmission line replacement fully functional as a replacement of the existing transmission line.

Schedule D Electromagnetic Meter Vault

The lump sum price includes all labor, materials, and equipment required for the placement of a concrete vault with top at grade, piping, fittings, valves, electromagnetic meter, hatch, and all other work required to measure water flow through the vault.

Schedule E. Raw Water Automation

The lump sum price includes all labor, materials, and equipment required for the placement of a concrete vault with top at grade, butterfly valves with actuators, 2" HDPE, 6" DIP, radio transmitters, programming, and other electrical and control devices used to automate the opening and closing of the valves based on water levels detected in two water storage tanks.

1.04 DESCRIPTION OF ADDITIVE BID ITEMS

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1.05 MAINTENANCE OF OPERATION

Contractor shall provide all necessary bypasses and temporary structures to maintain potable water distribution operations during the construction period.

1.06 DOCUMENTS

A. Construction Drawings
B. Contract Documents and Specifications

END OF SECTION

SECTION 01015

CONTRACT TIME

PART 1 - GENERAL

1.01 COMPLETION DATE SCHEDULE

Time for Substantial Completion:

A. Schedule A:	45 calendar days
B. Schedule B:	30 calendar days
C. Schedule C:	30 calendar days
D. Schedule D:	60 calendar days if awarded independently
	30 calendar days if awarded in combination with Schedule A, B, or C
E. Schedule E:	60 calendar days if awarded independently
	30 calendar days if awarded in combination with Schedule A, B, or C

The total time for substantial completion shall be the sum of the individual Schedule(s) awarded to the CONTRACTOR and 45 days for mobilization/administration based on the days provided above.

Time for Final Completion:

A. Final completion shall be 30 calendar days after substantial completion

1.02 SCHEDULE

As required by Section 01310, CONTRACTOR'S CONSTRUCTION SCHEDULE, the Contractor shall furnish to the OWNER an acceptable construction schedule to complete the various portions of the project within the time allowed. Specific dates, as used herein, shall mean calendar days after the date of the notice to proceed. For the period of time that any portion of the project remains unfinished after the time fixed for completion by these specific dates, the Contractor shall pay to the OWNER liquidated damages as described in Section 00510. The Contractor's construction schedule shall reflect the entire contract time defined in this section.

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

A. GENERAL

The basis of payment described is for work indicated on the Bid Form and in the sections of the specifications. The following presents one suggested means of splitting out the elements of the project, the items which are set forth on the Bid Form. Items may include work within a single section of the specifications or in more than one section.

B. PAYMENT

1. The sum of the following item descriptions shall be paid for at the prices, as quoted in the Bid Form, and shall be full compensation for labor, materials, equipment, retails, transportation, deliveries, adjustment of controls and equipment, warranties, operation and maintenance instructions, tests, start-up services, all permitting, groundwater pumping, bypass pumping, cleanup, restoration, labeling, overhead, profit, incidentals to complete all work for each item, and for all risk, loss, damage or expense of whatever nature arising from the nature of the work or the prosecution thereof.

2. Work or materials that are essential to the work, but which are not specifically called out under any of the following items, will not be paid for separately, but shall be included in other items of work.

C. DIVISIONS OF WORK

SCHEDULES A, B, C, D – WATER TRANSMISSION LINE AND MAG METER VAULT

1. MOBILIZATION (ITEM #1, 23, 40, 55):

   LUMP SUM: All work associated with completely delivering necessary equipment, labor, and materials to complete all of the proposed work, traffic control, and construction staking of the proposed work in the Village of Cimarron, New Mexico as shown in the construction drawings and specifications.

2. SITE PREPARATION (ITEM #2, 24, 41, 56):

   LUMP SUM: Provide all permitting, labor, equipment, construction staking, utility potholing as required, dewatering, and other work necessary to prepare the site for construction as shown in the construction drawings and specifications.

3. PIPE (ITEM # 3, 14, 25, 27, 42):

   LINEAR FOOT: All equipment, labor, and materials associated with excavation, bedding, placement, compaction, testing, backfill, and all other items and work necessary for proper installation of a fully functioning water main and services as shown in the construction drawings and specifications.

4. PIPE – DIRECTIONALLY DRILLED (ITEM # 28):

   LINEAR FOOT: All equipment, labor, and materials associated with pipe preparation, jointing, drilling, drilling pits, placement, testing, utility potholing, and all other items and work necessary to proper installation of a fully functioning water main by means of directionally drilling as shown in the construction drawings and specifications.

5. FITTINGS (ITEM # 4, 5, 6, 7, 8, 9, 13, 29, 30, 31, 35, 43, 44, 46, 47):

   EACH: All equipment, labor, and materials associated with the installation of various pipe fittings including over excavation, thrust blocks, restraints, and all other items and work necessary for proper installation of fittings as shown in the construction drawings and specifications.

6. VALVES (ITEM # 10, 32, 45):

   EACH: All equipment, labor, and materials associated with the installation of various valves including valve boxes, valve collars, water rings/covers, Carsonite marker if required, and all other items and work necessary for proper installation of functioning valves as shown in the construction drawings and specifications.

7. AIR RELEASE AND BLOW OFF VALVES AND VAULTS (ITEM #11, 12, 33, 34, 48):

   EACH: All equipment, labor, and materials associated with the installation of air release valves and blow off valves including over excavation, valve vault construction, and all other items and work necessary for the proper installation of a fully functioning air release valves and blow off valves as shown in the construction drawings and specifications.

8. MAG METER AND VAULT (ITEM # 57):

   LUMP SUM: All equipment, labor, and materials associated with the installation of the electromagnetic meter including the tees off the main line, main line valve, and all other elements shown including meter vault, additional piping, fittings, valves, hatches, manhole steps, providing electric power, conduit, signal indicators, and all other items and work necessary for the proper installation of a fully functional electromagnetic meter as shown in the construction drawings and specifications.

9. CONNECTIONS TO EXISTING LINES (ITEM # 15, 18, 19, 36, 37, 50, 51):

   EACH: All equipment, labor, and materials associated with connecting the proposed work to an existing pipe complete in place, which shall include any extra excavation required, shut-off coordination, the removal of any caps or plugs or the cutting of the existing pipe any number of times required to make the connection and all other items and work required to make a fully functioning connection between the proposed work and the existing water lines as shown in the construction drawings and specifications.

10. CONNECTION ¾" WATER SERVICE (ITEM # 20, 38, 52):

    LINEAR FOOT: All equipment, labor, and materials associated with the proper installation of a ¾" water service line from the proposed water transmission line to the existing meter box at the properties indicated on the drawings, including any extra excavation required, shut-off coordination, connection of the new water service to the meter pit, and all other items and work required to make a fully functioning water service connection as shown in the construction drawings and specifications.

11. FIRE HYDRANT ASSEMBLY (ITEM # 16, 49):

EACH: All equipment, labor, and materials associated with the excavation, piping from the main line to the fire hydrant, gravel drain pocket, mechanical restraining system or blocking, backfilling, compaction, and all other items and work necessary for the proper installation of a fully functional fire hydrant as shown in the construction drawings and specifications specifically excluding the valve at the tee but as described in another measure and payment.

12. SALVAGE EXISTING FIRE HYDRANT (ITEM # 17):

EACH: All equipment, labor, and materials associated with connecting existing fire hydrants to the proposed work, including over excavation, piping, and all other items and work necessary for the proper connection of an existing fire hydrant to the proposed work to become a fully functional fire hydrant. If the existing fire hydrant is determined to be unfit for further use by the owner, the owner's representative, the engineer, or any jurisdictional authority, the contractor shall remove the existing fire hydrant and install a new fire hydrant assembly complete in place as outlined above and as shown in the construction drawings and specifications at the same unit price as the Fire Hydrant Assembly item above.

13. CONCRETE REVERSE ANCHORS (ITEM #21, 39, 53):

EACH: All equipment, labor, and materials associated with the installation of concrete reverse anchors, including over excavation required, concrete form work, concrete placement, and all other work shown in the construction drawings and specifications.

14. ASPHALT REPAIR FROM OPEN TRENCHING (ITEM #22, 54):

LUMP SUM: All equipment, labor, and materials associated with asphalt repair in areas disturbed by open cut trenching, including compaction, road base, asphalt, and finishing to provide a uniform area of asphalt as shown on the drawings and required by the specifications.

SCHEDULE E – RAW WATER AUTOMATION

15. MOBILIZATION (ITEM #58):

LUMP SUM: All work associated with completely delivering necessary equipment, labor, and materials to complete all of the proposed work, traffic control, and construction staking of the proposed work in the Village of Cimarron, New Mexico as shown in the construction drawings and specifications.

16. SITE PREPARATION (ITEM #59):

LUMP SUM: Provide all permitting, labor, equipment, construction staking, utility potholing as required, dewatering, and other work necessary to prepare the site for construction as shown in the construction drawings and specifications.

17. CONCRETE VAULT (ITEM # 60, 84):

LUMP SUM: All equipment, labor, and materials associated with the concrete vault, excavation, subgrade, placement of vault, backfill, guard posts, and all other items required for the proper placement of the concrete vault as shown in the construction drawings and specifications.

18. 3'x3' HATCH (ITEM # 61):

    EACH: All equipment, labor, and materials associated with the installation of a 3'x3' hatch complete in place and as shown in the construction drawings and required by the specifications.

19. PIPE (ITEM # 63, 71, 80):

    LINEAR FOOT: All equipment, labor, and materials associated with excavation, bedding, placement, backfill, compaction, testing, and all other items and work necessary for proper installation of a fully functioning pipe as shown in the construction drawings and specifications.

20. FITTINGS AND PIPE ACCESSORIES (ITEM # 62, 64, 65, 66, 67, 73, 75, 81, 82, 83):

    EACH: All equipment, labor, and materials associated with the installation of various pipe fittings and pipe accessories including over excavation, thrust blocks, restraints, concrete work, seals, pipe saddle, and all other items and work necessary for proper installation of fittings and pipe accessories as shown in the construction drawings and specifications.

21. VALVES AND ACTUATORS (ITEM # 68, 69, 70, 72, 74, 76):

    EACH: All equipment, labor, and materials associated with the installation of valves with attached pneumatic actuators and all other valves with appurtenances complete in place in addition to all other items and work necessary for the proper installation of functioning valves as shown in the construction drawings and specifications.

22. ¼ HP SUMP PUMP IN PIT (ITEM #77):

    LUMP SUM: All equipment, labor, and materials associated with the installation of a ¼ horsepower sump pump with automatic operation, sump pit, and all other work necessary for the proper installation of a functioning sump pump and pit complete in place as shown in the construction drawings and specifications.

23. ELECTRICAL ITEMS (ITEM #78):

    LUMP SUM: All equipment, labor, and materials associated with the installation of the various electrical items including SCADA system, liquid level monitors, transmitters, conduits, wiring, breakers, programming, testing, training Village operations staff (1 Day), and all other items and work necessary for the proper installation of all electrical equipment as shown in the drawings and specifications.

24. MECHANICAL ITEMS (ITEM #79):

    LUMP SUM: All equipment, labor, and materials associated with the installation all mechanical equipment, including air compressor, fans, heaters, testing, training Village operations staff (1Day), and all other mechanical items and work shown in the construction drawings and specifications.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION MEETING

A preconstruction meeting will be held within 21 working days of award of the contract. The purpose of the meeting will be to discuss the various requirements of the specifications and the Contractor's responsibilities with regard to safety, schedule, and traffic control as defined in the contract documents. The Contractor shall not start construction work until after the preconstruction meeting.

1.02 WEEKLY MEETINGS

The Contractor's superintendent shall meet with the Owner's Representative at the beginning of each week to discuss the activities scheduled for the following week and the compliance of the work with the schedule established at the previous monthly status meeting.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL

Where required by the specifications, the Contractor shall submit descriptive information which will enable determination of whether the Contractor's proposed materials, equipment, or methods of work are in general conformance to the design concept and in compliance with the drawings and specifications. The information to be submitted shall consist of drawings, specifications, descriptive data, certificates, samples, test results and such other information, all as specifically required in the specifications. In some instances, specified submittal information describes some, but not all, features of the material equipment, or method of work. Features not requiring submittals shall be as specified.

Submittal review shall be only for general conformance with the design concept and general compliance with the information given in the contract documents. It shall not include review of quantities, dimensions, weights or gages, fabrication processes, construction safety precautions, all of which are the sole responsibility of the Contractor. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Owner's Representative shall not be required to review and shall not be responsible for any deviations from the contract documents not clearly noted by the Contractor, nor shall the Owner's Representative be required to review partial submissions or those for which submissions for correlated items have not been received.

The Contractor may authorize material or equipment suppliers to deal directly with the Owner's Representative with regard to such submittals; however, ultimate responsibility for the accuracy and completeness of the information contained in the submittal shall remain with the Contractor.

1.02 CONTRACTOR'S RESPONSIBILITIES

The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment, or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the requirements of the specifications and drawings. The Contractor shall insure that there is no conflict with other submittals and shall notify the Owner's Representative in each case where his submittal may affect the work of the Owner or others. The Contractor shall insure coordination of submittals among the related crafts and subcontractors.

Immediately following Award of the Contract, the Contractor shall review the plans and specifications and shall prepare a list of all submittals anticipated on the project and shall submit this list to the Owner's Representative. Items not on the list but requiring review shall be added to the list as requested by the Owner's Representative at any time during the construction.

1.03 **TRANSMITTAL PROCEDURE**

A. General

Submittals regarding material and equipment shall be accompanied by a transmittal form. A separate form shall be used for each specific item, class of material, equipment, and for items specified in separate, discrete sections. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Submittal numbers shall have the following format: "XXX-YYYYY-ZZ"; where "XXX" is the sequential number assigned by the Contractor, "YYYYY" is the specification section number covered by the submittal, and "ZZ" is the sequential number of the submittal ("01" for the first submittal, "02" for the second submittal, etc.). Resubmittals shall have the same submittal number format; where "XXX" is the originally assigned submittal number.

Submittal 25-11350-02, for example, would be the second submittal (first resubmittal) of submittal 25 covering Section 11350.

B. **Deviation from Contract**

If the Contractor proposes to provide material, equipment, or method of work which deviates from the contract documents, he shall indicate so on the transmittal form accompanying the submittal copies.

C. **Submittal Completeness**

Submittals which do not contain all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

D. **Requests for Substitution**

The Contractor may offer material or equipment of equal or better quality and performance in substitution for those specified. The Owner will consider offers for substitution only from the Contractor and will not acknowledge or consider such offers from suppliers, distributors, manufacturers, or subcontractors. The Contractor's offers of substitution shall be made in writing to the Owner's Representative and shall include sufficient data to enable the Owner's Representative to assess the acceptability of the material or equipment for the particular application and requirements.

If the offered substitution necessitates changes to or coordination with other portions of the work, the data submitted shall include drawings and details showing such changes. Contractor agrees to perform these changes as part of the substitution of material or equipment at no additional cost to the Owner. Within 21 calendar days after receipt of the offer of substitution, the Owner's Representative will review the material submitted by the Contractor and advise the

Contractor of objections, if any, to the proposed substitution or if further information is required. Upon notification by the Owner's Representative, the Contractor shall either provide material or equipment which complies with project specifications or furnish requested additional information. While the Owner's Representative might not take any objections to the proposed substitution, such action shall not relieve the Contractor from responsibility for the efficiency, sufficiency, quality and performance of the substitute material or equipment, in the same manner and degree as the material and equipment specified by name. Any cost differential associated with a substitution shall be reflected in the offer and the contract documents shall be modified by a change order.

1.04 **REVIEW PROCEDURE**

When the contract documents require a submittal, the Contractor shall submit copies of the specified information as follows unless otherwise specified:

A. One reproducible original of all the submitted information. When individual sheets in the submittal exceed 8 1/2" x 11", a sepia shall be submitted.

B. 5 copies of all the submitted information.

C. Submittals shall be delivered or mailed to:

Nolte Associates, Inc.

1975 Research Parkway., Ste. 165

Colorado Springs, CO 80920

Unless otherwise specified, within 21 calendar days (or as agreed to by Contractor and Owner's Representative) after receipt of the submittal, the submittal shall be reviewed and three copies of the marked-up reproducible original shall be returned to the Contractor. The reproducible original shall be retained by the Owner's Representative. The returned submittal shall indicate one of the following actions:

A. If the review indicates that the material, equipment, or work method is in general conformance with the design concept and complies with the drawings and specifications, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.

B. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in operation and maintenance information, a corrected copy shall be provided.

C. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "REVISE AND RESUBMIT." Except at his own risk, the Contractor

shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

D. If the review indicates that the material, equipment, or work method is not in general conformance with the design concept or in compliance with the drawings and specifications, copies of the submittal will be marked "REJECTED". Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".

Following the initial review, two "resubmittals" will be allowed by the Owner's Representative prior to a "backcharge" for engineering review and administration costs being incurred by the Contractor. The "backcharge" will be deducted from any amounts due the Contractor.

1.05 **EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS**

Review of drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide shall not relieve the Contractor of his responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Owner, or by any officer or employee thereof, or by any engineering firm conducting such review on behalf of the Owner, and the Contractor shall have no claim under the contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Owner has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

END OF SECTION

SECTION 01310

CONTRACTOR'S CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.01 SCOPE

This section specifies the procedures for preparing and revising the cost-loaded construction schedule used for planning and managing construction activities. The schedule provides a basis for determining the progress status of the project relative to the completion time, specific dates, and for determining the acceptability of the Contractor's progress payment estimates.

1.02 DESCRIPTION

The Contractor shall prepare a time scale network schedule using a critical path method. A general guide for preparing such a schedule is contained in *The Use of CPM in Construction, a Manual for Contractors*, published by the Associated General Contractors of America.

The schedule shall depict all significant construction activities and all items of work listed in the breakdown of contract prices submitted by the Contractor in accordance with Section 00200, BID FORM. Assigned values for each part of the work shall be indicated. The dependencies between activities shall be indicated so that it may be established what effect the progress of any one activity has on the schedule.

Detailed network activities shall include, in addition to construction activities, the submittal and approval of samples of material and shop drawings, the procurement of critical materials and equipment, and their installation and testing. All submittals of equipment and materials in Divisions 11, 13, 14, 15 and 16 shall be shown on the schedule together with appropriate allowances for review and delivery times, installation, testing and training as appropriate. All activities of the Owner and Owner's Representative that affect the progress of the work shall be shown. Any omission of work from the schedule required for contract compliance shall not excuse the Contractor from completing such work within any applicable completion date.

Completion time and all specific dates given in Section 00510, AGREEMENT shall be shown on the schedule. Activities making up the critical path shall be identified.

No activity on the schedule shall have a duration longer than 21 days or assigned value greater than $100,000, except activities comprising only fabrication and delivery may extend for more than 21 days. Activities which exceed these limits shall be divided into more detailed components. The scheduled duration of each activity shall be based on the work being performed during the normal 40-hour work week with allowances made for legal holidays and normal weather conditions.
Schedules shall be realistic. Contractors shall be required to show use of all working days allowed for completion in their schedule or accept a no cost change order reducing the number of days allowed for the completion of the work to the amount shown on the proposed and approved schedule.

1.03 **SUBMITTAL PROCEDURES**

Within 20 days after the date of the Notice of Proceed, the Contractor shall complete a construction schedule conforming to paragraph 1.02, DESCRIPTION of this section and representing in detail all planned procurement and onsite construction activities. The schedule shall be prepared on reproducible paper and may be in draft form with legible freehand lines and lettering. The Contractor shall submit the original and four copies to the Owner's Representative in accordance with Section 01300, SUBMITTALS.

No progress payments shall be made prior to the acceptance of the CPM schedule. Failure to resubmit updated schedules as required herein shall result in an increase in the retentions of the amounts due the Contractor as described in Section the GENERAL CONDITIONS.

Within 14 days after receipt of the submittal, the Owner's Representative shall review the submitted schedule and return two copies of the marked up original to the Contractor. If the Owner's Representative finds that the submitted schedule does not comply with specified requirements, the corrective revisions will be noted on the submittal copy returned to the Contractor for corrections and resubmitted as specified in Section 01300, SUBMITTALS.

1.04 **SCHEDULE REVISIONS**

Revisions to the accepted cost-loaded construction schedule may be made only with written approval of the Contractor and the Owner. Changes in timing for activities which are not on the critical path may be modified with written agreement of the Contractor and Owner's Representative. A change affecting the contract value of any activity, the timing of any activity on the critical path, the completion time and specific dates may be made only in accordance with the GENERAL CONDITIONS.

1.05 **PROJECT STATUS UPDATE**

Weekly meetings will also be held between the Contractor and Owner's Representative to review the progress of the work of the previous week and to coordinate the work of the subsequent week. The schedule shall be revised whenever: the schedule does not represent the progress of the work; equipment submittals, approvals or deliveries make rescheduling of activities necessary; any change to the sequence of activities occurs or any change occurs to activities on the critical path; or when a contract modification necessitates a revision to the schedule. Updates to the schedule shall, at a minimum, be required on a monthly basis.

END OF SECTION

DIVISION 2

SITE WORK

SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 DESCRIPTION

This section specifies site preparation, which consists of clearing, grubbing, demolition, erosion control, and disposal of materials.

1.02 JOB CONDITIONS

A. **Existing Conditions**

The Contractor shall determine the actual condition of the site as it affects this portion of work.

B. **Protection**

Site preparation shall not damage structures, landscaping or vegetation adjacent to the site. The Contractor shall repair, or replace any damaged property. To the maximum extent practicable, dust generated during construction activities shall be minimized. Submit a dust control plan to the Owner Representative for approval in accordance with Section 01300, SUBMITTALS.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 GENERAL

The Contractor shall notify the Owner Representative when site preparation is complete. Further work shall not be started until the conditions defined herein are satisfied.

3.02 PERFORMANCE

A. **Clearing and Grubbing**

Unless otherwise specified, the Contractor shall remove obstructions such as brush, trees, logs, stumps, roots, heavy sod, vegetation, rock, stones larger than 6 inches in any dimension, broken or old concrete and pavement, debris, piping and structures where the completion of the work require their removal except those trees indicated on the drawings to be left intact. In general, the depth of stripping shall be 1-3 in. over the majority of the site. Material that is removed and is not to be incorporated in the work shall be disposed of off the site.

B. **Leveling/Smoothing**

After grubbing operations are completed, the clearing and grubbing area shall be leveled/smoothed so that the surface is left without obvious holes (from tree and root removals), ridges or mounds. The project area after the leveling/smoothing operations are completed shall not have any exposed objectionable materials and the surface slopes shall not have mounds or depressions in excess of 1 ft when measured with a 20 ft long straight edge.

C. **Demolition and Removal**

1. Pavement: When portions of asphalt pavements and concrete pads are to be removed and later construction is to be connected, edges shall be sawcut, on a neat line at right angles to the curb face.

2. Salvage: Owner has the right to salvage any items scheduled for removal. The Contractor shall notify the Owner Representative **5** days prior to any salvage or demolition work to determine the disposition of items to be removed. The Owner Representative will mark items to be salvaged. Such items shall be properly disconnected, removed from their foundations, cleaned, and stored at a location on the site as indicated by the Owner Representative.

D. **Utility Interference**

Where existing utilities interfere with the prosecution of the work, the Contractor shall relocate them in accordance with Section 00710, GENERAL CONDITIONS.

E. **Protection**

The Contractor shall provide protection devices, including barricades, fencing, warning signs, lights and other items necessary to ensure the security of, and safety within, the project site during this phase of the work.

F. **Cleanup**

Remove and transport debris, rubbish, and excess material from the site in a manner that will prevent spillage on streets or adjacent areas. Clean up spillage from streets and adjacent areas. Comply with Federal, State, and local hauling disposal regulations. Cleanup shall be an ongoing activity throughout the contract period.

G. **Disposal of Materials**

All materials removed from clearing and grubbing shall become the property of the Contractor unless designated by the Owner Representative and shall be removed from the project site. Contractor shall make his own arrangements for disposing of materials outside the project site and he shall pay all costs involved. Arrangements shall include, but not be limited to, entering into agreements with property owners and obtaining necessary permits, licenses and environmental clearances.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. **Scope**

The section provides specifications for dewatering systems and appurtenances to be used during construction. Groundwater is expected to be encountered in some areas on the project site and may vary.

B. **Type**

This specification covers the use of site sump pumping, well pointing, vertical sand drains, and deep well drainage systems.

1.02 QUALITY ASSURANCE

Before dewatering is commenced, the Contractor shall obtain the acceptance of the Owner Representative for the method, installation and details of the dewatering system he proposes to use. To that end, the Contractor shall submit to the Owner Representative plans setting forth the details of his proposed dewatering systems. The dewatering system plans shall be in sufficient detail to indicate sizes of pumps, piping, appurtenances, the ultimate disposal point for water and to permit the Owner Representative to judge the overall completeness and effectiveness of the proposed system.

The control of groundwater shall be such that softening of the bottom of excavations, or formation of "quick" conditions or "boils," does not occur. Dewatering systems shall be designed and operated so as to prevent removal of the natural soils.

The Contractor shall select the particular method of dewatering to be employed.

PART 2 - METHODS

2.01 GENERAL

The Contractor shall furnish, install, operate and maintain all machinery, appliances, and equipment to maintain all excavations free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or menace to the public.

The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent which would cause damage or endanger adjacent structures.

The static water level shall be drawn down a minimum of 2 ft below the bottom of the excavation to maintain the undisturbed state of the foundation soils and to facilitate the placement of fill or backfill compacted to the required density.

2.02 **SUMP PUMPING**

Sumps shall be at the low point of excavation. Excavation shall be graded to drain to the sumps.

2.03 **WELL POINTS**

The annular space between the pipe and the borehole of the well point shall be sealed near the top of the well point to prevent vacuum leaks. Installation shall be carried out in such a way so as not to excessively disturb in situ material.

2.04 **DEEP WELLS**

Deep wells shall be cased with PVC, steel, or other suitable casing material. The casing shall have a perforated section at the water producing zone. The annular zone between the casing and the bore hole may be gravel packed. Installation shall be carried out by any acceptable method.

2.05 **VERTICAL SAND DRAINS**

Vertical sand drains shall be installed with minimum disturbance to in situ material.

PART 3 - EXECUTION

3.01**GENERAL**

One hundred percent standby pumping capacity shall be available on site at all times and shall be connected to the dewatering system piping to permit immediate use. In addition, standby ancillary equipment and appurtenances for all ordinary emergencies, and competent workmen for operation and maintenance of all dewatering equipment shall be on site at all times. Standby equipment shall include emergency power generation and automatic switchover to the emergency generator when normal power fails.

Dewatering systems shall not be shut down between shifts, on holidays, on weekends, or during work stoppages.

The Contractor shall control surface water to prevent entry into excavations.

At each excavation a sufficient number of temporary observation wells to continuously check the groundwater level shall be provided.

3.02 **RELEASE OF GROUNDWATER**

The release of groundwater at its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill, and prevent flotation or movement of structures, pipelines and sewers.

END OF SECTION

DIVISION 12

SPECIAL CONSTRUCTION

SECTION 12000

HORIZONTAL DIRECTIONAL DRILLING

12.01.00 INTRODUCTION

A. General: The CONTRACTOR shall perform Horizontal Directional Drilling/Boring (HDD) in accordance with the provisions of this Section. The following factors shall be considered by the CONTRACTOR when preparing for a HDD project:

1. Types of soils anticipated including the percentages of gravels, cobbles, and boulders.

2. Presence of groundwater.

3. Length of the bore.

4. Proximity of existing utilities.

5. Possible impacts on traffic.

6. Space availability for operation of equipment and staging.

7. Required grade and alignment accuracy.

8. Environment conditions and the impact of the method selected on those conditions.

9. Possibility or probability of obstacles in the planned alignment.

10. The type and size of the carrier pipe or casing to be installed.

12.02.00 DEFINITIONS

A. Horizontal Directional Drilling: A steerable drilling method using pressurized drilling fluid to operate drill bits via a motor at the head of a drill string. The position of the drill is monitored to excavate the path of a pilot hole which is subsequently reamed to large diameters for the final process pipe which is typically pulled into the bore hole.

B. Earth Pressure Balance: Pressure applied to the cutting face equals the pressure of the earth against the cutting face.

C. Drill String: A series of joined individual pipes which is used to advance the excavation equipment.

D. Annular Space: The void between the outside diameter of the installed casing pipe and the outer limits of the bore being excavated for the casing pipe. The annular space also refers to the space between the casing pipe and the smaller diameter carrier pipe installed within the casing.

E. Pullback: Method of installing piping by pulling it back through a borehole, usually following a drill string and a reamer to open the bore to a sufficient diameter to accept

the pipe.

F. Hydraulic Fracturing: Fractures produced by pressurized drilling fluids or grout in weak or unconsolidated areas of the soil matrix resulting in excessive fluid loss or upwelling of fluid to the surface.

12.03.00 RELATED SECTIONS

A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Dewatering

2. Chapter 2 Earthwork, Erosion Control, Seeding

3. Chapter 3 Water System

4. Chapter 6 Roadway

5. Chapter 9 Trenching, Backfilling and Compaction

6. Chapter 11A Reclaimed Water System

12.04.00 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Installation of directional bores shall be in accordance with the latest adopted edition of the "Standards and Specifications for the Design and Construction of Public Improvements and Standards for Utility System Construction Manual" prepared by the City of Westminster. Contractor is required to become familiar with this document.

B. All materials and equipment shall be in accordance with any and all applicable Federal, State and local codes, laws and ordinances in effect at the job site. All of the aforementioned codes, laws and ordinances shall take precedence over these specifications in case of any conflict. CONTRACTOR shall refer to the Owner for resolution of conflicting specifications.

C. Except as otherwise indicated, the current editions of the following commercial standards apply to the Work of this Section:

1.	ANSI/AWS DI.1	Structural Welding Code
2.	ANSI/AWWA C200	Steel Water Pipe 6-Inches and Larger
3.	ASTM A283	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
4.	ASTM C 150	Specification for Portland Cement
5.	ASTM C869	Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete

6.	ASTM D	Test Method for Particle-Size Analysis of Soils
7.	ASTM D 1556	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
8.	ASTM D1586	Test Method for Penetration Test and Split-Barrel Sampling Soils
9.	ASTM D2166	Test Method for Unconfined Compressive Strength of Cohesive Soil
10.	ASTM D2216	Test Method for Laboratory Determination of Water (Moisture Content of Soil and Rock)
11.	ASTM D2434	Test Method for Permeability of Granular Soils (Constant Head)
12.	ASTM D2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
13.	ASTM D2937	Test Method for Density of Soil In-Place by the Drive-Cylinder Method
14.	ASTM D 3017	Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
15.	ASTM D 3080	Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
16.	ASTM D 4564	Test Method for Density of Soil in Place by the Sleeve Method
17.	ASTM D 4643	Test Methods for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method
18.	ASTM D 4767	Test Method for Consolidated-Underground Triaxial Compression Test of Cohesive Soils
19.	ASTM D 4829	Test Method for Expansion Index of Soils
20.	ASTM D 4944	Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide, Gas Pressure Test Method
21.	ASTM D 4959	Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating Method
22.	ASTM D 5195	Test Method for Density of Soil and Rock In-Place at Depths Below the Surface by Nuclear Methods
23.	ASTM D 5220	Test Method for Water Content of Soil and Rock In-Place by the Neutron depth Probe Method

24. AWWA C 213 Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines

D. The following industry, association and government codes and standards shall be followed as applicable to the design, fabrication, assembly, installation and testing of all materials and equipment furnished under this specification.

1. AASHTO American Association of State Highway and Transportation Officials
2. AISC American Institute of Steel Construction
3. AISI American Iron and Steel Institute
4. ANSI American National Standards Institute
5. APWA American Public Works Association
6. ASME American Society of Mechanical Engineers
7. ASSE American Society of Sanitary Engineers
8. ASTM American Society of Testing and Materials
9. AWS American Welding Society
10. AWWA American Water Works Association
11. CDOT Colorado Department of Transportation
12. FM Factory Mutual
13. IEEE Institute of Electrical and Electronics Engineers
14. NACE National Association of Corrosion Engineers
15. NEMA National Electrical Manufacturers Association
16. OSHA Occupational Safety and Health Administration
17. SSPC Structural Steel Painting Council
18. UL Underwriters Laboratories

E. The issue or revisions of these documents in effect on the date of the work shall apply.

12.05.00 CONTRACTOR SUBMITTALS

12.05.01 General:

The CONTRACTOR shall submit shop drawings in accordance with the project requirements and the following. Submittals shall include the following, as applicable:

A. Carrier pipe and casing materials, including the diameter, wall thickness, specifications, relevant data, pipe class and type. Also includes tracer wire if applicable.

B. Installation schedules for excavation, pipe installation, backfill, grouting, and related directional boring operations.

C. Data on lubricants proposed for installation.

D. Locations, dimensions, and shoring plans and sections for boring and receiving pits, including the method of excavating, shoring, bracing the pits and thrust block design.

E. Manufacturers' data sheets and specifications describing in detail the system to be used.

F. Layout plans.

G. Description of method to contain drilling fluids and to separate and dispose of spoils.

H. Maximum anticipated pulling loads and supporting calculations.

I. Pipe design data and specifications. Include design calculations to account for bending and pulling stresses expected during construction.

J. Grade and alignment control systems.

K. Contingency plans for correction of the following potential conditions:

1. Inability to complete the pilot hole.
2. Excessive fluid loss or hydraulic fracturing.
3. Inability to pull the pipe.

12.05.02 Permits:

The CONTRACTOR shall obtain necessary permits from governing agencies having jurisdiction and furnish two copies to the Owner's designated representative before the start of the Work. Permits include, but not limited to railroad, CDOT, public right-of-way, Health Department, utility, street cut, dewatering, discharge, etc. The work shall not commence until all applicable permits are obtained by the CONTRACTOR.

12.05.03 Insurance:

The CONTRACTOR shall obtain additional insurance that may be required by permits. Evidence of the insurance coverage shall be submitted to the permitting agency and the Owner’s Representative.

12.05.04 Certifications:

The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section, including physical and chemical properties of all steel. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

12.05.05 Qualifications:

Directional boring shall be performed by a qualified Contractor. The Contractor shall have successfully completed at least 5 previous directional boring operations of similar length and diameter. The CONTRACTOR shall provide descriptions of similar projects, including references, where contractor responsible for directional boring has successfully used the proposed horizontal boring system.

12.06.00 QUALITY ASSURANCE

12.06.01 Notification:

The CONTRACTOR shall provide a minimum of 3 days advance notice before the start of excavation or boring operations. No work shall be performed without prior approval from the Owner.

12.06.02 Welding Requirements:

All welding procedures used to fabricate steel casings shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or special welds for pipe cylinders, casing joint welds, reinforcing plates and grout coupling connections. All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the type of materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months before starting work on the casing or pipeline. Machines and electrodes similar to those used in the Work shall be used in qualification tests. Furnish all material and bear the expense of qualifying welders.

12.06.03 Superintendent:

The CONTRACTOR shall also provide an experienced onsite superintendent to direct the Work. The superintendent shall be onsite throughout the operations and shall have directed work on at least two previous equivalent installations.

12.07.00 SAFETY

All work shall comply with the latest OSHA requirements.

12.08.01 EXISTING CONDITIONS

12.08.01 Subsurface Conditions:

The CONTRACTOR is responsible for existing subsurface information. Additional subsurface investigations deemed necessary by the CONTRACTOR to complete directional boring work shall be conducted at no additional cost to the Owner. Copies of all additional subsurface reports obtained by the CONTRACTOR shall be provided to the Owner. CONTRACTOR is responsible for obtaining any permits associated with such investigations.

12.08.02 Subsurface Data:

The following subsurface information will affect equipment selection and the progress and practicality of trenchless excavation. The actual test data required will vary depending upon the scope of the project soil conditions encountered and trenchless method proposed. Testing may include but not be limited to the following:

1. Particle-size analysis (ASTM D 422)
2. Soil Classification (ASTM D 2487)
3. Plastic limit (ASTM D 4318)
4. Liquid limits (ASTM D 4318)
5. Plasticity index (ASTM D 4318)
6. Expansion index (ASTM D 4829)
7. Density (ASTM D 1556, D 2937, D 5195, D 4564)
8. Water (moisture) content (ASTM D 4959, D 2216, D 5220, D 3017, D 4643, D 4944)
9. Shear strength: Direct (ASTM D 3080) and Triaxial, C.U. (ASTM D 4767)
10. Unconfined compressive strength (ASTM D 2166)
11. Permeability (ASTM D 2434)
12. Apparent or unconfined soil cohesion.
13. Standard penetration test (ASTM D 1586)
14. Water table depth
15. Nature of fill material
16. Nature of pollutants
17. Rock type and color
18. Fracture index
19. Rock quality designation (RQD)
20. Core recovery, TCR.

12.08.03 Subsurface Test Samples:

The CONTRACTOR shall collect subsurface test samples within 20 feet horizontally of the centerline of the proposed conduit location when practicable. Subsurface samples shall be collected to a minimum depth of one pipe diameter below the proposed conduit invert elevation. Test samples shall be collected at a maximum of 300 feet intervals.

12.08.04 Utilities:

The CONTRACTOR shall conduct an investigation to identify and locate all underground utilities within 20 feet of each side of centerline of the proposed conduit alignment. Utility location and depth shall be positively verified by potholing. The CONTRACTOR shall take all necessary precautions to prevent damage to existing utilities which could result from trenchless excavation activities. The CONTRACTOR shall give special consideration to gas lines or electric cables by submitting a report acknowledging the proximity of these utilities and actions to be taken to avoid damage to them. The CONTRACTOR shall repair, replace, or compensate the respective owners for any damage to permanent facilities due to negligence or lack of adequate protection. These facilities include utilities, structures, trees, shrubs and other permanent objects. In the event that unexpected subsurface conditions impeding drilling operations are encountered, the procedure shall be discontinued until Owner's Representative has been consulted.

12.11.00 GENERAL

12.11.01 Carrier Pipe and Fittings:

A. HDPE Pipe:

High Density Polyethylene (HDPE) as per AWWA C 906, ductile iron pipe size (DIPS) equivalent to having the same outside diameter as PVC C 900 (4"-12"), C 905 (14"-36") or as DIP. Material for pipes to be used for potable water service shall be approved by the National Sanitation Foundation (NSF). Pipe must have UV stabilizer. Submit product specifications including type, class, color and thickness DR to Owner for approval.

B. PVC Pipe:

Certainteed, Certa-Lok™ C900/RJ restrained joint PVC pipe or approved equal. Class 200 (DR-14) 4"-12" pipe.

Certainteed, Certa-Lok™ - Yellowmine 1B, Restrained Joint Pipe or approved equal.

C. Fabricated Fittings:

Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings. Fabricated fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe. Fabricated fittings shall be tested in accordance with AWWA C906.

D. Polyethylene Flange Adapters:

Flange adapters shall be made with sufficient through bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves (serrations) to promote gasketless sealing, or restrain the gasket against blowout.

E. Back-up Rings and Flange Bolts:

Flange adapters shall be fitted with back-up rings that are pressure rated equal to or greater than the mating pipe. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 3 or higher.

F. MJ Adapters:

MJ adapters 4" through 16" may be provided with optional stainless steel stiffener upon request. MJ adapters 14" and above shall be provided with heavy duty back-up ring kits. All MJ adapters 18" and above must be provided with stainless steel stiffeners.

12.11.02 Steel Casing:

The steel casing pipe shall be in accordance with ASTM A 283, Grade C, unless indicated otherwise. The minimum casing inside diameter shall be at least 6-inches larger than maximum outside diameter of the carrier pipe. The casing wall thickness shall be designed to accommodate the maximum jacking/pulling load allowed, as well as expected earth and live loads. Thickness shall be no less than 3/8-inch and the CONTRACTOR shall be fully responsible for the sufficiency of the casing provided. Casing section joints shall be of the interlocking type or butt welded, lap welded, or welded using butt straps in the field. Each end of the casing shall be prepared by providing 1/4-inch by 45-degree chamfer on the outside edges for butt welding.

12.11.03 Grout:

If deemed necessary by Owner grout shall be used to completely fill any annular space between the bore and installed casing pipe. Grout shall consist of one part portland cement, three parts sand and the minimum amount of water necessary to obtain the desired consistency; and, all grout mixtures shall contain 2% of bentonite by weight of the cement. Portland cement, water and sand shall conform to the applicable requirements of SSPWC, except that sand to be used shall be of such fineness that 100% will pass a Standard No. 8 sieve and at least 45%, by weight, will pass a Standard No. 40 sieve. Bentonite shall be a commercial-processed powdered bentonite, Wyoming type, such as Imacco-gel, Black Hills, or equal.

12.11.04 Lubricants:

Water or fluid being inert and pose no environmental risk, such as bentonite (described above) or polymer surfactant mixture producing a slurry of proper consistency.

12.11.05 Casing End Seals:

An elastometric end seal boot shall be installed on the open end of the casing pipe and fastened tightly to the casing and carrier pipe via stainless steel bands as approved by Owner.

12.11.06 Casing Spacers:

Casing spacers shall be RACI or approved equal. Spacers type, size and location shall be per manufacturer's recommendation. Submit to Owner for approval.

12.11.07 Tracer Wire:

Continuous insulated 14-gauge copper wire solid colored in accordance with the appropriate color coding dependent on the utility type.

12.11.08 Fittings:

(3 through 12-inch DIP OD Pipe) MJ sleeve connectors of the proper ID and transition gasket as required and compatible with the OD at each end of the HDPE pipe are included in this bid. These fittings shall be installed after the directional bore has stabilized for a minimum of 72 hours. Fittings shall be installed at the location and depth called for in the drawings.

12.11.09 Pipe Stiffeners:

(1 ½ and 2-inch CTS) Connections for HDPE pipe to mechanical fittings will use stainless steel insert stiffeners. Fittings shall be Mueller 110 Series ONLY.

12.11.10 Water Line Services:

HDPE is not approved for Potable Water (2004).

12.11.11 Color Coding:

The piping shall be permanently coded to provide service identification in accordance with APWA guidelines for HDPE pipe. Stripes along the entire outside surface of the pipe shall be made co-extrusion or impregnation in accordance with the following schedule. For PVC pipe, plastic utilized in pipe manufacture shall be of the color shown below.

Potable Water	Blue Stripes - (HDPE Pipe – Not Approved)
Reclaimed Water	Purple Stripes
Wastewater	Green Stripes

12.15.00 CONTRACTOR SPECIFICATIONS

12.15.01 General:

The CONTRACTOR shall comply with the lawful requirements of affected railway companies, Department of Transportation (DOT), public agencies, public utilities, and

other entities. Trenches, shafts or pits in public streets shall not be open for extended periods of time.

Location and Identification: All piping shall be installed with a continuous insulated 14-gauge copper wire, for main location purposes by means of a metal detector. The wire insulation shall be solid color in accordance with the appropriate color-coding. Upon completion of the directional bore, the CONTRACTOR shall demonstrate to the Owner that the wire is continuous and unbroken through the entire run of the pipe by energizing and locating the entire run in the presence of the Owner's Representative.

Traffic Control: Traffic control is the responsibility of the CONTRACTOR. Payment for this item shall be based on the lump sum bid price on an as-needed basis for each project for a typical one (1)-lane closure.

Environmental Protection: CONTRACTOR shall be responsible for the protection of nearby bodies of water from impacts caused by erosion or siltation. Protective measures shall include the installation of silt barriers and/or hay bales. Payment for this item shall be based on the bid unit price.

Site Restoration: CONTRACTOR shall be responsible for the final site restoration, including filling open pits, clean up and grading sod, seed, mulch, and concrete/asphalt repair.

Field Marking: CONTRACTOR shall be responsible for field marking of each bore end denoting location and depth.

The CONTRACTOR shall provide all structures, safety equipment and professional service required to provide for the health and safety of the general public and of personnel involved in the directional boring work in accordance with the requirements of Federal, State and Local Authorities.

The CONTRACTOR shall take all measures necessary to protect surrounding public and private property, adjacent buildings, roads, drives, sidewalks, drains, sewers, utilities, trees, structures, poles and appurtenances from damage due to directional bore work. Responsibility and payment for correction of such damage shall be the sole responsibility of the CONTRACTOR.

The equipment used in direction bore operations shall be of the appropriate commercial size for making a satisfactory installation meeting the criteria set forth herein.

The installation of pipeline under railroad or roadway shall be in accordance with all requirements of the railroad company, the Department of Transportation, the railroad Owner, the Owner or other pertinent regulatory agencies as applicable.

All areas, where loss of ground has occurred due to the boring operation, shall be backfilled by the CONTRACTOR to the specifications outlined by the pertinent governing agency. CONTRACTOR shall prevent settlement of overlying structures or other damage due to the boring operations.

Boring and Receiving Pits: The CONTRACTOR shall comply with the provisions of the OSHA Safety and Health Standards for Construction for the protection of employees in

excavations.

Countermeasures: Appropriate equipment shall be provided to counter conditions which can cause delay such as groundwater, running sand, boulders, etc. The CONTRACTOR shall develop and submit an acceptable contingency plan to address such conditions. The CONTRACTOR shall be alert at all times to abnormalities in the installation process. The Owner shall be notified immediately if anomalies are encountered.

Permits: The CONTRACTOR shall abide by all permit conditions.

Field Testing and Disinfection: Upon completion of the installation, the pipe shall be pressure tested and potable water lines disinfected in accordance with applicable specifications.

12.15.02 Boring and Receiving Shafts

Sheeting, Shoring and Bracing: Shafts shall be constructed to accommodate boring equipment and provide safe working space around the equipment as recommended by the equipment manufacturer. Sheeting, shoring, and bracing for boring and receiving shafts shall conform to the requirements of the standard specifications. Shafts shall have adequate shoring to prevent wall collapse or ground movement in the vicinity of the shaft.

Safety Measures: All work shall comply with the latest OSHA requirements.

Dewatering: When installed below the water table, waterproof sheet piles or a dewatering system shall be employed to keep the shaft dry at all times. Dewatering shall conform to the requirements of the standard specifications. Measures shall be taken to prevent surface runoff from entering the shaft.

Foundation: Boring pits shall have a foundation of crushed stone or equal to provide a base for support and alignment of the boring equipment.

Backfilling Shafts: All shafts shall be backfilled upon completion of operations in accordance with the requirements of the standard specifications. All equipment, shoring, bracing and rubbish shall be removed from the job site.

12.15.03 Drilling Fluids and Slurries

A. The following requirements apply to the use of drilling fluids and their additives.

1. Drilling fluid pressures shall be limited to those necessary and shall be controlled to avoid or minimize hydraulic fracturing or over excavation. If hydraulic fracturing or excessive loss of fluid is discovered, the process shall be halted until actions are taken to control the losses.
2. Drilling fluids and cuttings shall be recovered, separated and the drilling fluid reused. Direct disposal of drilling fluids may be permitted with approval from the Owner. The CONTRACTOR shall be responsible for the disposal of excavated material as well as excess drilling fluid, water, trash, and waste. Containment barriers shall be used to prevent drilling fluid runoff from the construction site and frequent inspections along the bore path for upwelling drilling fluid shall be conducted.

Cleanup of any inadvertent returns shall be performed in a timely manner.

3. Drilling fluid shall be inert and pose no environmental risk, such as bentonite or polymer surfactant mixture producing a slurry of proper consistency.

12.15.04 Directional Drilling

Drilling/Pulling Equipment: The equipment used to drill the pilot hole, back ream and pull the product pipe in place shall be adequately sized and compatible to the expected ground conditions. It shall be equipped with instrumentation to accurately locate the alignment and grade of the pilot hole to monitor drilling fluid flow and pressure and measure pulling force applied to the product pipe. Steering information of the drill string, pressures, and pulling forces shall be continuously monitored during operations. The pulling strength of the boring equipment shall not exceed the pipe safety pull strength as per manufacturer's recommendations. The equipment shall be capable of using mechanical and/or hydraulic means to change the boring course. Equipment shall also be used to recover and separate drilling fluids and soil cuttings and subsequent reuse of drilling fluids. Direct disposal of contained drilling fluids may be permitted with prior approval of the Owner. The equipment shall employ a fluid cutting technique. The soil shall be cut by small diameter, high-pressure jets of drilling fluid. The jets shall cut the soil in advance of the boring tool, impregnating and lining the tunnel wall with drilling fluid. The drilling fluid shall be inert and pose no environmental risk, such as bentonite or polymer surfactant mixture producing a slurry of proper consistency. The hydraulic power system shall be self-contained and free of leaks, with sufficient pressure and volume to power the drilling operation.

The horizontal alignment and vertical profile or depth of pipe shall be shown on the drawings. The pipe shall have a minimum cover of 60 inches (60"). The maximum depth for the directional drilling shall be as specified for each project; but in no case shall be less than an 18-inch (18") clearance below any existing or proposed underground utilities to be crossed. Compound curvatures may be used, but limited by the maximum deflection as set forth either by the pipe manufacturer or AWWA Standards, whichever is more strict. The ideal entry angle shall be 12° to 14° (not to exceed 15°). Exit angle shall be 6° to 12° to facilitate the pull-back operation.

Pilot Hole: The CONTRACTOR shall drill the pilot hole along the path shown in the Contract Drawings to within the tolerance limits of no deviation greater than two percent (2%) of depth over a length of 100-feet (100'). In the event that the allowable deviation is exceeded, the CONTRACTOR shall notify the Owner and the Owner may require the CONTRACTOR to pull back and redrill from a location along the bore path before the deviation. The exit point of the drill string shall also meet specified tolerance limits. At the completion of the pilot hole, the CONTRACTOR shall provide an as-built survey consisting of a three dimensional coordinate tabulation accurately referencing the pilot hole to the drilled entry point. Drilling must be accomplished with fluid assisted mechanical cutting. Uncontrolled jetting (where fluid force is the primary means for creation of the final bore hold diameter) is prohibited. The minimum pressure and flow of drilling fluids practicable shall be used during drilling operations.

Ream and Pull Back: Upon successful completion of the pilot hole, the borehole shall be reamed to a minimum of 25 percent (25%) greater than the outside diameter of the pipe being installed. The CONTRACTOR shall not attempt to ream, at one time, more than the drilling equipment and mud system is designed to safely handle. The number of

reaming passes to expand the pilot hole for product pipe installation is left to the discretion of the CONTRACTOR. The maximum allowable tensile load of the product pipe shall not be exceeded during pullback operations or when pre-reaming and pullback are performed simultaneously. A swivel connection shall be used between the barrel reaming device and the product pipe to minimize torsional stress on the pulled pipe. The pulled pipe shall be supported in such a fashion that it moves freely during pullback with no damage done to any corrosion coatings or linings. When staging area is limited, shorter lengths of pipe may be stockpiled then connected and pulled in segments. The pipe shall be pulled back such that at least one joint at the lead end completely clears the bore so that piping and joint can be inspected. Once pull-back operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole. The CONTRACTOR shall exercise due care in not applying, at any time, more than the safe pipe pull pressure recommended. Adequate lengths of pipe shall be provided at both the launching and receiving ends to facilitate service connection assemblies.

The as-built variance from the specified bore path shall not exceed ±2-feet in the horizontal plane. The CONTRACTOR shall submit as-built drawings indicating any deviations form the specified bore path prior to Owner's release of final payment.

The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the borehole. The pipe shall be guided into the borehole to avoid deformation of, or damage to, the pipe. The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, movement or distortion of surface features. Any damages caused by the CONTRACTOR'S operations shall be corrected by the CONTRACTOR, at no additional cost to the Owner.

In the event that unexpected subsurface conditions impeding drilling operations are encountered, the procedure shall be discontinued until the Owner has been consulted. No additional compensation shall be allowed.

If final grade of the finished bore is not satisfactory to the Owner or any other jurisdictional entity, the pipe shall be abandoned, full pressure grouted in place and an alternate installation shall be made, at no additional cost to the Owner or other jurisdictional entity.

Loss of Fluid: At installations below bodies of water, the CONTRACTOR shall be diligent to detect drilling fluid losses below the water surface. Operations shall be stopped when they result in any pipe damage or surface disruption. The CONTRACTOR shall propose immediate action for review and approval by the Owner to resolve the problem. Remedial action shall be at no additional expense to the Owner.

Clean-Up: The CONTRACTOR shall be responsible for the removal and disposal of excavated material and excess drilling fluid in accordance with all local, state and federal regulations.

Welding: Welding of steel pipe used for pullback shall be in accordance with ANSI/AWS Dl .1. All welds shall be radiographically inspected. All welds shall meet the manufacturer's recommendations. Fusion welds shall be performed by a certified, experienced technician that has been properly trained to follow the pipe manufacturer's recommendations.

Erosion and sedimentation control measures and on-site containers shall be installed to prevent drilling mud from spilling out of entry and/or exit pits. Drilling mud shall be disposed of off-site, in accordance with applicable local, State and Federal requirements and/or permit conditions. Disposal in vacant land or any other sites without a written authorization from the land owner is strictly prohibited. CONTRACTOR shall include in his bid the cost for removing/vacuuming the drilling mud and its lawful disposal and shall notify the Owner of the designated disposal site(s) prior to the beginning of the work.

12.15.05 Joining:

Heat Fusion Joining: Joints between plain end pipes and fittings shall be made by butt fusion. Joints between the main and saddle branch fittings shall be made using saddle fusion. The butt fusion and saddle fusion procedures used shall be procedures that are recommended by the pipe and fitting Manufacturer. The Contractor shall ensure that persons making heat fusion joints have received training in the Manufacturer's recommended procedure. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction. External and internal beads shall not be removed.

Butt Fusion of Unlike Wall Thickness: Butt fusion shall be performed between pipe ends, or pipe ends and fitting outlets that have the same outside diameter and are not different in wall thickness by more than one Standard DR, for example, SDR 13.5 to SDR 17, or SDR 11 to SDR 13.5. Transitions between unlike wall thickness greater than one SDR shall be made with a transition nipple (a short length of the heavier wall pipe with one end machined to the lighter wall) or by mechanical means or electrofusion. SDR's for polyethylene pipe are 7.3, 9, 11, 13.5, 17, 21, 26, 32.5 and 41.

Heat Fusion Training Assistance: Upon request and at the requestor's expense, training personnel from the Manufacturer or his Representative shall be made available.

Joining by Other Means: Polyethylene pipe and fittings may be joined together or to other materials by means of (a) flanged connections (flange adapters and back-up rings), (b) mechanical couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material, (c) MJ Adapters or (d) electrofusion. When joining by other means, the installation instructions of the joining device manufacturer shall be observed.

Branch Connections: Branch connections to the main shall be made with saddle fittings or tees. Polyethylene saddle fittings shall be saddle fused to the main pipe per this section.

12.15.06 HDPE Pipe Installation:

Refer to Trenching, Backfilling and Compaction Specifications.

Mechanical Joint & Flange Installation: Mechanical joint and flange connections shall be installed in accordance with the Manufacturer's recommended procedure. MJ Adapters and flanges shall be centered and aligned to the mating component before assembling and tightening bolts. In no case shall MJ gland or flange bolts be used to draw the connection into alignment. Bolt threads shall be lubricated, and flat washers should be used under the

nuts. Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the Manufacturer. At least 1 hour after initial assembly, flange connections shall be re-tightened following the tightening pattern and torque step recommendations of the Manufacturer. The final tightening torque shall be as recommended by the Manufacturer.

Pipe Handling: When lifting with slings, only wide fabric choker slings capable of safely carrying the load shall be used to lift, move, or lower pipe and fittings. **Wire rope and chain are prohibited.** Slings shall be of sufficient capacity for the load, and shall be inspected before use. Worn or damaged equipment shall not be used.

Protection Against Shear and Bending Loads: In accordance with ASTM D 2774, connections shall be protected where an underground polyethylene branch or service pipe is joined to a branch fitting such as a service saddle, branch saddle or tapping tee on a main pipe, and where pipes enter or exit casings or walls. The area surrounding the connection shall be embedded in properly placed, compacted backfill, preferably in combination with a protective sleeve or other mechanical structural support to protect the polyethylene pipe against shear and bending loads.

Fusion Quality: The Contractor shall ensure the field set-up and operation of the fusion equipment, and the fusion procedure used by the Contractor's fusion operator while on site. Upon request by the Owner, the Contractor shall verify field fusion quality by making and testing a trial fusion. The trial fusion shall be allowed to cool completely; then test straps shall be cut out and bent strap tested in accordance with ASTM D 2657. If the bent strap test of the trial fusion fails at the joint, the field fusions represented by the trial fusion shall be rejected. The Contractor at his expense shall make all necessary corrections to equipment, set-up, operation and fusion procedure, and shall re-make the rejected fusions.

12.20.00 BASIS FOR PAYMENT

Payment for the installation of service pipe and for casing pipe shall be based on the actual footage of the installed pipe, upon pigging and pressure testing as applicable; submittal or record information by the CONTRACTOR for each directional bore indicating bore profile and location in reference to existing features; and acceptance of the work by the Owner. Unit bid price shall include allowance for casing and end-sealing assemblies and mud disposal.

Payment for the installation of carrier pipe in a casing pipe shall be based on the actual footage of the installed pipe, upon pigging and pressure testing as applicable; submittal or record information by the CONTRACTOR for each directional bore indicating bore profile and location in reference to existing features; and acceptance of the work by the Owner.

Payment shall be based on the actual footage of the directional bore installed and the actual footage for the furnishing above ground of excess tubing to allow connections to be made by others.

END OF SECTION

DIVISION 15

EQUIPMENT

SECTION 15800

HVAC AIR DISTRIBUTION AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work under this section shall include furnishing and installing material and equipment related to air-conditioning and ventilation systems consisting of the following, but not limited thereto:
   1. Ductwork
   2. Fans
   3. Unit heaters
   4. Louvers
   5. Filters, Dryer and Compressed Air

B. The Contractor is responsible for the complete and satisfactory installation of the work in accordance with the true intent of the Drawings and Specifications. He shall provide, without extra charge, all incidental items required, as a part of his work, even though not particularly specified or indicated. The installation shall be so made that its several component parts will function together as a workable system and shall be left with all parts adjusted and in working order.

1.2 QUALITY ASSURANCE

A. All materials and equipment shall be new, free of defects, and installed in accordance with manufacturer's current published recommendations in a neat manner and in accordance with standard practice of the Industry.

1.3 SUBSTITUTION APPROVALS

A. Owner and/or engineer approval.

1.4 SUBMITTAL DATA AND SHOP DRAWINGS

A. Submit product data to engineer.

1.5 REGULATORY REQUIREMENTS

A. References: Comply with the applicable referenced regulations, references, and standards.

B. Requirements of Regulatory Agencies: Comply with all applicable codes, ordinances and regulations.

C. Fees and Permits: Obtain required permits necessary to execute the work under this division. Contractor shall be responsible for all permit fees.

D. All electrical devices and wiring shall comply with standards of the National Electric Code. All devices shall be UL listed and so identified.

1.6 DRAWINGS

A. Drawings are diagrammatic and show the general design, arrangement, and extent of the systems. Do not scale drawings for roughing-in measurements, nor use as shop drawings. Make field measurements and prepare shop drawings as required. Coordinate work with shop drawings of other specification divisions.

PART 2 - PRODUCTS

2.1 ELECTRICAL EQUIPMENT

A. All electrical components related to the heating and ventilation systems shall conform to Division 16 Electrical Specifications, and shall be suitable for operation on the voltage and phase available at the building site. These characteristics shall be verified by the Contractor prior to ordering equipment.

2.2 MINIMUM DUCT CONSTRUCTION STANDARDS

A. Duct construction and installation shall be in accordance with functional criteria requirements of the SMACNA HVAC Duct Construction Standards.
   1. All shop and field-fabricated ductwork, joints, seams, and reinforcement shall conform to SMACNA HVAC Duct Construction Standards for pressure classes specified.
   2. The proprietary TDC and TDF formed-on duct connector systems may be used limited to ductwork of $\pm$ 2-inch w.g. or lower pressure class, Seal Class B, and a maximum dimension of 42 inches or less. All corners shall have sealant backup plates.
   3. "Ductmate" or WDCI proprietary connector systems are acceptable provided the type of joint and the maximum joint spacing for various gauges and pressure classes conform to the SMACNA Duct Construction Standards Manual."
   4. All longitudinal seams shall be Pittsburgh Lock or better, "Snaplock" is not acceptable.
   5. The Contractor will be required to replace all ductwork not conforming to this specification.

B. Duct sealing shall be per construction and installation standards published in the SMACNA HVAC Duct Construction Standards as follows:

DUCT SEALING REQUIREMENTS

Seal Class	Sealing Required
B	All traverse joints and longitudinal seams, 3-inch w.g. maximum
C	Transverse joints, 2-inch w.g. or less

C. Exhaust air ductwork shall be constructed to negative 2-inch w.g. pressure class and Seal Class B.

2.3 SHEET METAL DUCTWORK

A. Shop or field-fabricated ductwork shall comply with the SMACNA "HVAC Duct Construction Standards."
   1. Sheet metal used for duct and plenum construction shall be galvanized steel of lock forming quality, ASTM A527, zinc coating designation of G90.
   2. Sheet metal for all exposed ductwork shall be electro-galvanized and prefinished for painting; Galvaneal, Paint Grip, Paint Lok, or approved equal.

2.4 DUCT SEALANT

A. Approved Manufacturers: Chicago Mastic Corp., Foster, Hardcast, SOLVseal, Tough Bond, and United McGill.

B. Duct joint and seam sealant options are:
   1. Tape System: Woven fiber, 2-inch tape impregnated with a gypsum mineral compound using an activator to form a hard, durable seal; "Hardcast" or approved equal.
   2. Liquid Sealant: One-part, non-sag polymerized butyl sealant formulated with a minimum of 50% solids and manufactured specifically for sealing joints and seams in ductwork.
   3. Mastic for Flanged Joints: One-part silicone elastomeric sealant complying with ASTM C920, Type S, Grade NS, Class 25.

C. Sealant shall be UL classified as fire resistive when dry.

D. Sealant used on outdoor ductwork shall be listed and approved for outdoor service.

2.5 FLEXIBLE DUCT CONNECTORS

A. Manufacturer is Ventfabrics, Inc., model "Ventel", or approved equal. Flexible connector shall be heavy glass fabric, double-coated with DuPont's Hypalon. It shall be air-tight, water-tight, and fire-retardant (per UL 214). It shall be resistant to sunlight, ozone, and weather.

B. Flexible connector shall be 14 oz./sq.yd. and 0.014" thickness. Connector shall be heat-

resistant up to 275°F and cold resistant down to -10°F.

2.6 SUPPLY AND EXHAUST FANS

A. Approved manufacturers are: Cook, Greenheck, ACME, or approved equal.

B. Fans shall have capacities and accessories as scheduled on the drawings.

C. Fans shall bear the AMCA seals for rated sound and air.

D. Fans shall be of the type as listed on the drawings.

E. Ductwork connections to fans shall be made with flexible duct connectors.

2.7 ELECTRIC UNIT HEATERS

A. Furnish and install electric unit heaters in capacities and locations shown on drawings.

B. Unit heaters shall have integral contactors, transformers, and relays required for operation of the unit. Heater shall have safety and limit controls per UL, NEMA, and NEC requirements.

C. Unit heaters shall have wall mount brackets and remote thermostats unless otherwise noted.

D. Approved manufacturers are Markel, Qmark/Marley, Electromode, and Chromalox.

2.8 LOUVERS

A. Approved Manufacturers: Air Balance, Airstream, American Warming and Ventilating, Arrow, Creative Metals, Dowco Corp., Greenheck, Louvers & Dampers, Inc., Penn Ventilator Co., Ruskin, and Vent Products.

B. All louvers shall be tested in accordance with AMCA Standard 500 and shall bear the AMCA Certified Ratings Seal for both air performance and water penetration.

C. Size and location as shown and/or scheduled on the drawings.

2.9 AIR COMPRESSOR

A. As scheduled on drawings.

B. Refrigerated Air Dryer:

1. Provide continuous operating hermetic compressor refrigerated type air dryer, UL listed, sized for maximum dew-point of + 39°F with 100°F saturated inlet air at 100 psig at maximum rated flow. Pressure drop: 3 psi maximum at rated flow. Rated working pressure: 125 psig minimum. Size the unit for 100°F ambient operating temperature.

Operating ambient temperature range shall be 50 to 110°F. Wilkerson, Hankinson, or Engineer-approved equal.

2. Dryer package shall include operating/failure status indication, manual bypass service valve, inlet and outlet pressure gauges, and automatic condensate drain trap with manual override.
3. Refrigerant for the dryer shall be R-134A, or Engineer-approved, non-CFC, alternate.

C. Filter and PRV Station:

1. Provide aerosol, coalescing auto-drain, sub-micron type air filter assembly with replaceable element, 98% efficient for solids 0.3 micron and larger, and 99% efficient oil removal at rated capacity. Sized for maximum of 1 psi drop at 80 psig inlet and rated system capacity, 10 scfm minimum. Rated working pressure: 150 psig minimum. Furnish with manual filter bypass and shutoff valves, upstream and downstream pressure gauges, dirty filter indicator with visual and audible alarms (Hankinson 3844-40-01), and one spare filter element.
2. Provide relieving type pressure-reducing valve suitable for control service sized for rated system capacity (10 scfm minimum). Furnish ASME-rated safety relief valve on low-pressure side, 5 scfm minimum, factory set at 80 psig maximum. Furnish 0- 100 psig control pressure gauge.
3. Filter and/or PRV may be furnished as a factory accessory package in the refrigerated air dryer.

PART 3 - EXECUTION

3.1 SLEEVES AND INSERTS

A. Contractor shall be responsible for locating and installing sleeves, inserts, and supports as required during the various stages of construction.

3.2 INSTALLATION

A. Unless otherwise noted on the plans or specifications, all equipment and materials shall be installed in accordance with the recommendations of the manufacturer. Maintain maximum head room and space conditions at all points.

B. Contractor shall be responsible for making minor changes in the equipment or duct locations as required due to any structural obstructions and conflicts with work specified in other divisions.

3.3 DUCT INSTALLATION

A. Duct Construction and Installation:

1. All ducts and plenums shall be constructed, reinforced, and sealed in accordance with SMACNA “HVAC Duct Construction Standards” and as scheduled in Part 1.
2. All ductwork shall be fabricated and installed so that no undue vibration or noise results. Joints per seal class shall be sealed airtight with additional taping and caulking provided if necessary.

3. Hang ducts with strap iron attached to bottom of ducts spaced not over 5 feet center-to-center.
4. Square elbows shall have single-thickness turning vanes.
5. Provide all necessary manual, backdraft, and relief dampers as required for proper adjustment and control of air distribution.
    a. Provide a 45-degree entry fitting at all branches in rectangular ductwork, except where parallel flow branches are used.
    b. Manual dampers shall have rigid bearings and locking quadrants which allow no rattling. Damper rods shall be marked to indicate the relative position of the damper blade with respect to the rod.
    c. Backdraft and relief dampers shall be installed per the manufacturer's recommendations.
6. Provide flexible and fabric connections at inlet and discharge duct connections to in-line fans, and on fan coil units and air handling equipment, except when fans are internally isolated. Flexible connections shall be securely fastened to the duct and equipment per SMACNA Duct Construction Standards. Allow at least one inch of slack.
7. At all places where inside of duct will be visible through grilles, louvers, etc., paint visible inside portion of duct flat black.
8. Install sash lock type access panels or removable pin hinged access doors on ductwork and housings to provide access to all parts of every automatic damper, fire and/or smoke damper, upstream and downstream of duct coils, and any other items requiring maintenance or inspection. Panels and/or doors shall be gasketed to minimize leakage. Fire damper access doors shall be painted red.
9. Transitions in ductwork, in changing shapes and sizes, shall be made with angles not exceeding 15 degrees (diverging) or 30 degrees (converging) wherever possible.
10. Contractor shall not provide holes in the duct systems for the installation of hangers, conduits, etc., for other equipment. Work of all other trades shall be so coordinated as to render this unnecessary.
11. At ends of ducts which are not connected to equipment, ductwork, or air distribution devices at time of ductwork installation, provide a temporary closure of plywood or corrugated cardboard backed polyethylene film or other covering which will prevent entrance of dust and debris and duct leakage until time connections are to be completed.

B. Special Duct Construction:
1. Ducts exposed to outdoor weather shall be lined and all points sealed with a weatherproof sealer such as Pecora “Synthacalk” sealant or approved equal.

C. Duct Penetrations through Wall and Floors:
1. Provide 1-inch angle collars for all exposed ducts passing through walls, ceilings, or floors. Anchor collars in position after installation is complete.
2. Where vertical ducts pass through floors, supporting angles shall be rigidly attached to ducts and to the floor. Angles shall be galvanized and of approved sizes to properly support the ductwork. The supporting angles shall be placed on at least two sides of the duct.

3. Where horizontal ducts pass through walls and vertical ducts pass through floors, opening shall be tightly sealed off so as to provide a tight seal between duct and opening.

D. Sealing of Ducts:

1. All ducts shall be sealed as defined in Part 2 of this section. Metal surfaces to be joined must be clean, dry, grease-free. Apply a heavy brush coat of sealant to the interior metal surface of the duct slip joint, then interlock securely duct sections and position in place. Apply a finish heavy brush coat of sealant to the exterior metal surface duct joint or seam covering heads of lock joint screws, making sure that all voids are completely filled to ensure a continuous air pressure sealant.
2. In the event of possible excessive duct vibration or mechanical abuse, the exterior metal surface joint finish shall be applied as follows: Apply a heavy brush coat of sealant to the exterior metal surface joint or seam and lay into the wet film a reinforcing membrane of glass fabric approximately 2-inch-wide, making sure it is pressed firmly into the wet film. Apply immediately a heavy finish brush coat of sealant.

3.4 ADJUSTING HVAC SYSTEMS

A. Contractor shall provide all necessary adjustments to equipment to deliver performance as specified on Contract Documents.

B. After all adjustments are made, a detailed written report shall be prepared and submitted for approval. Final acceptance of this project will not be made until a satisfactory report is received.

C. Requirements for adjusting air systems are as follows:

1. If required, the major items of equipment shall have been checked out by the manufacturer's representative.
2. All bearings shall have been checked for proper lubrication.
3. All belt drives shall have been adjusted for proper alignment and tension.
4. The systems shall be checked for such items as duct leakage, damper leakage, equipment vibrations, correct damper operations, etc.
5. All fan systems, major duct sections, registers, diffusers, etc., are to be adjusted to deliver design air quantities within +5%.
6. Sheaves and belts shall be exchanged as required to adjust the rpm of all fans so they handle specified air quantity.

D. After all balancing is complete and all coordination with the Owner or his representative is complete, the balancing firm shall furnish five bound reports which shall contain the following information:

1. Belt and drive sheave information (as installed and as changed), fan nameplate information, motor nameplate information, and amperage and voltage to all motors (in various operating modes where applicable).
2. Static pressure drops across all components of the air systems.

3. Required and final balanced cfm at each system inlet or outlet. Include the inlet or outlet size, static pressure drop across it, air temperature, and velocities read to attain the required cfm.
4. Overload protection data for all motors shall be recorded. Starter brand, model, enclosure type, installed overload devices, original ratings and set points (and revised device ratings and set points when applicable) shall be recorded. If the starters were furnished by the Mechanical Contractor, the overloads shall be verified and changed to the correct size when necessary, and so noted in the report. If the starters were furnished by the Electrical Contractor, the correct overload device sizes and settings shall be noted in the report and the Electrical Contractor shall be advised of all discrepancies.

3.5 OPERATIONAL DEMONSTRATION

A. Upon completion of all work and all tests, Contractor shall furnish the necessary skilled labor for operating all systems and equipment installed under this Section for a period of four hours, or as otherwise specified. This period is purposely set aside to demonstrate the workability of all systems and to instruct the Owner or his representatives fully in the operations, adjustment, and maintenance of all equipment furnished, utilizing the appropriate sections of the maintenance manual as a reference guide. Give at least 72 hours notice to the Owner.

3.6 MAINTENANCE MANUAL

A. See Division 1.

END OF SECTION

DIVISION 16

ELECTRICAL

SECTION 16010

GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section is an extension of the General Conditions, and contains items of a common or administrative nature pertaining to all electrical work.

1.2 REQUIREMENTS

A. Furnish all labor, materials, services, equipment, and appurtenances required to complete the installation of the complete electrical power and control systems in accordance with the and contract drawings.

1.3 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

A. Regulatory Agencies: Installations, materials, equipment, and workmanship shall conform to the applicable provisions of the National Electrical Code (NEC), the Nationals Electrical Safety Code (NESC), and the terms and conditions of the electrical utility and other authorities having lawful jurisdiction pertaining to the work required. All modifications required by these codes, rules, regulations, and authorities shall be made by the Contractor without additional charge to the Owner.

B. Underwriters' Laboratories (UL): All materials, appliances, equipment, or devices shall conform to the applicable standards of Underwriters' Laboratories, Inc. The label of, or listing by, UL is required.

C. Standards: Where referenced in these specifications or on the drawings, the publications and standards of the following organizations shall apply:
   1. American Society of Testing and Materials (ASTM)
   2. Institute of Electrical and Electronic Engineers (IEEE)
   3. Insulated Cable Engineers Association (ICEA)
   4. National Electrical Manufacturers Association (NEMA)
   5. National Fire Protection Association (NFPA)
   6. American National Standards Institute (ANSI)

1.4 SUBMITTALS

A. Material List: Within two weeks after contract award and before submittals are started, the Contractor shall submit for approval a list of all proposed material and equipment, indicating manufacturer's name and general description. Partial list shall be cause for rejection.
   1. Solid State Soft Starters
   2. Motor Control Centers
   3. Control/Instrumentation Systems (RTP)
   4. Harmonic Equipment, filters, reactors, etc,

B. Shop Drawings: Submit for review prior to ordering. Show complete outlines, dimensions, electrical services, control diagrams, electrical characteristics of special nature or critical to the installation, and pertinent data required for installation. In addition to specific references or requests, submit shop drawings for the following applicable items:
   1. Variable Speed Drives
   2. Motor Control Centers
   3. Control/Instrumentation Systems (RTP)
   4. Harmonic Equipment, filters, reactors, etc,
   5. Panelboards
   6. Lighting Fixtures
   7. Switches
   8. Lightning Protection Devices
   9. Transient Voltage Surge Suppressors
   10. Receptacles
   11. Safety Switches

C. Partial submittals shall be cause for rejection.

1.5 SUBSTITUTIONS

A. Refer to Article 8, General Conditions, paragraph 8.5 substitution of equipment and materials.

B. Equipment and/or materials manufactured by any one of the manufacturers listed in this specification or on the drawings shall be acceptable.
   1. All equipment shall conform to the arrangement and overall dimensions as shown on the plans and one-line diagram.
   2. The dimensions shown on the drawings are critical. The equipment supplier is responsible for changes to dimensions of equipment per Article 8.5 “Substitution.”

C. Where no specific manufacturer is listed, a first-class item of cataloged manufacturer shall be furnished.

D. Request for substitution constitutes a representation that Contractor has investigated proposed product and has determined that it is equal to or superior in all respects to specified product or that the cost reduction offered is ample justification for accepting the offered substitution.

E. Requests for acceptance of materials and equipment not specified herein will not be reviewed prior to bidding. If Contractor wishes to furnish or use a substitute item of material and/or equipment, it must be submitted as a change order request to the Engineer within 15 working days of notice to proceed. The request for change order shall itemize each of the proposed substitutions identified by applicable specification section, paragraph number, and/or drawing number. The Contractor shall identify all exceptions and/or differences to the specification in writing at the time of submittal. A price change decrease shall be listed for each item along with complete data showing performance over entire range, physical dimensions, electrical characteristics, material construction, operating weight, and other applicable data. The Engineer will review the change order request for equality, suitability, and reasonableness of price differential. A single substitution change order listing the accepted items will be issued with the net cost of the change order being the sum of the accepted item costs. Only one request for substitution for each product will be considered. The Engineer will

make recommendations for either acceptance or rejection to the Town of Castle Rock. The Town's decisions will be final.

F. It shall be the responsibility of the Contractor to ensure that the substitute material and/or equipment fits into the space provided. The Contractor shall pay for all extra costs incurred by other trades for any and all changes necessitated by these substitutions.

G. The Contractor shall be responsible for any changes from the electrical drawings occasioned by the specifically different equipment. The Contractor shall pay for all additional engineering services (redesigns, submittal reviews, cost estimates, etc.) required to incorporate the specifically different equipment.

H. Acceptance of substitutions shall not relieve Contractor of meeting requirements of the contract documents for substituted items and associated work.

I. Contractor shall, without additional cost, coordinate installation of accepted substitutions, making such changes as may be required for work to be complete in all respects.

J. Contractor waives all claims for additional costs related to substitutions.

1.6 MANUFACTURER'S RECOMMENDATIONS

A. Where installation procedures or any part thereof are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendations shall be cause for rejection of the equipment or material.

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

A. The electrical requirements for equipment specified or indicated on the drawings are based on information available at the time of design. If equipment furnished for installation has electrical requirements other than indicated on the electrical drawings, the Contractor shall make all adjustments to wire and conduit size, controls, overcurrent protection and installation as required to accommodate the equipment supplied, without additional expense to the Owner. The complete responsibility and costs for such adjustments shall be assigned to the respective section of this specification under which the equipment is furnished.

2.2 MATERIALS

A. All similar materials and equipment shall be the product of the same manufacturer.

B. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer's current and standard design. All material and equipment installed shall be new, unless otherwise specified.

2.3 ALTITUDE

A. All equipment and material shall be designed, constructed and tested to operate successfully at 5,280 feet above sea level and -25°F to 104°F ambient temperature range unless otherwise specified.

PART 3 - EXECUTION

3.1 GENERAL

A. Fabrication, erection, and installation of the complete electrical system shall be done in a first-class workmanlike manner by qualified personnel experienced in such work, and shall proceed in an orderly manner so as not to hold up the progress of the project. Check all areas and surfaces where electrical equipment or material is to be installed, removed or relocated and report any unsatisfactory conditions before starting work.

3.2 PERFORMANCE TESTS

A. Thoroughly test all fixtures, services, and all circuits for proper operating conditions and freedom from grounds and short circuits before acceptance is requested. All equipment, appliances, and devices shall be operated under load conditions.

B. After the wiring system installation is complete, and at such time as the Owner may direct, conduct operating tests for approval. When requested, test all the wire, cable, devices, and equipment after installation, to assure that all material continues to possess all the original characteristics as required by governing codes and standards listed in these specifications.

C. Perform such other tests as required by other sections of these specifications or as requested to prove acceptability.

D. Furnish all instruments and labor for testing.

3.3 OPERATING INSTRUCTIONS AND MANUALS

A. Instructions: Furnish competent instruction to the Engineer in the care, adjustment, and operation of all parts of the electrical equipment and systems.

B. Manuals: Upon completion of the work prepare and deliver to the Engineer two sets of complete operating and maintenance manuals for the systems and major equipment installed. Include catalog data, shop drawings, wiring diagrams, performance curves and rating data, spare parts lists, and manufacturer's operating and maintenance data.

C. Other: The above requirements are in addition to specific instruction and manuals specified for individual systems or equipment.

3.4 LOCATION OF EQUIPMENT AND OUTLETS

A. The approximate locations of cabinets, panelboards, switches, light outlets, power outlets, etc., are indicated on the drawings; however, they are not intended to give complete and accurate information. Determine the exact location after thoroughly examining the general building plans and by actual measurements during construction, subject to the approval of the Engineer.

B. Exact locations for conduit, boxes, etc., stubbed up or in the floor shall be the responsibility of the Contractor. Coordinate this work with the other trades.

3.5 IDENTIFICATION AND SIGNS

A. Mark each individual motor controller, disconnect switch, transformer, and remote control device to identify each item with its respective service. Marking may be stenciled on the enclosure or adjacent surface in utility areas. Provide nameplates in finished areas.

B. Provide nameplates with engraved lettering not less than 3/8"- high where specified or noted. In general, use black core laminated plastic, attached with screws. Embossed plastic adhesive tape is not acceptable. Flush mounted devices may have identification engraved in the device plate.

C. Provide warning signs on all equipment or devices operating at 480 volts or more, reading "DANGER-480 VOLTS," etc., with white letters on red background, of standard code size. Signs may be decals, stencils, or nameplates.

D. Identify panelboards, solid-state reduced voltage starter, transformers, and cabinets by nameplates with descriptions indicated on the drawings together with indication of location of the feeder overcurrent protection.

3.6 EXCAVATION AND BACKFILLING

A. Perform excavation, backfilling, and repaving required for work under this Division in accordance with DIVISION 2, SITE WORK. In general, backfill and tamp with compaction at least equal to that of the surrounding area.

3.7 STARTUP PROVISIONS

A. A factory-trained service engineer shall be provided to assist the Contractor in the proper installation, calibration, testing, operational startup and coordination of all phases of the power and control instrumentation system. Said engineer shall also be provided to instruct the maintenance personnel in the proper calibration, testing, and maintenance of the entire control system for a period of not less than two working days.

3.8 CLEANING

A. The Contractor shall be responsible for all rubbish, debris, etc., accumulated through the electrical work. Clean regularly and leave in a "vacuumed" condition.

3.9 TEMPORARY POWER AND LIGHTING

A. Furnish and install all temporary electrical facilities required for construction and safety operation. No part of the permanent electrical systems or the existing electrical system may be used for temporary service unless approved by the Owner. Provide construction power electrical metering. Facilities shall comply with all applicable OSHA and NEC requirements.

3.10 POWER SUPPLY

A. Power supplies for these projects will be 277/480V, three-phase, four-wire from utility company transformers. Provide necessary work and coordination for service connection to the utility company. Provide metering facilities as required by the utility company and as shown on the drawings. All requirements for the permanent power supply shall be coordinated with the Owner and as recommended and approved by the utility company.

END OF SECTION 16010

SECTION 16110

RACEWAYS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. The drawings and general provisions of the contract, including the General Conditions, apply to the work specified in this section.

B.	Electrical General Provisions	Section 16010
	Grounding	Section 16450

1.2 REQUIREMENT

A. Submit Conduit Routing Plan and details for all embedded conduits to the Engineer for review.

PART 2 - PRODUCTS

2.1 CONDUITS

A. Rigid Steel Conduit: Rigid, threaded, thick-wall, zinc-coated on the outside, and either zinc-coated or coated with an approved corrosion-resistant coating on the inside.

B. Rigid Aluminum Conduit: The use of aluminum conduit is not permitted.

C. Intermediate Metal Conduit (IMC): Rigid, threaded, lightweight steel, zinc-coated on the outside, and either zinc-coated or coated with an approved corrosion-resistant coating on the inside.

D. Rigid Nonmetallic Conduit: Schedules 40 and 80, high-impact, PVC approved for 90°C conductors. Carlon, Triangle, or approved equal.

E. Electrical Metallic Tubing (EMT): The use of EMT is not permitted.

F. Flexible Conduit: The use of flexible conduit is not permitted.

G. Liquid-Tight Flexible Conduit: Flexible galvanized steel tubing with extruded liquid-tight PVC outer jacket.

H. Conduit Size: Minimum conduit size 3/4" except where specifically approved for equipment connections. Sizes not noted on the drawings shall be as required by the NEC.

2.2 CONDUIT FITTINGS

A. Rigid Steel Conduit and IMC Fittings: Iron or steel only

B. Rigid Nonmetallic Conduit Fittings: Approved for the purpose and as recommended by the manufacturer.

C. Liquid-Tight Flexible Conduit Fittings: With threaded grounding cone, a steel, nylon or equal plastic compression ring, and a gland for tightening. Either steel or malleable iron only with insulated throats and male thread and locknut or male bushing with or without O-ring seal. Each connector shall provide a low resistance ground connection between the flexible conduit and the outlet box, conduit or other equipment to which it is connected.

D. Connectors and Couplings: Compression type threadless fittings are not permitted. Set screw type fittings are not permitted. Connectors shall have insulated throats.

E. Bushings: Insulated type, designed to prevent abrasion of wires without impairing the continuity of the conduit grounding system, for rigid steel conduit and IMC, larger than 3/4" size.

F. Expansion Fittings: Each conduit that is buried in or secured to the buildings construction on opposite sides of a building expansion joint and each long run of exposed conduit that may be subject to excessive stresses shall be provided with an expansion fitting. Expansion fittings for rigid steel conduit shall be hot-dipped galvanized malleable iron with factory installed packing and a grounding ring. Expansion fittings for rigid non-metallic conduit shall be of the short type in runs 25’ or less, and the long type in runs 26 to 80'. The long type shall be a two-piece barrel and piston joint, providing 6" of the total movement range in 3/4" through 6" conduit sizes. The short type shall be a one-piece, coupling with O ring, providing 2" of total movement range in 3/4" to 2" conduit sizes.

G. Seal-Off Fittings: Threaded, zinc or cadmium coated, cast or malleable iron type for steel conduits. Fittings used to prevent passage of water vapor shall be of the continuous drain type.

2.3 WIREWAYS

A. Square D Company - Square cross section, lay-in type, NEMA 12 oiltight, with hinged gasketed covers on all sections. Use standard lengths. Field cuts permitted only where absolutely necessary. Rust-inhibiting phosphatizing coating on sheet metal parts. Blue-gray baked enamel finish. Hardware plated to prevent corrosion. Provide all accessories including tee fittings, junction boxes, cross fittings, transposition sections, gusset brackets, nipples, pull boxes, reducer fittings, wall flanges, panel or cabinet flanges, elbows, ceiling, and wall support brackets and supporting hardware, etc.

2.4 SUPPORTS

A. All supports, hangers, screws, bolts, etc., shall be galvanized steel or cadmium plated.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION

A. Conduit Systems: Rigid steel conduit, IMC, rigid nonmetallic conduit or liquid-tight flexible conduit unless otherwise specified.

B. Rigid Galvanized Steel:
   1. Conduit exposed up to 4'-0" above grade and exposed to physical abuse, shall be rigid steel conduit of standard weight mild steel pipe, zinc-coated. Couplings, elbows, bends, etc., shall be subject to the same requirements as for rigid steel conduit.
   2. In hazardous locations
   3. For all high voltage (600V or greater) circuits above or below grade. Half lap tape all rigid steel conduit below grade with Scotchwrap No. 51 or approved equal.
   4. 90-degree rigid galvanized steel elbows and extensions with PVC coating from PVC conduit in or under slab to above slab.

C. Rigid Nonmetallic Conduit:
   1. Install in accordance with manufacturer's recommendations for all conduits exposed above grade. Joints shall be solvent welded. Field bends shall utilize approved bending equipment. Rigid nonmetallic conduit is not permitted in ducts, plenums, or other air handling spaces; where conduits rise out of concrete or masonry; where exposed indoors or outdoors and subject to physical abuse.
   2. Heavy-wall, Rigid, Schedule 40 PVC.
      a. For all exposed wiring runs from 4'-0" above finished floor or grade.
   3. Extra Heavy-wall, Rigid, Schedule 80 PVC.
      a. For all wiring runs in or under the concrete floor slab and in concrete walls.
      b. For all wiring runs buried underground, where indicated.
      c. For all exposed wiring runs where not exposed to physical abuse from grade or above finished floor to 4'-0".
      d. 90-degree PVC elbows from PVC conduit in or under slab to above slab under completely enclosed electrical equipment (switchboards, MCC, control panels, etc.). These conduits may be cut off under the equipment.
      e. 90-degree rigid galvanized steel PVC coated elbows from PVC conduit in or under the slab to fixed equipment (motor, panelboards, instruments, etc.).

D. Liquid-tight Flexible Conduit: For final connection to all motors and other vibrating equipment. Overall length of the conduit shall not exceed 3'-0".

E. Conduit in Concrete: Rigid nonmetallic conduit may be embedded in concrete providing the outside diameter does not exceed one-third the thickness of the concrete slab, wall, or beam, is located entirely within the center third of the member, and lateral spacing of conduits is not less than three diameters. Rigid steel conduit embedded in concrete or masonry is not permitted, except as permitted by the Engineer.

F. Steel Conduit in Ground: Rigid steel conduit that is in contact with ground, on a vapor barrier, or encased in concrete shall be wrapped with Scotchwrap 51 half-lapped, or shall have an additional outside factory coating of polyvinyl chloride with a minimum coat thickness of 40 mils. Other PVC or Phenolic-resin-epoxy coating material which is equally flexible and chemically resistant may be used providing approval by the Engineer is obtained prior to installation.

G. Exposed Conduits: Install exposed conduit systems parallel to or at right angles to the lines of the building. Right angle bends in exposed runs shall be made with standard elbows, screw-jointed conduit fittings, or conduit bent to radii not less than those of standard elbows. Raceways shall

project 2” minimum above floor or equipment foundation.

H. Concealed Conduits: Install conduit systems concealed where possible unless otherwise noted. Conduit systems may be exposed in unfinished utility areas, ceiling cavities, and where specifically approved by the Engineer. Install concealed conduit systems in as direct lines as possible.

I. Conduit Bends: In any conduit run, the number of quarter bends or equivalent between terminations at cabinets or boxes shall not exceed four bends for conduits up to 1-1/4", three bends for 1-1/2" to 2-1/2" conduits, and two bends for 3" to 4" conduits. Conduit runs between cabinets or boxes shall not exceed 200’ for straight runs nor 100' for runs with maximum number of bends.

J. Conduit Openings: Protect all vertical runs of conduit terminating in the bottoms of boxes or cabinets, etc., from the entrance of foreign material prior to installation of conductors.

K. Seal-Off Fittings: Install where required by the NEC, where conduits pass from warm to cold locations, where entering the vault, and where otherwise indicated.

L. Sleeves for Conduit: Install sleeves for conduit where shown or as required. Conduit sleeves not used shall be plugged with recessed type plugs. Sleeve all conduit passing through walls except in hazardous areas. Sleeves that are used shall be caulked tight with lead yarn.

M. Exterior Underground Conduits: Install exterior underground conduits 30” minimum below finished grade.

3.2 CONDUIT SUPPORTS

A. Supports: Provide supports for horizontal steel conduits not more than 10' apart with one support near each elbow or bend, including runs above suspended ceilings. Supports for non-metallic conduits shall be not farther apart than as shown in NEC Table 347-8. Provide supports and hangers as necessary and as required to insure a good and substantial installation. Support raceways, fixtures, cabinets, boxes, etc., on approved types of trapeze hangers or wall brackets as manufactured by Unistrut or approved equal. Provide hanger rods securely fastened to or through the building structure for all trapezes, etc. Do not suspend from mechanical piping or ductwork. Perforated plumber's straps or wire or other method or device not specifically designed and approved for the support of conduits will not be permitted. All supports, hangers, screws, bolts, etc., shall be galvanized steel or cadmium plated.

B. Straps: Install one-hole pipe straps on conduits 1-1/2" or smaller. Install individual pipe hangers for conduits larger than 1-1/2". Spring steel fasteners with hanger rods may be used in dry locations in lieu of pipe straps. Hangers shall be the standard products of ERICO Products, Inc., B-Line, or approved equal.

C. Trapezes: Install multiple (trapeze) pipe hangers where two or more horizontal conduits run parallel and at the same elevation. Secure each conduit to the horizontal hanger member by a U-bolt, one-hole strap or other specially designed and approved fastener.

D. Hanger Rods: Install 3/16" diameter or larger steel rods for trapezes, spring steel fasteners, clips and clamps. Wire or perforated strapping shall not be used for the support of any conduit.

E. Fastening: Fasten pipe straps and hanger rods to concrete by means of inserts or expansion bolts, to brick-work by means of expansion bolts, and to hollow masonry by means of toggle bolts. Wooden plugs and shields shall not be used. Power-driven fasteners may be used to attach pipe straps and hanger rods to concrete where approved by the Engineer.

3.3 CLOSING OF OPENINGS

A. Wherever slots, sleeves or other openings are provided in floors, walls, or equipment pads for the passage of conduits or other forms of raceway, including bus ducts, such openings, if unused, or the spaces left in such openings, shall be filled or closed in a manner approved by the Engineer.

3.4 PUMP STATION CONDUITS AND RACEWAYS

A. All conduit installed in the meter vault will be mounted on the ceiling except for vertical runs from the ceiling down to receptacles or equipment. The intent is to locate all electrical equipment as high as possible. Under no circumstances shall conduits be routed on the floor.

3.5 PUMP STATION WALL PENETRATIONS AND EXTERIOR JUNCTION BOX OR EQUIPMENT WATERPROOFING

A. All conduit penetrating the meter vault shall be waterproofed, both externally and internally to prevent surface or ground water entering the vault by this route. Seal raceways entering vault by installing non-metallic LB conduit body at entry location. After completion of conductor installation and checkout, pack conduit and conduit body with electricians putty or approved duct seal compound. Exterior sealing of conduit shall be accomplished per specifications for pipe penetrations in General Note 8 of Drawing 4.

3.6 GROUNDING WIRE

A. A separate grounding conductor shall be installed in all raceways. Raceways shall not be relied upon as grounding conductor.

END OF SECTION 16110

SECTION 16120

CONDUCTORS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. The drawings and general provisions of the contract, including the General Conditions, apply to the work specified in this section.

B.	Electrical General Provisions	Section 16010
	Grounding	Section 16450

PART 2 - PRODUCTS

2.1 WIRES AND CABLES (600 VOLTS AND UNDER)

A. Type: Conform to the applicable UL and ICEA Standards for the use intended. Copper conductors with 600-volt insulation unless otherwise specified or noted on the drawings. Stranded conductors for No. 6 and larger and where elsewhere specified or noted on the drawings.

B. Aluminum Conductors Prohibited: Aluminum conductors will not be permitted.

C. Secondary voltage cables and wires shall be copper, unless otherwise indicated on drawings, single conductor rated 600 volts conforming to or exceeding ICEA Specifications and shall be as follows:
   1. In sizes #1/0 AWG to 4/0: Cross-linked polyethylene insulation type XHHW (75 - 90^{O}C) or THWN
   2. In sizes 250 MCM and larger: Type RHW/USE or THWN
   3. In sizes #1 AWG and smaller: All conductors shall have heat/moisture resistant thermoplastic insulation type THW or THWN (75^{O}C), except as follows:
      a. Where conduit temperature will exceed 100^{O}F, use type THHN (90^{O}C). Type XHHW (90^{O}C) permissible in dry locations.
      b. In 120 volt incandescent fixtures, type AF (150oC).
      c. In wireways of fluorescent lighting fixtures types THW-MTW (90oC).
      d. Handling cord drops and cord connections: Type "SO" cord.
   4. All wiring for control circuits to contactors, pushbuttons, and the like, shall be 14 AWG, copper, stranded with THWN/THHN insulation.
   5. Grounding Conductors: Copper Type TW with green integrally colored insulation, or bare-medium-hard-drawn copper.
   6. General Electric, Okonite, Rome or General Cable products are acceptable.
   7. Low Voltage Conductors: Jacketed, approved type, with low smoke producing characteristics. Wiring in ducts, plenum, and other air handling spaces shall comply with NEC 300-22. Other cables shall comply with NEC Article 310.

D. Color Coding: Neutral and ground conductors shall be color-coded in accordance with NEC. Ungrounded circuit conductors shall be marked in accordance with paragraph 3.09A. Connect all conductors of the same color to the same phase conductor. Conductor No. 10 and smaller shall be

covered their entire length with a color compound. Conductor sizes larger than No. 10 may be color-coded at each termination and in each box or enclosure with 6" of half-lapped 3/4" pressure-sensitive, plastic tape of respective colors in lieu of solid color compound.

2.2 CONNECTORS AND LUGS

A. For copper conductors No. 6 and smaller: 3M Scotch-Lok or T&B Sta-Kon, or equal compression or indent type connectors with integral or separate insulating caps.

B. For copper conductors larger than No. 6: Solderless, indent, hex screw, or bolt-type pressure connectors, properly taped or insulated.

C. Wirenuts, where permitted, shall be the standard product of 3M Scotch, Buchannon

2.3 TAPE

A. Plastic tape, 8.5 mils maximum thickness, one megohm minimum insulation resistance, oil-resistant vinyl backing, oil-resistant acrylic adhesive, incapable of supporting combustion per ASTM D-568 Test Method B.

PART 3 - EXECUTION

3.1 WIRE AND CABLE TESTS (600 VOLTS AND UNDER)

A. Measure the insulating resistance of service entrance conductors, feeder circuit conductors, and service ground. Measurements shall be taken between conductors and between conductors and ground. Resistance shall be 1,000,000 ohms or more when tested at 500 volts by megger without branch circuit loads. Tests and procedures shall meet the approval of the Engineer, and shall be in accordance with the applicable IPCEA standards for the wires and cables to be installed. Furnish all instruments, equipment and personnel required for testing, and conduct tests in the presence of the Engineer. Submit written reports of the tests and results to the Engineer.

3.2 SPLICES (480 VOLTS AND UNDER)

A. Splices are not normally permitted in power or control conductors. Conductor lengths shall be continuous from the supply to the load. If splices are deemed unavoidable, specific approval of the engineer is required.

B. Lighting and outlet circuits shall utilize approved wirenuts installed in device boxes or accessible raceway junction boxes to extend the circuit from device to device. Splices for this purpose are exempt from the requirements of Paragraph 3.02 A.

3.3 PULL WIRES

A. In each empty conduit, install a No. 14 galvanized steel pull wire or a plastic line having a tensile strength of not less than 200 pounds.

3.4 IN RACEWAYS

A. Install in rigid conduit, non-metallic conduit, or liquid-tight flexible metallic conduit, unless otherwise specified or noted on the drawings.

3.5 CABLE BENDS

A. Radius of bends shall not be less than 12 times the outer diameter of the cable.

3.6 BUNDLING

A. Conductors No. 10 and smaller shall be neatly and securely bundled, and conductors larger than No. 10 shall be neatly and securely cabled in individual circuits, utilizing marlin twine, two-ply lacing, or nylon straps.

3.7 FEEDER IDENTIFICATION

A. Tag feeder circuits in each enclosure with wraparound circuit designation labels where more than one feeder passes through or terminates in the enclosure.

3.8 CONNECTORS AND LUGS

A. Install with manufacturer's recommended tools and with the type and quantity of deformations recommended by manufacturer.

3.9 INSTALLATION OF WIRES

A. All wiring shall be routed through an acceptable raceway regardless of voltage application, unless specified otherwise under other sections of these Specifications.

B. Pull no wire into any portion of conduit system until all construction work which might damage the wire has been completed. Conductors for all voltages shall be color coded as follows:
   1. Wire No. 10 and smaller shall be factory color coded.
   2. Wire No. 8 and larger may be color coded by field painting or color taping or the entire length of exposed ends or 12" of exposed end, whichever is less.
   3. 120/208 volts: Phases: a-black, b-red, c-blue, neutral-white, ground-green
   4. 277/480 volts: Phases: a-brown, b-orange, c-yellow, neutral-gray, ground-green

END OF SECTION 16120

SECTION 16130

BOXES AND FITTINGS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. The drawings and general provisions of the contract, including the General Conditions, apply to the work specified in this section.

B.	Electrical General Provisions	Section 16010
	Grounding	Section 16450

PART 2 - PRODUCTS

2.1 OUTLET BOXES

A. Construction: Provide malleable iron cadmium finish, cast aluminum, or plastic boxes for all locations. Pressed steel boxes are not permitted, except for boxes in drywall covered wood or metal stud walls, and drywall covered ceilings. Provide concrete type boxes for flush installation in concrete walls and floors and masonry walls.

B. Size: To accommodate the required number and sizes of conduits, wires and splices in accordance with NEC requirements, but not smaller than size shown or specified. Standard concrete type boxes not to exceed 6" deep except where necessary to permit entrance of conduits into sides of boxes without interference with reinforcing bars.

C. Wall-Mounted Switch, Receptacle, and Signal Boxes: Unless otherwise noted or specified, not less than 4" square by 1-1/2" deep for two devices, and multi-gang boxes for more than two devices.

D. Light Fixture Boxes: 4" diameter by 1-1/2"-deep minimum for ceiling and interior bracket fixtures with concealed conduits. Screw-joint boxes with canopy seat for ceiling and interior bracket fixtures with exposed conduits.

E. Grounding Terminal: Provide a grounding terminal in each box containing a green equipment ground conductor, or serving motors, lighting fixtures, or receptacles. Grounding terminal shall be green-colored washer-in-head machine screw or grounding bushing.

2.2 PULLBOXES AND JUNCTION BOXES

A. Minimum NEC requirements unless larger box is noted. As specified for outlet boxes with blank cover and gasket for pullboxes with internal volume not more than 150 cubic inches. As specified for cabinets and pullboxes with internal volume over 150 cubic inches, except covers to have same thickness as box with corrosion-resistant screw or bolt attachment and gasket.

PART 3 - EXECUTION

3.1 OUTLET BOXES

A. Installation: Unless otherwise specified or shown on the drawings, outlet boxes shall be flush mounted and the front edges of the boxes or plaster covers shall be flush with the finished wall or ceiling line, or, if installed in walls and ceilings of incombustible construction, not more than 1/4" back of same. Mount boxes with the long axes of devices vertical, unless otherwise specified. Boxes in plastered walls and ceilings shall be provided with plaster covers. A multiple of box extensions and/or covers will not be permitted. Install in a rigid and satisfactory manner with suitable metal bar hangers, box cleats, adjustable box hangers, etc. Use wood screws on wood, expansion shields on masonry and machine screws on steel work.

B. Mounting Heights: The mounting height of a wall-mounted outlet box shall be construed to mean the height from the finished floor to the horizontal center line of the cover plate. On exposed tile, block, or brick construction, mount outlet boxes at the nearest bed joint to the mounting height indicated. Receptacles shall be mounted 42" A.F.F. and switches 42" A.F.F. unless noted otherwise.

C. Wall-Mounted Switch, Receptacle and Signal Outlets: Install outlet boxes near the doors on the lock sides as shown on the drawings, unless other locations are approved by the Engineer.

3.2 PULLBOXES AND JUNCTION BOXES

A. Provide additional pullboxes wherever necessary to meet requirements for maximum lengths of conduit runs and maximum numbers of bends as specified under Conduit and Fittings. Show all terminal strips in their relative location. Label all power and control conductors with appropriate phase or control wire tag number. The control wire color shall also be identified. Provide as-built drawings for all junction boxes.

END OF SECTION 16130

SECTION 16140

WIRING DEVICES AND PLATES

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. The drawings and general provisions of the contract, including the General Conditions, apply to the work specified in this section.

B.	Electrical General Provisions	Section 16010
	Grounding	Section 16450

PART 2 - PRODUCTS

2.1 SNAP SWITCHES

A. Unless otherwise specified, each snap switch (flush tumbler-toggle) shall be of the A.C. General use type for mounting in a single-gang spacing, fully rated 20 amperes minimum at 120-277 volts, conforming to minimum requirements of the latest revision of the Underwriters' Laboratories, Inc., UL 20 Fifth Edition Standard Snap Switches and further requirements herein specified. Specification grade, heavy duty, single-pole, three-way or four-way, of the maintained, momentary, or lock type as indicated on the drawings. Switches shall operate in any position and shall be fully enclosed cup type with entire body molded phenolic, urea, or melamine with cover of molded phenolic, urea or melamine. Fiber, paper or similar insulating material shall not be used for body or cover. Ivory color handles unless otherwise indicated on the drawings. Silver or silver alloy contacts. A.C. 120/277 volt general use snap switches shall be capable of withstanding tests as outlined in NEMA Publication WD1-1965, and shall be as follows or equal unless otherwise noted:

20A 120-277V AC	Hubbell
single-phase	1221, 1281
three-way	1223, 1283

2.2 RECEPTACLES

A. General: Configuration and requirements for all connector or outlet receptacles shall be in accordance with NEMA Publication WD1-1965, Part 3 and Part 10. Fire-resistant, non-absorptive, hot-welded, phenolic composition or equal bodies and bases with metal plaster ears (integral with the supporting member). Single or duplex as shown or noted on drawings. Ivory color unless otherwise noted on the drawings. Double grip contacts for each prong.

B. Grounding Type: All receptacles shall be grounding type with a green colored hexagonal equipment ground screw of adequate size to accommodate an insulated grounding jumper (based on Table 250-95 of the NEC with minimum size No. 14 AWG). Grounding terminals of all receptacles shall be internally connected to the receptacle mounting yoke.

C. Unless otherwise noted, receptacles shall be as follows or equal:

Hubbell

15A-125V AC 2P 3W	5262
20A-125V AC 2P 3W	5362
30A-250V AC 2P 4W	9330

D. Special: Receptacles for special applications shall be as indicated on the drawings.

	Hubbell
GFI, 15A-125V AC 2P 3W	GF5262

2.3 DEVICE PLATES

A. General: Provide device plates for each switch, receptacle, signal and telephone outlet, and special purpose outlet. Do not use sectional gang plates. Provide multi-gang outlet plates for multi-gang boxes. Plates shall be metal, of spec. grade, ivory color, unless otherwise noted.

B. Exposed: Plates for exposed jointed fittings shall match the fittings with edges of plates flush with edges of fittings. Heavy cadmium-plated steel with gasket. Plates for cast type boxes at locations subject to wet or rain conditions shall be of the cast, vapor-tight type. Provide hinged lift covers for receptacle devices, Hubbell #5205WO or #5206WO, or approved equal. Provide weatherproof light switch cover plates, Hubbell #1750 or 1795, or approved equal.

C. Communication: Plates for telephone and signal outlets shall each have 3/8-inch bushed opening in the center.

D. Plates for special purpose outlets shall be of a design suitable for the particular application.

2.4 REMOTELY CONTROLLED SWITCHES OR RELAYS

A. Electro-magnetically operated, mechanically-held unless otherwise required. Rugged construction, substantially made, conforming to NEMA and IEEE test standards for industrial type power relays and the requirements of UL508, Standards for Safety Industrial Control Equipment. Ratings as indicated on the drawings, suitable for the application. Contacts shall be double-break, renewable, solid wiping type, silver-to-silver or silver-tungsten alloy, self-aligning, quick-make, quick-break, with a minimum inductive load rating of 10 amps. Relays shall be as manufactured by Allen-Bradley, Cutler-Hammer, Square D, or Westinghouse, equal to Allen-Bradley Bulletin 700 Control Relays. Provide sound-deadening mounting and enclosure.

2.5 MOMENTARY CONTACT SWITCHES

A. Tumbler type single-pole, double-throw momentary contact, similar in appearance to the conventional snap switch, 15 ampere at 120/277 volts. Provide cover plates to match the finish of other conventional snap-switch plates in the area. Provide nameplate to identify the circuit or equipment controlled.

PART 3 - EXECUTION

3.1 DEVICE PLATES

A. Install with alignment tolerance of one-sixteenth inch and all edges in continuous contact with wall surfaces.

3.2 SWITCHES

A. Install with "on" up.

3.3 RECEPTACLES

A. Install with the ground hole up. Mount all weatherproof receptacles horizontally.

END OF SECTION 16140

SECTION 16157

STARTERS, SWITCHES, AND FUSES

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. The drawings and general provisions of the contract, including the General Conditions, apply to the work specified in this section.

B. Electrical General Provisions	Section 16010
Grounding	Section 16157, Section 16450

PART 2 - PRODUCTS

2.1 DISCONNECTING MEANS

A. Safety Type Disconnecting Switches: Heavy duty type, 600 volts, horsepower rated for motors, fused or non-fused as required. Number of poles and ampacity as noted or required by code. Short-circuit rating shall be sufficient to withstand the available fault current or let-through current before the fuse melts without damage or change in rating. NEMA 1 enclosures shall be used for dry locations. NEMA 3R enclosures shall be used for wet locations or where exposed to weather unless otherwise noted. Square D, Westinghouse, or equal. All safety switches shall be of one manufacturer.

B. Separately Enclosed Motor Snap Switches: Motor snap switches may be used for motor disconnect means, controller, and motor overcurrent protection when applicable. These devices shall be horsepower rated and may contain motor-running, overcurrent protection.

2.2 FUSES

A. Fuses shall be Class K-1 and K-5 of rejection type for 600 amperes and below and Class L for over 600 amperes. Fuses shall be Bussmann "Limitron" and "Fusetron," Gould Shawmut, or Littelfuse equivalents.

B. Coordinate the low voltage fuses required for the project to provide basic selective protection and properly coordinate with the other associated protective equipment.

2.3 INDIVIDUAL MOTOR STARTERS

A. The size of the combination starter shall be as shown on the drawings. All individual starters shall be of the same manufacturer and furnished by the Mechanical Contractor. Starters smaller than NEMA size 1 are not acceptable. IEC rated and/or NEMA equivalent rated starters are not acceptable. Provide fully sized NEMA rated starters.

B. Individual motor starters shall be combination circuit breaker (magnetic only) full voltage magnetic type with three-leg Class 20 overload protection in NEMA enclosure suitable for the location the equipment is installed. Provide two interlock contacts of interchangeable open-close type. Provide

hand-off-automatic selector, motor running "Amber" transformer type pilot light with long-life lamps and reset button in cover. Control circuits shall be provided by an adequately sized 120-volt control transformer with two high-side fuses and one secondary fuse. Motors 15 HP and above shall be equipped with power factor correction capacitor for correction to 95% lagging.

C. Acceptable manufacturers are General Electric, Furnas, Square D, Westinghouse, or equal.

2.4 MANUAL STARTERS

A. Starters for fractional horsepower, 120-volt motors shall be manual type, unless shown otherwise, equipped with built-in overload protection. All magnetic starters shall be of one manufacturer. Thermal overload switches shall be General Electric type CR101 or equal of other acceptable manufacturer.

2.5 REDUCED VOLTAGE SOFT-START CONTROLLER

A. Provide a reduced voltage soft-start controller as indicated on the drawings.

B. Unit shall provide a reduced voltage start of the closed loop voltage ramp type.

C. A separately adjustable ramp down or decel function shall be supplied. Each ramp shall have a Torque (Initial/Final) and a Time (Start/Stop) adjustment.

D. A shorted SCR detector shall be supplied with an interlock contact that will prevent starting of a device with shorted SCRs when wired into the control circuit in the appropriate position or may be used as an alarm driver.

E. Unit shall be supplied with a bypass contactor rated to handle the running current of the motor.

F. Adjustments
1. Initial Torque Adjustment Range
   30 - 90% of nominal voltage
2. Start Time Adjustment Range
   0.5 - 30 seconds
3. Final Torque Adjustment Range
   30 - 90% of nominal voltage
4. Stop Time Adjustment Range
   0.5 - 30 seconds
5. Line Voltage Limiter Adjustment Range
   80 - 120% of nominal voltage
6. PFC Circuit Adjustment Range
   60 - 100% of nominal voltage

G. I/O Points
1. Inputs:
   120V Control Power
   Motor Run Coil
   Ramp Selections
2. Outputs:
   N.O. Auxiliary Contact

N.C. Overtemperature Switch
N.C. Shorted SCR Detected

3. Diagnostics:
Control Power On LED
Motor Power On LED
Motor Starting LED
Shorted SCR LED

H. Approved reduced voltage soft-start controller is Furnas Nordic starter or equal.

PART 3 - EXECUTION

3.1 SAFETY AND DISCONNECT SWITCHES

A. Install safety and disconnect switches in general area of equipment and accessible to maintenance personnel. Secure switches firmly to supporting structure with approved fasteners. Verify size of switches for each installation. Where practical, switches shall be mounted such that the top of switch is 6'-3" above finished floor or surface.

3.2 MOTOR CONTROL

A. Thermal overload relays shall be set at not more than 115% of motor full load current and in accordance with manufacturer's requirements.

B. Do not install thermal overload switches on roof or where exposed to sun.

C. Secure starter to supporting structure with approved fasteners.

3.3 OVERCURRENT PROTECTIVE DEVICES

A. Install fuses where required as a protective device and in conformance with equipment manufacturer's specified requirements.

3.4 MECHANICAL WIRING AND CONNECTIONS

A. Work by Mechanical Contractor: Provide all heating and ventilation equipment included under Division 15. Furnish all control devices which directly handle the full load current of the heating and ventilation equipment.

B. Provide all control wiring which does not directly control the full load motor or heating equipment current.

C. Furnish identification signs for electrical components of mechanical system.

D. All work shall be done in accordance with Division 16.

E. Work by Electrical Contractor: Provide all power feeders and final connect to all motors and electric heating equipment furnished under Division 15.

F. Install and wire through all control devices which directly handle full load motor or electric heating equipment current, e.g., as magnetic starters, line voltage thermostats, P.E. switches, etc., which are furnished by mechanical contractor. Locate where shown on the mechanical drawings.

G. Install identification signs furnished under Division 15. Provide 120V outlet and dedicated circuit for control voltage located in each mechanical equipment room or area.

H. Provide disconnects for all mechanical equipment.

3.5 EQUIPMENT CONNECTIONS

A. Provide all final connections for items of equipment including power feeders and disconnects or receptacles as required. All equipment items will be furnished and set by others. Confirm with suppliers all rough-in data, e.g., electrical characteristics, dimensions, locations, type of connection, etc., prior to installation.

END OF SECTION 16157

SECTION 16450

GROUNDING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

Electrical General Provisions	Section 16010
Raceways, Fittings, and Supports	Section 16110
Conductors	Section 16120

PART 2 - PRODUCTS

2.1 GROUND CONDUCTOR

A. Stranded copper, without splice throughout its length, sized as indicated, bare or insulated; color-coded green.

2.2 MADE ELECTRODES

A. One-piece copper clad rod minimum of 5/8-inch diameter by 8 feet long. Do not use metallic conduit or pipe.

2.3 BONDING JUMPERS

A. Bare copper. Jumpers for service equipment shall be the size of grounding conductor. Jumpers for interior wiring raceways and enclosures shall be sized according to NEC Table 250-95.

PART 3 - EXECUTION

3.1 GENERAL

A. Install two separate grounding systems; a service grounding system and an equipment grounding system. The service equipment, conduit systems, supports, cabinets, equipment, and neutral conductor shall be grounded in accordance with the minimum code requirements and as further indicated on the drawings or specified. Connect the two grounding systems together only at the main service equipment and at the secondary terminals of transformers creating separately derived distribution systems, such as dry-type transformers.

3.2 SERVICE GROUNDING SYSTEM

A. General: The service grounding system is provided for the A.C. service neutral ground. Current return conductors, such as neutrals of the service entrance, feeder circuits, and branch circuits, shall not be used for equipment grounding. Care must be exercised to insure that neutral bars are not bonded to the enclosures of panelboards, etc., which are not part of the main service equipment. Except for separately derived systems, the neutral conductors shall be grounded only in the main

service equipment.

B. Common Ground Point: Establish one common ground point in the main service equipment by interconnecting the insulated neutral bus (or bar), the uninstalled equipment ground bus (or bar), and service grounding electrode conductor.

C. Neutral Disconnecting Means: Install a neutral disconnecting means in the main service equipment for disconnecting and isolating the neutral bus from the common ground. The disconnect means may be disconnecting links in the interconnection between the insulated neutral and the uninsulated equipment ground.

D. Neutral Bars: Provide an insulated neutral bar, separate from the uninsulated equipment ground bar, in all panelboards, transformers, starters, disconnect switches, cabinets, motor control centers, automatic transfer switches, etc., which have neutral connections.

3.3 EQUIPMENT GROUNDING SYSTEM

A. General: Provide a complete equipment grounding system in accordance with the minimum code requirements and as further indicated on the drawings or specified. The equipment ground (green conductor) consists of metallic connections to ground of non-current-carrying metal parts of the wiring system or apparatus connected to the system. The primary purpose of equipment grounding is to provide greater safety by limiting the electrical potential between noncurrent-carrying parts of the system, and to provide a low impedance path to ground for possible ground fault current.

B. Common Ground Point: Establish one common ground point as specified elsewhere in this section of the specifications for interconnection of the equipment grounding system and the service grounding electrode conductor.

C. Service Equipment Enclosure: Bond the enclosure of the main service equipment to the uninsulated equipment ground bus (or bar) with a conductor or bar sized per NEC 250-79c and 250-79d.

D. Ground Bar: Provide an uninsulated equipment ground bar, separate from any insulated neutral bar, in all panelboards, transformers, starters, disconnect switches, cabinets, etc., for grounding the enclosure and for connecting other equipment ground conductors. The ground bar shall be an integrally mounted and braced bus bar in switchboards, or a separately mounted bar adequately braced or bolted to the enclosure of other types of equipment. The ground bar shall be adequately braced or bolted to the enclosure after thoroughly cleaning both surfaces to assure good contact. Provide solderless pressure connectors for all conductor terminations. Number and size of pressure connectors on equipment grounding bars as required for the termination of equipment grounding conductors. In addition to the active circuits, provide pressure connectors for all three-phase spares and spaces.

E. Conduits: Metallic conduits containing ground wire only shall be bonded to the ground wire at both conduit entrance and exit. Install grounding conductor in each conduit or duct except those used for telephone, sound, or low-voltage signals. Bond the conductor at both ends to the equipment grounding system.

F. Feeders and Branch Circuits: Provide a separate green insulated equipment grounding conductor for each single or three-phase feeder and each branch circuit with a three-phase protective device.

Provide a separate green insulated equipment grounding conductor for single-phase branch circuits where indicated on the drawings. Install the required grounding conductor in the common conduit or raceway with the related phase and/or neutral conductors and connect to the box or cabinet grounding terminal. Where there are parallel feeders installed in more than one raceway, each raceway shall have a green insulated equipment ground conductor.

G. Devices: Install a minimum No. 12 green insulated equipment bonding conductor from a grounding terminal in the respective outlet or junction box to the green ground terminal of all receptacles and through flexible conduit to all light fixture housings.

H. Motors: Install a separate green insulated equipment grounding conductor from the equipment ground bar in the motor control center or separate starter through the conduit and flexible conduit to the ground terminal in the connection box mounted on the motor. Install the grounding conductor in the common conduit or raceway with the related motor circuit conductors.

3.4 SEPARATELY DERIVED SYSTEMS

A. Electrical equipment and standby generators creating separately derived distribution systems, such as dry-type transformers, shall utilize the equipment ground bars in the equipment enclosure for both secondary equipment ground and secondary neutral ground with separate grounding conductor extended to an approved ground electrode.

3.5 GROUNDING ELECTRODES

A. Three service ground electrodes shall be utilized. One shall be the concrete embedded reinforcing steel in the floor. The second shall be a ground rod, and the other shall be a made electrode consisting of not less than twenty feet of bare copper conductor encased along the bottom of a concrete foundation footing which is in direct contact with the earth (NEC 250-83a). Make the connections to the cold water pipe inside the building at the point of entrance. The grounding electrode for separately derived systems shall be approved for the application.

3.6 GROUNDING CONDUCTORS

A. The grounding conductors for both service ground electrodes shall be insulated or bare copper, sized in accordance with NEC 250-94 (a), including the conductor for the made electrode. The conductors shall be continuous without joint or splice, and shall be installed in conduit with the conduit bonded to the conductor at each end. Install the conductor to permit the shortest and most direct path, and terminate in the main service equipment on the common ground point. Equipment grounding conductors shall be green insulated conductors equivalent to the insulation on the associated phase conductor, but not less than Type TW. The equipment grounding conductor or straps shall be sized in accordance with NEC. Where one feeder serves a series of panelboards or transformers, the equipment grounding conductor shall be continuous without splices. Grounding conductors shall not be installed through metal-sheathed holes. All connections shall be available for inspection and maintenance.

3.7 GROUND CONNECTIONS

A. Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated, the coating must be removed down to the bare metal. After the coating has been removed, apply a noncorrosive

approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal, it shall be painted or touched up with "Galvanox," or equal.

3.8 TESTS

A. Test the completed grounding system with a megger at the service ground bar in the presence of the local electrical inspector and submit a written report to the Engineer for approval. The service shall not be energized if the test shows more than 5 ohms, unless approved by the Engineer.

END OF SECTION 16450

SECTION 16510

LIGHTING/LAMPS

PART 1 - GENERAL

1.1 PROVISIONS

A. The general provisions of the contract, including General and Supplementary Conditions, Electrical General Provisions, Section 16010, apply to the work specified in this section.

1.2 DESCRIPTION

A. Work Included: Provide complete systems for interior and exterior lighting including all luminaires and lamps as indicated on drawings and as specified herein.

B. Execution and completion of all lighting in accordance with the drawings and Specifications.

C. Related Work Described Elsewhere:

Grounding	Section 16450
Conductors	Section 16510

1.3 GENERAL

A. All fixtures shall be listed and labeled by Underwriters' Laboratories, Inc.

B. The lighting fixture schedule indicates which fixtures are to be furnished by the Contractor and are designated on drawings by means of letters.

C. All materials and accessories, whether specifically described or not, shall be of best grade of commercial manufacturer, and all workmanship shall be first class in every respect.

D. Photometric data shall be furnished with submittal information for all fixtures of standard manufacture. Data shall include ITL or ETL test reports.

E. Tandem-wired units are acceptable where appropriate.

1.4 SUBMITTALS

A. Fixture List: Within two weeks after contract award and before material is ordered, the Contractor shall submit for approval a list of all proposed material and equipment, indicating manufacturer's name and general description.

B. Shop Drawings: Submit for approval a minimum of seven (7) copies of all shop drawings after the material list has been approved and prior to ordering. Show complete outlines, dimensions, electrical characteristics critical to the installation, and pertinent data required for installation. Indicate in the transmittal that submittal has been reviewed and accepted and all contract deviations identified, in addition to specific references or requests.

PART 2 - PRODUCTS

2.1 FIXTURE CONSTRUCTION AND LUMINAIRES

A. Furnish all luminaires of type, kind, and with number of lamps as indicated in fixture schedule, on drawings, and as specified herein.

Provide complete lighting equipment, including canopy suspensions, supporting brackets, hickeys, casings, sockets, holders, reflectors, ballasts, diffusing material, louvers, lamps, plaster frames, and flanges appropriate for the ceiling type. Where a discrepancy in length exists between the luminaire designated in the schedule and the length indicated on the plan, the scaled length of fixtures shall determine their length. Provide special plates, barriers, rings, etc., as required to comply with the National Electrical Code.

B. All luminaires shall be free of light leaks, warps, dents, or other irregularities. Lenses shall be free of cracks, chips, or discolorations.

Design and Construction of Luminaires Utilizing Ballasts: The ballast case temperature will not exceed the UL 90^{O}C limit in a 25^{O}C ambient. Luminaires to be installed in a damp or wet location shall be constructed with proper gasketing and corrosion resistant materials or coatings. Construct steel fixture channels, end caps, interior barriers, reflectors, etc., of adequate gauge.

C. All metal surfaces of luminaires shall be bonderized, galvanized, or sheradized after fabrication and treated to provide rust inhibiting and finish coat adherence properties.

D. All fixtures installed, where exposed to weather and/or cold temperature, shall be weatherproof, of the low temperature type, and suitable for efficient operation at the temperatures and conditions encountered. Provide low temperature ballasts for fluorescent and H.I.D. luminaires where mounted in ambient temperatures below 50^{O}F.

E. Fixtures and end pieces shall be constructed of adequate gauge steel.

F. Steel shall be painted with a final baked white enamel finish. Minimum reflectance for painted housing interiors shall be 88%. Painted finishes shall be a minimum of 1.5 mils thickness and shall have a balance between hardness and bending properties suitable for the application when required. Application and cleaning shall be done in a manner that will not cause yellowing or otherwise damage the finish.

G. Alzak aluminum reflectances shall be:

1.	Specular:	80% minimum	(75% for metal halide)
2.	Diffuse:	75% minimum	(70% for metal halide)

H. All fixtures exposed to weather or cold temperatures shall be weatherproof and suitable for efficient operation at the temperature and conditions concerned.

2.2 LENSES (FLUORESCENT)

A. Material: Lens (diffuser) shall be 100% virgin acrylic.

B. Minimum unpenetrated thickness shall be 0.125 inches; no blends or copolymers shall be permitted.

Plastics shall be ETL certified as light stabilized and non-yellowing.

C. Patterns shall be as scheduled on the drawings.

2.3 LAMPS

A. The Contractor shall furnish and install lamps in all fixtures as indicated on the drawings or as required. Fluorescent lamps shall be energy saver (warm white)(cool white). Forty-watt fluorescence shall be rapid start; 20 watt shall be trigger start. Incandescent lamps shall be inside-frost unless otherwise noted on the drawings. Incandescent and quartz lamps shall be rated at 130V. Verify lamp colors with Engineer prior to ordering.

B. Lamps shall bear labels of General Electric, Philips, Sylvania, or Norelco.

2.4 INCANDESCENT LAMPS

A. Incandescent Lamps: 2,500-hour, 130-volt, extended service. Provide special lamps from longest life available in each category.

2.5 FLUORESCENT LAMPS

A. Fluorescent Lamps: T8, rapid start with following minimum requirements:

Wattage	Color	Initial Lumens	Lumens At 2/5 Life	Rated Life
32		3,050	----	20,000 hours

B. High Output Fluorescent Lamps:

Wattage	Color	Initial Lumens	Lumens At 2/5 Life	Rated Life
60	Cool White	4,300	3,700	12,000 hours
85	Cool White	6,550	5,720	12,000 hours
85	Daylight	5,600	4,815	12,000 hours
110	Cool White	9,200	7,910	12,000 hours
110	Daylight	7,700	6,620	12,000 hours

C. Verify color with Engineer prior to ordering.

D. Energy efficient lamps and ballast shall be required if specified on drawings and/or fixture schedule. Additional specification may be shown on drawings.

2.6 BALLASTS

A. Ballasts shall be of the high power factor type bearing the CBM, BTL, and UL labels, as manufactured by Universal, Jefferson, Advance, or Motorola.

B. All ballasts shall be Class "P", internally thermally protected, automatic resetting type.

C. Sound rating shall be "A".

D. All fluorescent ballasts shall be "watt reducer super low heat energy savings" ballasts.

E. Mercury vapor fixture ballasts shall be suitable for 150^{O}F interior application and -20^{O}F outside.

2.7 EXIT AND EMERGENCY LIGHTING SYSTEM

A. Provide complete system as indicated on the drawings.

B. Locate all exit lights for maximum visibility. Connect system to emergency system as shown and specified.

C. Exit signs shall conform to local code requirements.

PART 3 - EXECUTION

3.1 LUMINAIRE AND FIXTURE INSTALLATION

A. Verify all ceiling types and coordinate fixture type and accessories prior to ordering fixtures. Coordinate and cooperate with ceiling supplier in the preparation of ceiling shop drawings. Architectural ceiling plans shall be used to determine exact locations of lighting fixtures.
   1. Completely connect and securely mount all luminaires. Provide all additional supports and hangers as may be necessary to securely fasten and support all luminaires to ceiling or structure.
   2. Clean luminaires and lamps, remove construction dirt, dust, paint, etc., and leave luminaires and lamps in first-class condition upon completion of work.
   3. All luminaires shall be delivered to the job site in cardboard boxes designed to prevent injury to luminaires in transit.
   4. Where two or more 48-inch fluorescent luminaires are indicated in continuous row, a 96-inch chassis may be used; lamps will remain 48 inches.
   5. Contractor shall certify to Owner that the fluorescent luminaires provided on the project will operate satisfactorily and continuously with Type "P" ballasts when installed under the conditions indicated on the design drawings and the ambient temperatures encountered therein. Ballasts and luminaires, where installed, shall provide a minimum possible sound level.
   6. The term "relamp" means to replace lamps with new lamps, tubes, bulbs, etc.

B. Recessed Luminaires: Installation of recessed luminaires shall conform to the following:
   1. In locations where modular wiring system is not used, provide separate junction box above ceiling near luminaire and wire to luminaire in flexible conduit.
   2. Provide plaster frames for recessed luminaries installed in a plaster ceiling.
   3. Openings cut in ceiling for recessed luminaires shall be completely concealed when luminaire trim is installed. There shall be no light leaks between luminaire trim and ceiling after luminaire is installed.
   4. Review ceiling construction as designed and provide all additional supports and hanging devices necessary to properly install luminaires in type of ceiling installed.

C. Adjust all incandescent lamp sockets to match specified lamps and aim all adjustable fixtures as directed by the Engineer.

D. All fixtures shall be securely fastened to either the slab, ceiling, wall or suspended ceiling grid.

E. All surface mounted lighting fixtures shall be installed with spacers between the fixture and mounting surface as required by code.

F. Recessed incandescent fixtures shall have thermal protection and shall be identified as thermally protected where installed in combustible type material. Refer to Section 410-65(c) of NEC. Contractor is to provide proper type of fixture for each application whether specifically indicated or not to comply with code.

G. Secure all recessed lighting equipment to suspended ceiling tees with fastening devices as approved by inspection authority. Provide all details.

END OF SECTION 16510

SECTION 16910

CONTROLS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. The drawings and general provisions of the contract, including the General Conditions and Division 1 specifications, apply to the work specified in this section.

B. Related Work Described Elsewhere:

General Electrical Provisions	Section 16010
Raceways	Section 16110
Conductors	Section 16120
Boxes and Fittings	Section 16130
Starters, Switches, and Fuses	Section 16157
Grounding	Section 16450
Heating and Ventilating Systems	Section 15800

1.2 REQUIREMENTS

A. The Contractor shall furnish, install, and place into service all process control systems including accessories related to this facility, all as shown and as specified above and herein.

B. The Contractor shall route and tag the control and instrumentation wiring in the existing RTP.

C. The District shall obtain the services of a separate Controls Contractor to wire configure and program the Central Network Monitor and the RTP at this station.

1.3 MINOR WORK

A. The work includes such necessary material and devices of a minor nature that may not be indicated on the Drawings or mentioned in the Specifications, but which are necessary for the compliance with codes and for the successful operation of the entire control system. The Contractor will be allowed no extra compensation because of this requirement.

1.4 COORDINATION

A. Verify all equipment sizes and the control of the motors and equipment before starting wiring. Consult with other Contractors to confirm exact requirements for equipment furnished and carefully do all work in accordance with shop drawings and requirements of manufacturer of equipment being wired. Motor horsepower is shown on the drawings for estimating purposes only. Verify that equipment to be furnished will agree with plans. If different in phase, voltage, sequence of operation, horsepower, or space requirements, coordinate the changed requirement with the equipment supplier so that there will be no additional cost to the District. The Contractor shall have full responsibility for the functional operation of power and control systems for the lift station.

1.5 SUBSTITUTIONS

A. The Contractor shall be responsible for any changes from the electrical drawings occasioned by the specifically different equipment. The Contractor shall pay for all additional engineering services required to incorporate the specifically different equipment. The Contractor shall be responsible for noting all exceptions to the specification in writing to the Engineer at the time of submittal.

1.6 SUBMITTALS

A. Shop Drawings: The Contractor shall submit detailed shop drawings and data as construction documents that fully describe the functional operation of all instrumentation and control systems. The quantity of submittal sets required shall be as specified under Special Provisions and Section 16010 of these Specifications. These drawings and data sheets shall be submitted as a complete bound package at one time. Any partial submittals shall be cause for rejection. The Contractor shall clearly identify all exceptions taken to the specifications in writing to the Engineer and submit them for review.

B. Preparation of Submittal Drawings and Data: The Contractor shall coordinate the work specified in this section of these Specifications and other sections so that a complete instrumentation and control system for the facility will be provided and will be supported by accurate shop and record drawings.

C. Schematic Diagrams: Complete schematic diagrams shall be submitted showing all control devices, subassemblies, coils, contacts, pushbuttons, selector switches, pilot lights, etc. All wiring connections shall be shown schematically. Each conductor on the schematic shall be identified by number, letter, or letter-number combination. The identification shall be used only once in the electrical system. Each conductor shall have the same identification at each terminal and tie point. All conductors connected to the same terminal or tie shall have the same identification.

D. Panel Layout Drawings: Panel layout drawings shall show the general physical arrangement of all components in or on the panel. Devices may be represented by squares or rectangles and shall be identified with the same designation shown on the schematics. Outline dimensions shall be shown and sufficient component layout dimensions shall be shown to verify space allocations. The drawing shall include a parts list identifying by manufacturer and model or catalog number each component or device installed in or on the panel.

E. Component Data Sheets/Technical Bulletins: Submit data sheets and technical bulletins for each instrument called out on the Process and Instrumentation Diagrams. These shall be identified by Tag Number. Where identical instruments are utilized in multiple similar applications, the data need be submitted only for one but Tag Numbers for all instruments to which the data sheets apply shall be noted. The data sheets shall show:
   1. Component Instrument Tag
   2. Manufacturer's model number or other product designation.
   3. Project location or assembly at which the component is to be installed.
   4. Input and output characteristics.
   5. Scale range and units (if any) and multiplier (if any)
   6. Requirements for electric supply (if any)
   7. Requirements for air supply (if any).
   8. Materials of component parts to be in contact with, or otherwise exposed to, process media.
   9. Special requirements or features

F. Index: A complete index shall appear in the front of each bound submittal volume. A separate technical brochure or bulletin shall be included with each instrument data sheet. The data sheets shall be indexed in the submittal by systems or loops, as a separate group for each system or loop. If, within a single system or loop, a single instrument is employed more than once, one data sheet with one brochure or bulletin may cover all identical uses of that instrument in that system. Each brochure or bulletin shall include a list of tag numbers for which it applies.

1.7 CONTROL EQUIPMENT SUPPLIER

A. The Contractor shall install all District-furnished material and equipment.

B. The Contractor is responsible for the routing and installation of all conduit and wire from remote equipment to the RTU panel. The Contractor shall carefully coordinate all work efforts with the districts system integrator. The Contractor shall properly identify all discrete and analog I/O circuits and tag these circuits at the RTU panel in coordination with the district system integrator.

1.8 SCADA SYSTEM

A. The existing level indication and control system is an ISAACS & Associates 900MHz radio based system that transmits level information from the Raw Water Tank to the River Pumping Station and to the Water treatment plant. This system controls the river pumping station to automatically fill the raw water tank and provides level indication of the raw water tank at the water treatment plant. This system will remain in operation.

B. The Contractor will provide an ISAACS tank level indication system similar to the Raw Water tank system, to transmit the Lambert tank level to the Water Treatment Plant (WTP). The contractor will provide a Bristol Babcock Control Wave Network 3000 SCADA RTP system with Free-Wave 900MHz Spread Spectrum Radio, mounted on the wall in the WTP as shown on the electrical drawings. The district's system integrator will be responsible for termination, programming, testing and start-up of the new ISAACS Lambert tank level system and the Bristol Babcock Control Wave Network 3000 SCADA RTP system with Free-Wave 900MHz Spread Spectrum radio, that will communicate between the WTP and the Town Hall Operations Center.

C. Operation: Automatic operation of pneumatically controlled BFV 1.1 and 2.1 will be performed via the Bristol Babcock Control Wave Network 3000 SCADA system. Provide all material and equipment for proper function, interface, and operation with the SCADA system in manual and automatic modes.

D. Control Sequence of Operation: The following paragraphs shall be used to establish both the hardware and control requirements of the SCADA control system.

1. BFV 1.1 Default position shall be closed by spring actuator. When it is desired to fill the Lambert tank from the Cimarroncito Reservoir the SCADA system will open the pneumatic 3-way solenoid on BFV 1.1. The pneumatic air system will open the valve and the geared limit switch will indicate when the valve is open. Water flows to the WTP and through the distribution system to the Lambert Tank. When the tank is full as indicated by the ISAACS tank level system, the SCADA system will close the pneumatic 3-way solenoid on BFV 1.1. The spring actuator will close the valve and the geared limit switch will indicate when the valve is closed.

2. BFV 2.1 Default position shall be closed by spring actuator. When it is desired to fill the Lambert tank from the River Pumping System, which supplies water to the Raw Water Tank, the SCADA system will open the pneumatic 3-way solenoid on BFV 2.1. The pneumatic air system will open the valve and the geared limit switch will indicate when the valve is open. Water flows to the WTP and through the distribution system to the Lambert Tank. When the tank is full as indicated by the ISAACS tank level system, the SCADA system will close the pneumatic 3-way solenoid on BFV 2.1. The spring actuator will close the valve and the geared limit switch will indicate when the valve is closed. The River pumping station will automatically replace water used from the Raw Water Tank.

3. WTP discharge Magnetic flow meter: A new magnetic flow meter will indicate and totalize the flow from the clear-well in the WTP. The flow will be sent to the SCADA system where it will be totalized and trended, on a daily and monthly basis for reporting.

4. Vault floor flooding: A moisture sensor shall be installed on the floor of the valve vault to detect the presence of water. This status shall be inputted to the RTP as an alarm condition.

5. Vault intrusion: Contacts on the valve vault hatch shall be connected to the WTP intrusion system to generate an alarm.

1.9 INPUT/OUTPUT (I/O) CONTROL FUNCTIONS

A. General: The (RTP) at the WTP continuously controls and monitors the status of discrete inputs and the values of analog process variables. The following I/O list shows the nature, type, and approximate number of the various types of points required. It shall be the responsibility of the Contractor to terminate the wiring for the discrete and analog signals in the RTP panel. The Contractor shall provide the wiring termination drawing.

B. I/O List:

Function	Software	Discrete Input	Discrete Output	Analog Input	Analog Output	Field Element	Comments
BFV 1.1							
Hand Position		X				X	
Auto Position		X				X	
Auto Open Control			X			X	Keyboard
Auto Close Control			X			X	Keyboard
Valve Position		X				X	Open/Close
Lambert Tank Level	X			X		X	Keyboard
BFV 2.1							

Function	Software	Discrete Input	Discrete Output	Analog Input	Analog Output	Field Element	Comments
Hand Position		X				X	
Auto Position		X				X	
Auto Open Control		X				X	Keyboard
Auto Close Control		X				X	Keyboard
Valve Position		X				X	Open/Close
Lambert Tank Level	X			X		X	Keyboard
WTP Discharge Flow	X			X		X	Mag-Meter
Vault Floor Flooding		X				X	Water on Floor Switch
Vault Intrusion		X				X	Hatch Switch

1.10 EXHAUST FAN IN VALVE VAULT

A. Control of exhaust fan in the valve vault will be in accordance with the mechanical control shown on drawing M 2.0. The fan runs only when the vault light switch is turned on.

PART 2 – PRODUCTS

2.1 COMPATIBILITY OF COMPONENTS AND EQUIPMENT

A. The Contractor shall be held responsible for obtaining all the necessary data and information on valves, pumps, pump control valves, flow meters, chemical metering and injection systems, and other control devices not furnished under this section of the specification but with which the control system must interconnect. The Contractor shall correlate this information with the work and ensure that elements furnished under this section are completely compatible with those furnished under other sections or with District-furnished material and equipment. All interconnections shall be shown on the wiring diagrams. The Contractor shall be held responsible that equipment furnished for any and all parts of the facility be totally compatible.

2.2 SCADA EQUIPMENT

A. All material and equipment for the Cimarron Water Treatment Facility Upgrade will be furnished and installed under this contract. All programming will be performed under a separate contract and will not be performed under this contract.

B. RTP: The new SCADA RTP at the Water Treatment Facility will be programmed by the districts system integrator. The electrical contractor will extend and tag all control wiring to the new RTP as indicated.

C. Uninterruptible Power Source (UPS): The unit shall be a self-contained, self-protected, fail safe system that provides regulated power to the load from a maintenance-free jell cell D.C. battery source during outage conditions. The unit shall be capable of powering the RTP,

digital displays, and any other equipment required for a period of one-half hour. The UPS shall provide backup power during conditions of momentary and prolonged power outages. Manual bypass switch shall be provided to bypass the UPS to the AC line for maintenance purposes. The unit shall be a Best Technology, Inc., Model L1660B or equal. The line side of the UPS shall be provided with a transient voltage surge suppression device. The suppresser shall be a Transector #ACP1000 BWM.

D. Communication Surge Protector: Provide surge protection devices on all communication ports and radio circuits. Surge protection shall be manufactured by Black Box, Transtector, or equal.

E. RTP Panel: The panel shall consist of an adequately sized, NEMA 12 enclosure to house the RTP, UPS, moisture sensor relay, control relays, digital indicators, duplex receptacles, internal wireway system, and shall accommodate all the control functions described in the specification. The complete enclosure shall be primed and painted with industrial grade, baked-on, grey enamel. A heavy-duty continuous hinge shall support the door. The door handle shall feature a 3-point drawn down latch with a key lock. All locks shall be keyed alike. A back panel shall be provided for equipment mounting. Provide white-faced, laminated nameplates with black core for each device in or on the panel. All incoming control wires shall be terminated at a master terminal strip. All control wiring from panel interior to front panel-mounted devices shall be extra flexible and bundled across hinge. All control wiring shall be bundled or routed in panel wireway. Terminal strips shall be provided with pressure plate terminals. Control wiring shall be MTW/THHN, stranded copper, sized and installed per the NEC, and color-coded by application as follows: 115 VAC control-red; 115 VAC neutral-white; DC control-blue; foreign power (if used)-yellow. All control wiring shall be marked corresponding to numbering system used on shop drawings at all conductor terminations. Both conductor markers and marked terminal blocks shall be used. All wiring from this panel to other remote-mounted devices shall be completely installed and factory tested. All secondary control components shall be powered with 120 VAC or 24 VDC. Indicating pilot lights shall be transformer type using 6-volt bulbs. All control relays shall be plug-in type for ease of replacement. Each control relay shall be provided with an integral neon light to indicate when the relay is energized. Lifting eyes shall be provided for easy handling. Enclosures shall be manufactured by Hoffman, Rittal, or equal.

2.3 CONTROL COMPONENTS

Equipment supplied to control the operation at the Cimarron Water Treatment Facility shall be from one manufacturer as nearly as possible. Contractor is responsible that equipment provided for any part of an operation be compatible with other parts. Small piping parts, connection devices, auxiliary switches, or any other equipment required due to differences in manufactured equipment shall be supplied as a part of the system at no extra cost to the District. Electrical components shall not be mounted to or secured from vibrating process equipment.

A. Push-buttons, Selector Switches, and Pilot Lights: Units shall be heavy duty and oil-tight as manufactured by Cutler Hammer (Bulletin T), Square "D", Allen Bradley, or equal. Pilot lights transformer type. Units installed in existing equipment shall match the existing when possible.

B. Terminals: Provide for all field connections, Buchanan, Connectron, or Marathon, pressure plate or box type.

C. Name Tags: White phenolic for equipment, process equipment identification, lights and switches, 3/16" lettering engraved to black core. Attach with brass screws.

D. Moisture Detector: The unit shall consist of a float switch mounted 2” above vault floor. Gems Inc. model LS-270 (normally open) #43765 or equal.

PART 3 – EXECUTION

3.1 PANEL WIRING

A. All pilot lights, push-buttons, and selector switches shall be panel-mounted. All incoming wires shall be terminated at a master terminal strip. All wiring from panel interior to panel-mounted devices shall be extra flexible and bundled across hinge. All wiring shall be bundled. Terminal strips shall be provided with pressure plate terminals. Wiring shall be #14 MTW/THHN, stranded copper, color-coded by application as follows: 115 VAC control-red; 115 VAC neutral-white; DC control-blue; foreign power (if used)-yellow.

3.2 CONTROL CABLE MARKING

A. All control wiring shall be marked corresponding to numbering system used on shop drawings at all conductor terminations. Both conductor markers and marked terminal blocks shall be used. Contractor will coordinate with district system integrator as to identification of control wiring extended to RTP.

3.3 INSTALLATION

A. Field devices shall be mounted at locations approximately as indicated on the drawings insofar as possible and shall be easily accessible for maintenance. Instruments not specifically located shall be located by the Contractor to provide accessibility for servicing; reasonable protection from the weather, physical abuse, and process hazards existing in the area; and protection of supporting structure from damage. It is the Contractor's responsibility to furnish the required material for a complete installation.

3.4 INSTRUMENT CALIBRATION

A. Instrument calibration will be performed by the district system integrator.

3.5 SYSTEM TEST AND DEMONSTRATION

A. Arrange with the District to provide demonstrations of all system operations for all persons of his choosing. Tests shall show that all electrical and control systems are clean, faultless, and free from mechanical and electrical defects. The Contractor shall provide one-half day of start-up assistance after acceptance of the work by the districts instrumentation engineer to insure that the District's operating personnel are properly trained in the system operation.

3.6 OPERATION AND MAINTENANCE MANUAL

A. Furnish number of copies as required by Section 16010 and Special Provisions, including system operating description, as-built drawings, catalog cuts, installation instruction, maintenance instructions, and replacement part list for all control systems and equipment. Provide address and telephone number of local source for parts and maintenance.

3.7 RECORD DRAWINGS

A. Maintain a complete set of Record Electrical Drawings at the site with all changes, etc., marked neatly thereon in a contrasting color. This set shall not be used for any other purpose. Keep the Drawings current at all times and present them to the Engineer upon completion of work. Record electrical drawings should provide the following information:
   1. Correct plan location of equipment installed.
   2. One-line diagram and panel-board corrections.
   3. Detail wiring diagram of all electrical equipment installed. Diagrams shall show the size and color of the wire, wire number (if used), and terminal block number (if used).
   4. The manufacturer's catalog number or part numbers shall be included for all equipment installed.

B. This information shall be incorporated in a neatly drafted and legible format as part of the operating and maintenance manuals.

END OF SECTION

NEW MEXICO

STANDARD SPECIFICATIONS

FOR PUBLIC WORKS CONSTRUCTION

SECTION 101

PORTLAND CEMENT CONCRETE

101.1.1 GENERAL: Portland cement concrete, prestressed concrete, post tensioned concrete, shotcrete, gunite, and light weight structural concrete shall consist of a mixture of Portland cement, aggregates, water, and admixtures, proportioned, batched and delivered as specified herein. All materials and design mixes used in Portland cement concrete, either batched at or delivered to a project shall be certified in accordance with the requirements of these specifications. Each design mix submitted and authorized for use under this Specification shall be identified by a design mix number, unique to that design mix. If either a change in material(s) or material supplier(s) from that specified in the authorized design mix occurs during a project, authorized use of the job mix formula on the project may be canceled as directed by the ENGINEER. A concrete design mix shall not be used on a project without written authorization of the ENGINEER. A design mix, upon request by a concrete supplier, may be authorized by the OWNER for use on OWNER and OWNER-related projects for a period of 14 months from the date of sampling of reference aggregates in the design mix.

101.1.2 For construction and reconstruction projects requiring portland cement concrete continuous placement(s) equal or greater than either 100 cubic yards of concrete per day, the CONTRACTOR shall have a full time portland cement concrete construction supervisor on site to direct the construction operations. The supervisor shall be certified either as an ACI certified Concrete Field Testing Technician Grade I, or the equivalent National Institute for Certification of Engineering Technologies Technician, with Specialty Concrete Work Elements Level I 82001, 82002, and Level II 84002, 84003, 84004, 84010. The supervisor shall be identified by the CONTRACTOR at the preplacement conference and shall be the contact person for the ENGINEER during concrete construction.

101.1.3 Pre-Placement Conference
A Pre-Placement Conference shall be held by the CONTRACTOR, as directed by the ENGINEER, no later than seven (7) calendar days prior to the start of construction for concrete continuous placement(s) equal or greater than either 100 cubic yards of concrete per day. The following meeting agenda/assigned responsibilities shall be accomplished at the conference.

I. ENGINEER/OWNER
   A. Scope of the project.
   B. Identify construction management team and contact telephone numbers.
   C. Review CONTRACT requirements for construction.
   D. Review Quality Assurance Program.

II. CONTRACTOR
   A. Review construction schedules.
      1. Placement schedules.
      2. Proposed construction schedule for duration of the project.
   B. Identify construction personnel and contact telephone numbers.
      1. Contractor Staff
      2. Sub-Contractor (s)
      3. Supplier (s)
      4. Safety Manger
   C. Present construction placement procedure plans.
      1. Equipment Schedule
      2. Concrete Design Mix
      3. Construction methodology
      4. Concrete pumping plan
      5. Traffic Control Plan
      6. Quality Control Plan

III. DISCUSSION AND COMMENT

101.2 REFERENCES

101.2.1 American Society for Testing and Materials (Latest Edition) (ASTM)

C31 Making & Curing of Concrete Test Specimens in the Field
C33 Specification for Concrete Aggregates
C39 Test for Compressive Strength of Cylindrical Concrete Specimens
C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C78 Test for Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
C94 Specification for Ready-Mixed Concrete
C125 Definition of Terms Relating to Concrete and Concrete Aggregates
C138 Air Content (Gravimetric), Unit Weight, and Yield of Concrete
C143 Test for Slump of Portland Cement Concrete specification. If required, certification
C150 Specification for Portland Cement
C172 Sampling Fresh Concrete
C173 Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
C192 Making & Curing of Concrete Test Specimens in the Laboratory
C227 Test for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar Bar Method)
C231 Test for Air Content of Freshly Mixed Concrete by the Pressure Method
C260 Specification for Air Entraining Admixtures for Concrete
C330 Specification for Lightweight Aggregates for Structural Concrete
C441 Test for Effectiveness of Mineral Admixtures in

Preventing Excessive Expansion of Concrete Due to Alkali-Aggregate Reaction
C494 Specification for Chemical Admixtures in Concrete
C567 Unit Weight of Structural Lightweight Concrete
C617 Capping Cylindrical Concrete Specimens
C618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
C685 Specification for Concrete Made by Volumetric Batching & Continuous Mixing
C803 Test for Penetration Resistance of Hardened Concrete
C805 Test for Rebound Number of Hardened Concrete
D2419 Sand Equivalent Value of Soils and Fine Aggregates

101.2.2 American Concrete Institute (Latest Editions)

ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 211.2 Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 318-89 Building Code Requirements for Reinforced Concrete

101.2.3 This Specification:

SECTION 337 PORTLAND CEMENT CONCRETE PAVEMENT
SECTION 340 PORTLAND CEMENT CONCRETE CURBS, GUTTERS, WALKS, DRIVEWAYS, ALLEYS, INTERSECTIONS, SLOPE PAVING, AND MEDIAN PAVING
SECTION 346 TEXTURED CONCRETE
SECTION 349 CONCRETE CURING
SECTION 420 TRAFFIC SIGNAL AND STREET LIGHTING CONDUIT, FOUNDATIONS AND PULL BOXES
SECTION 510 CONCRETE STRUCTURES
SECTION 512 PRECAST PRESTRESSED MEMBERS
SECTION 602 PORTLAND CEMENT CONCRETE FOR CHANNEL LINING AND DIKE AND DAM SURFACING

SECTION 701 TRENCHING, EXCAVATION AND BACKFILL
SECTION 800 INSTALLATION OF WATER TRANSMISSION, COLLECTOR AND DISTRIBUTION LINES
SECTION 900 SANITARY AND STORM SEWER FACILITIES
SECTION 915 STORM DRAINAGE APPURTENANCES
SECTION 1500 MONUMENTS

101.3 PORTLAND CEMENT

101.3.1 Portland cement to be used or furnished under this Specification shall comply either with the requirements of ASTM C150, Types I LA, II LA, III LA, and V LA, cements, or as specified herein, in the Supplementary Technical Specifications, Drawings, or as approved by the ENGINEER. The CONTRACTOR shall submit certification of compliance signed by the cement manufacturer, identifying the cement type and source (plant location), stating the Portland cement furnished to the project, and or used in the concrete delivered to the project complies with this Specification. If required, certification of the Portland cement used for each day's concrete placement shall be submitted to the ENGINEER for each type of cement and each design mix used on the project.

101.3.2 Portland cement specified in an authorized design mix shall be of the same source and type for all concrete batched at and/or delivered to a project under the authorized design mix identification number.

101.3.3 When suitable facilities (such as those recommended by the Concrete Plant Manufacturer's Bureau and/or approved by the ENGINEER) are available for handling and weighing bulk cement, such facilities shall be used. Otherwise, the cement shall be delivered in original unopened bags of the Manufacturer and the type of cement plainly marked thereon, each bag to contain 94 pounds (42.6 kg) of cement.

101.3.4 Cement shall be stored in such a manner as to permit ready access for the purpose of inspection and be suitably protected against damage by contamination or moisture. Should any lot of bulk cement delivered to the site show evidence of contamination, the ENGINEER may require that such lot be removed from the site.

101.3.5 Portland cement shall be measured by weight, lbs, (mass, kg) for concrete produced in accordance with the requirements of ASTM C94 and by volume for concrete produced accordance with the requirements of ASTM C685.

101.4 AGGREGATES:

101.4.1 Aggregates shall comply with the requirements of ASTM C33 and as amended herein, or as specified in the Supplementary Technical Specifications and Drawings, or as approved by the ENGINEER. Aggregates shall be certified to comply with the requirements of this Specification and authorized for use by the ENGINEER before the materials may be incorporated in the construction. Prior to delivery of the aggregates or material containing the aggregates, The CONTRACTOR may be required to furnish samples of the aggregates to the ENGINEER for testing. The CONTRACTOR's daily production aggregate gradations used in concrete shall be submitted to the ENGINEER upon request. Aggregates specified in an authorized design mix shall be of the same source and type for all

concrete batched and delivered under the authorized design mix identification number.

101.4.2 In placing materials in storage or in moving them from storage to the mixer, no method shall be employed which may cause the segregation, degradation, or the combining of materials of different grading which will result in any stockpile not meeting specified requirements.

101.4.3.1 Aggregates supplied under this Specification shall be assumed to be "alkali-silica reactive", ASR. Variance from this position for a particular aggregate source may be authorized by The ENGINEER. Application for a variance may be made to The ENGINEER.

101.4.3.2 An aggregate may be classified non-alkali-silica reactive if, when tested in accordance with ASTM C227, using low alkali cement demonstrates an expansion at one (1) year not greater than 0.05%, and the rate of expansion is negative decreasing, based on test measurements at 1 month, 3 months, 6 months, 9 months, and 15 months, as authorized by the ENGINEER.

101.4.3.3 Portland cement concrete design mixes using non alkali-silica reactive aggregates complying with 101.4.3.2 will not be required to be proportioned with Class F fly ash.

101.4.4.1 Coarse aggregates shall meet the gradation limits as specified in Table 2 of ASTM C33. Fine aggregates shall comply with the gradation requirements of ASTM C33, Section 4, Grading. The sand equivalent of fine aggregate, when tested in accordance with ASTM D2419, Sand Equivalent Value of Soils and Fine Aggregates, shall be greater than 75.

101.4.4.2 The maximum size aggregate shall comply with either these specifications, or the requirements of Table 101.A, or the Supplementary Technical Specifications, or the recommendations of ACI 318-89, paragraph 3.3.2, or as required by the ENGINEER.

101.4.5 Aggregates shall be measured by weight (mass) for concrete batched under the requirements of ASTM C94 and by volume for concrete batched in accordance with the requirements of ASTM C685.

TABLE 101.A
MAXIMUM SIZE AGGREGATE

	Application	Size, in
I.	Pavement, Sidewalk, Curb and Gutter, Drive Pads, Wheel Chair Ramps, Slab on grade, Foundations, and Structures,	1
II.	Channels, minimum 5% retained on the 1 in sieve	I-1/2
III.	High Early Release Concrete, minimum 5% retained on the ½ in sieve	3/4
IV.	Stamped, Patterned, Stairs and Steps, minimum 5% retained on the 3/8 in sieve	½
V.	Formed Concrete	
	A. 1/5 the narrowest dimension between sides of forms,	
	B. 1/3 the depth of slab,	
	C. 3/4 of the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, or prestressing tendons or ducts, or reinforcing and forms.	

101.5 WATER

Water used in Portland cement concrete shall be clean and free from injurious amounts of oil, acids, alkalis, salts, organic materials, or other substances that may be deleterious to the concrete or reinforcement. Non-potable water shall not be used unless the requirements of ACI 318.3.4.3.2 are met. Water shall be measured by weight or volume for concrete batched under the requirements of ASTM C94 and by volume for concrete batched in accordance with the requirements of ASTM C685.

101.6 ADMIXTURES:

101.6.1 Admixtures shall comply with the requirements of this specification. The CONTRACTOR shall submit a certification of compliance signed by the admixture manufacturer, identifying the admixture and its source (plant location), stating the admixture furnished to the project and/or used in the concrete delivered to the project complies with this Specification. Certification laboratory testing of an admixture shall be submitted by the CONTRACTOR to the ENGINEER upon request. Admixtures specified in an authorized design mix shall be of the same source and type for all concrete batched and delivered as defined under a design mix identification number. Admixtures shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the ENGINEER. An admixture shall not be used on a project without authorization by the ENGINEER.

101.6.2 Air-entraining agent, conforming to ASTM C260, shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the ENGINEER. The air-entraining agent used shall not contain more than 0.035% chloride by weight. Air-entrainment content shall comply with the requirements Table 101.B., the Supplementary Technical Specifications, or the recommendations of ACI 318, latest

edition.

TABLE 101.B ENTRAINED AIR CONTENT

Nominal Maximum Size Aggregate, in.	Air Content Range, (%)	
	min	max
1 / 2	5.5	8.5
3/4	4.5	7.5
1	4.5	7.5

101.6.3 Chemical admixtures shall conform to either the requirements of ASTM C494, or as specified in the Supplementary Technical Specifications, or as specified by the ENGINEER. Chemical admixtures shall not contain more than 0.035% chloride by weight.

101.6.4.1 Mineral admixtures shall be class "F" fly ash complying with the requirements of ASTM C618 including the requirements of TABLE 4, UNIFORMITY REQUIREMENTS, and the requirements of this Specification.

101.6.4.2 Mineral admixtures, when tested in accordance with ASTM C441, shall conform to the following:

Reduction in expansion @ 14 days, % , min, 100% Reliability	65.0
Mortar expansion @ 14 days, max, %	0.20
Expansion must be less than control sample expansion.	

101.6.4.3 The "Reactivity with Cement Alkalis" shall be determined using new Dow Corning glass rod base for aggregate. If a fly ash does not comply with the above requirement using the specified cement type, it may be authorized if the criteria is met using the low alkali Portland cement typically available to the Albuquerque area, as directed by the ENGINEER.

101.6.4.4 Mineral admixtures used or furnished under this Specification shall be certified quarterly, in a calendar year, to comply with this Specification by the supplier. Certification shall include test results and specifications, source and location.

101.6.4.5 Mineral admixtures shall be measured by weight (mass) for concrete batched under the requirements of ASTM C94 and by volume for concrete batched in accordance with the requirements of ASTM C685.

101.6.5 Accelerating admixtures may be used in Portland cement concrete batched and supplied under this Specification only when approved by the ENGINEER. The accelerating admixture used shall be a non-chloride type. A design mix proportioned with an accelerating admixture shall be submitted as specified in paragraph 101.8.8. and authorized by the ENGINEER, prior to use on a project.

101.7 PROPORTIONING

101.7.1 Portland cement concrete shall be proportioned in accordance with the requirements of ACI 318, latest edition, Chapter 5, either ACI 211.1 or ACI 211.2 (latest editions), and Table 101.C of this Specification, either field experience or trial mixtures, and the construction placement requirements selected by the CONTRACTOR. The CONTRACTOR shall be solely responsible for the portland cement concrete design mix proportions for concrete either batched at, or delivered to, placed and finished at the site. Certification of a design mix and all component materials, including all formulations of a mix and any and all admixtures which may be used under special construction conditions and environments with that mix to include high range water reducers (super-plasticizer), accelerating admixtures and retarders, and any other admixture, shall comply with the requirements of this Specification.

101.7.1.1 Design mix(es) shall be prepared in a laboratory accredited in accordance with the requirements of the New Mexico State Highway and Transportation Department “Procedure for Approval of Testing Laboratories to Perform Inspection, Testing, and Mix Design Services”, April 13, 1998 Edition, and operated under the direct supervision of a New Mexico registered Professional Engineer.

101.7.1.2 The testing equipment used in the design development testing shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certificates of calibration shall be maintained at the laboratory for review by the ENGINEER. A copy of the certifications shall be submitted to the ENGINEER upon request. A portland cement concrete design mix shall not be batched at and/or delivered to a job site without written authorization of the ENGINEER.

101.7.1.3 A design mix shall be prepared under the direct supervision of a New Mexico Registered Professional Engineer.

101.7.2 Portland cement shall be proportioned to comply with the requirements specified in Table 101.C, or as specified in the Supplemental Technical Specifications, or Plans, or as authorized by the ENGINEER.

101.7.3 The mineral admixture Class F fly ash shall be proportioned by weight of cement to provide a fly ash to portland cement ratio not less than 1:4, not less than 20 per cent of the total cementitious material. Portland cement concrete submitted under this Specification shall

be proportioned with Class F fly ash, unless a variance is authorized by the ENGINEER.

107.7.4 The water to total cementitious material ratio shall not be greater than specified in Table 101.C, or the maximum determined from a "trial mix" compressive strength vs. water to cementitious ration curve, defined in accordance with ACI 318, latest edition, Chapter 5. The trial mix compressive strength water to cementitious material ratio curve shall be developed with the target slump at design application maximum, ±0.75 inches, and the target entrained air content at design application maximum, ± 0.5 per cent, using materials specified in the design submittal. The cementitious material shall be defined as the total weight of portland cement and Class F fly ash in design mix.

101.7.5.1 A design mix submittal shall include but not be limited to the following information, as directed by the ENGINEER.

A. Certification of compliance of the design mix with the requirements of this Specification and by the New Mexico Registered Professional Engineer in responsible charge of the design mix development;

B. Certification of compliance of design mix's component materials by a manufacturer/supplier. The certification shall include laboratory test results of companion samples of the component material used in the laboratory prepared design mix, verifying the component materials comply with the specifications. For a mix design based on statistical methods, certification(s) of component materials shall be based on results performed within two (2) months of the submittal date.

C. Plastic characteristics of the design mix to include concrete temperature, slump, entrained air content, wet unit weight, yield and cement factor, reported in English and metric units;

D. Performance characteristics of the hardened concrete to include the compressive strength of all test cylinders averaged for a respective test and the corresponding average compressive strength reported in English units;

E. Compressive strength test (3 cylinder tests each point) shall be reported for each water to cementitious material ratio design mix proportioned at 3, 7, 14 and 28 days laboratory cure normal concrete; and, 1 day, 3 days, 7 days and 28 days laboratory cure for high early release concrete.

F. The "trial mix" compressive strength vs. water to cementitious ratio curve graphically plotted to include the water to cementitious ratio for the proposed design mix. A proposed design mix water to cementitious ratio outside the limits of a trial mix curve shall be rejected.

G. When a proposed design mix is based on statistical analysis of historical data, certification that the design mix represented by the historical data was batched with the same or similar materials from the same sources as the materials proposed in the design mix shall be included in the submittal. Under this design certification procedure, the proposal shall include a statistical analysis for a period of 12 months prior to sampling aggregates of the characteristics of a) slump, b) entrained air, and c) f'_c@28 day compressive strength test. A compressive strength test shall be the average of two (2) cylinders tested at 28 days. An annual average aggregate gradation analysis may be used if the data represents the 12 month period prior to sampling for a design mix. A minimum of three production gradations per month will be required in the data base, as directed by the ENGINEER.

H. Batch proportions for concrete made by Volumetric Batching and Continuous Mixing, ASTM C685, shall include 1) component batch weights, 2) component batch volumes, and 3) gate settings for each type of batching equipment the design mix that may be batched.

J. High Range Water Reducing Admixture(s) (hrwra), Superplastizers

a. A prescription for use of the hrwra in a design mix shall be provided by the CONTRACTOR to include but not limited to the following
   1. Maximum dosage per cubic yard (meter) by standard measure, ozs/yd^3;
   2. Admixture introduction location (plant or Job site);
   3. Minimum mixing after admixture introduction (drum revolution count at mixing speed);
   4. Air entrainment dosage adjustment, if required;
   5. Base mix water reducing admixture (wra) dosage adjustment, if required;
   6. Consistency (slump) targets for before and after admixture introduction;
   7. Concrete temperature limitations, if required; and,
b. Laboratory demonstrated performance of the design mix, at the specified maximum admixture dosage, shall be reported, including slump, entrained air content, unit weight, water to cementitious materials ratio, seven (7) and twenty eight (28) day compressive strength (fc), and three (3) days and seven (7) day compressive strength (fc) for high early release concrete. Submittal compressive strength shall be based on the average value of three cylinders required.

K. Accelerating Admixture(s)

a. A prescription for use of the accelerating admixture in a design mix shall be provided by the CONTRACTOR to include but not limited to the following:
   1. Maximum dosage per cubic yard (meter) by standard measure, ozs/yd^3;
   2. Concrete temperature limitations, if required;
   3. Admixture introduction location, plant or project;

4. Restrictions of use in combination with other admixtures, as applicable; and,
b. Special considerations for mixing, placing, and curing, as applicable.

L. Color Admixture(s)
a. A prescription for use of a color admixture in a design mix shall be provided by the CONTRACTOR to include but not limited to the following:
1. Maximum dosage per cubic yare (meter) by standard measure, ozs/yd^3;
2. Admixture introduction location, plant or project;
3. Restrictions of use in combination with other admixtures; and
b. Special considerations for mixing, placing, and curing, as applicable.

M. Submittal Format
a. A standard design mix submittal may include some or all of the above information as directed by the CONTRACTOR to define use as "optional" admixture(s). The standard design mix code would be the same for applications with and without the optional admixture(s)
b. A specific design mix submittal can be made to include either color, or accelerating, or high range water reducing admixture for use under a specified application only. Separate design mix submittals will be required to include the information specified above.

101.7.5.2 A submittal shall be rejected if it does not include the specified information and samples. A design mix submittal shall be accepted or rejected within ten (10) days of receipt by the ENGINEER.

TABLE 101.C - DESIGN MIX SPECIFICATIONS-PORTLAND CEMENT CONCRETE [1, 2, 3]

Application	Use In Section(s)	f 'c @ 28	Entrained Air Range	Slump, Not To Exceed, nte [5]	Portland Cement	w:(c+fa) max [7]

		days psi, min [4]	[11]		inches		min, lbs./yd^3	
				Placement	Norm	HRWRA		
Interior Concrete (heated areas) Foundations and slab on grade.	510	3,000	(See par.101.7.2)	Hand Place	4	6	423	0.50
Exterior Concrete a) Structure, foundations, slab on grade, steps/stairs; b) sidewalks, drive pads, wheel chair ramps, stamped pattern concrete, curb & gutter, and valley gutter; c) storm drain structures, channels, drop inlets, and manhole bases; d) retaining walls; and, e) miscellaneous concrete.	340, 346, 420, 510, 511, 602 [12,13], 701, 800, and, 1500	3,000	(See par.101.7.2)	Hand Place	4	6	470	0.45
				Slip Formed	2	3		
Pavement For design of PCCP, use MR= 600 lbs/in^2 [4]	337	4,000	(See par.101.7.2)	Hand Place	4	6	564	0.40
				Slip Formed	2	3		
Hydraulic Structures Reservoirs	510 and 512	3,500	(See par.101.7.2)	Hand Place	4	7	517	0.40
				Slip Formed	2	3		
Structures Buildings, bridges/bridge decks, and parking structures	500	4,000 [8, 9]	(See par.101.7.2)	Hand Place	4	7	564	0.40
				Slip Formed	2	3		
Sanitary Sewer Facilities Structures, manholes and bases.	900	4,000 [8, 9]	(See par.101.7.2)	Hand Place	4	7	658 [6]	0.40
				Slip Formed	2	3		
High Early Release Concrete fcr= 3,400 lbs/in^2 @ release to service [10]	All applications	4,000 @ 7 days	(See par.101.7.2)	Hand Place	4	7	Design	Design
				Slip Formed	2	3		

1. Use of material(s) not defined by this specification must be approved by the ENGINEER.
2. Maximum size aggregate shall comply with the requirements of par. 101. 4.4.2.
3. Portland cement concrete shall be proportioned with Class F fly ash complying with the requirements of 101.6.4, proportioned 1: 4, minimum, fly ash to portland cement, by weight.
4. *MR*-Modulus of Rupture, *f'c*-compressive strength at 28 days.
5. When authorized by the ENGINEER, a high range water reducing admixture (HRWRA), super plasticizer, may be used to increase slump. When a HRWRA is proposed for use on a project. The design mix shall be proportioned to include the HRWRA. The use of a HRWRA in a design mix that was not originally proportioned with a HRWRA is not acceptable under this specification. Higher slump(s) may be used, as directed by the ENGINEER.
6. If portland cement complying with ASTM C150 Type VLA is used, a minimum of 564 lbs/cy may be used.
7. "w : (c+fa)" is defined as *water to cementitious* materials ratio: w-water; (c+fa)-cementitious material as the sum of the portland cement and fly ash. Units are lbs/yd^3.
8. Lightweight structural concrete for structures, parking decks, and bridge decks shall be proportioned with a minimum compressive strength of f'c= 4,750 lbs/in^2 @ 28 days.
9. Minimum requirements for prestressed/post tensioned concrete. Actual criteria may differ as specified in the plans and supplemental technical specifications.
10. "High Early Release Concrete" may be used where early release of structure to either service or construction loads may be required ($\leq$ 3 days), as authorized by the ENGINEER. "fcr" is the minimum compressive strength for release, as determined by field cured cylinders. Maximum size aggregate shall be 3/4 inch.
11. Designated interior concrete, placed, finished, cured, and maintained by the Contractor in a temperate environment of 40^{O}F or greater, may be constructed with non air entrained concrete complying with all other requirements of this specification for the calendar period after April 30 and before October 1, as authorized by the Engineer. Concrete for wet exposures, showers and wash down areas, vehicle repair and storage floors shall not be included in this variance .

101.8 BATCHING

101.8.1 Portland cement concrete shall be batched in accordance with the requirements of either ASTM C94, or ASTM C685, and the requirements of this Specification, as authorized by the ENGINEER. Batching facilities, mixing, and transporting equipment shall be certified within 12 months prior to

batching of a design mix. The plant shall be certified by a NM Registered Professional Engineer, to comply with the requirements of this Specification. The certification shall have been competed within 12 months of batching an authorized portland cement concrete design mix. Written certification shall be available for review at the plant by the ENGINEER, and, submitted to the ENGINEER upon request.

101.8.2.1 Ready-mix concrete batch plants shall be certified to comply with the requirements of this Specification. Written certification of compliance shall be available for review at the batch plant by the ENGINEER.

101.8.2.2 Central-Mix Batch Plants shall be certified to comply with this Specification and standards of the National Ready-Mix Concrete Association. The central-mixers rated capacity shall be posted at the batch plant in the operator's area.

101.8.2.3 Portable batch plants shall be certified after erection at a project and prior to batching concrete to be used at the project site. The batch plants rated capacity shall be posted at the batch plant in the operator's area.

101.8.2.4 Ready-mix concrete trucks shall be certified to comply with the requirements of this Specification and the "Standards for Operation of Truck Mixers and Agitators of the National Ready-Mix Concrete Association", and the "Truck Mixer Manufacturer Bureau", latest editions. Written certification of compliance shall be carried in/on the vehicle for verification by the ENGINEER. The manufacturers rated capacity, mixing and agitating speeds shall be posted on the truck mixer. Mixers shall have an operable mixer drum revolution counter and water metering system to measure temper water that may be added to a mixer after batching and prior to discharge of a load.

101.8.2.5 Shrink-mixed concrete batching shall be certified to comply with the requirements of this Specification. Written certification of the program to include a) maximum concrete volume defined for the process/equipment, b) minimum time of mixing in the stationary mixer of materials after the addition of all cementitious material, and, c) minimum supplemental mixing revolutions in the transit mix truck. A copy of the certified procedure shall be shall be available at the batch plant for review by the ENGINEER, and submitted upon request. the ENGINEER shall be notified by the CONTRACTOR in writing which concrete supplied to a project is produced with this procedure. Shrink mixed batching shall not be used on a project without authorization by the ENGINEER.

101.8.2.6 Volume batching central mix and concrete mobile trucks shall be certified to comply with this Specification. Certification shall include discharge gate settings/material weight batching references for each material carried and a certified water meter and calibration chart to define water settings. Discharge calibration settings shall be established for each production batching rate and authorized design mix batched. The equipment shall be recalibrated if a change in materials or source of materials occurs. Written certification of compliance shall be carried in/on the vehicle for verification by the ENGINEER.

101.8.2.7 On-site batching and mixing equipment for concrete volumes of less than 1 cubic yard shall conform to the requirements of ASTM C192, and shall be approved by the ENGINEER. On-site batched concrete for volumes less than 1 cubic yard shall be either "Redi-2-Mix", "Quikrete", or equal prepackaged concrete mix. The concrete shall be proportioned with water not to exceed a maximum of 1.5 gallons per 60 lbs./bag or equivalent. Concrete batched under this paragraph shall not be used for finished, interior and/or exterior exposed concrete surfaces.

101.9 MIXING

101.9.1 Concrete batched in accordance with ASTM C94, shall be mixed in accordance with the requirements of that Specification and as follows.

101.9.2 Central-Mixed Plants: Concrete mixed in a stationary mixer and transported to the point of delivery shall be mixed from the time all the solid materials are in the drum. The batch shall be so charged with some water in advance of the aggregates and cementitious materials, and all water shall be in the drum by the end of one-fourth the specified mixing time. Mixing time shall be a minimum of 1 minute for the first cubic yard plus 15 seconds for each additional cubic yard, or fraction there of additional capacity. Where mixer performance tests have been conducted in accordance with ASTM C94, with the mixer to rated capacity, the mixing time may be reduced to the time at which satisfactory mixing defined by the performance tests shall have been accomplished. When the mixing time is so reduced the maximum mixing time shall not exceed this reduced time by more than 60 seconds for air entrained concrete. Certified concrete uniformity tests shall be conducted in accordance with ASTM C94. If the uniformity requirements are not met, that mixer shall not be used until the condition is corrected.

101.9.3 Shrink-Mixed Concrete:
Concrete mixed in a shrink mix production program shall be mixed in accordance with the certified shrink mix program as defined by the CONTRACTOR. Concrete shall be mixed in a stationary mixer not less than the certified minimum mixing time after all ingredients are batched into the drum, and not less than the minimum mixing revolutions specified for the

transit mix truck after the load is transferred into the transit mix truck. Mixing in the transit mix truck shall not exceed the maximum requirements of paragraph 101.9.4. Shrink-mixed concrete procedures shall be certified to provide concrete that complies with the uniformity specifications of ASTM C94 as determined by uniformity tests specified in ASTM C94, for the maximum batch volume of concrete defined by the CONTRACTOR. If uniformity requirements are not met for the combination of stationary plant and transit mixers , the shrink mix program shall not be used. Tempering of shrink mix concrete at the job site shall comply with the requirements of 101.10 and 101.11.

101.9.4 Truck-Mixed Concrete:
Concrete mixed in a truck mixer shall be mixed after all ingredients including water, are in the drum at least 70 revolutions and not more than 100 revolutions at the mixing speed as defined by the Manufacturer. The mixing speed for the mixer shall be identified on the mixer. Certified concrete uniformity tests shall be conducted on transit mixer trucks in accordance with ASTM C94 and annually. If the uniformity requirements are not met, that mixer shall not be used until the condition is corrected. Mixing beyond the number of revolutions at mixing speed found to produce the required uniformity of concrete shall be at the agitation speed defined by the mixer manufacturer. The manufacturer's recommended mixing and agitation speeds shall be posted on the truck mixer.

101.9.5 Volume Batched Concrete:
Concrete batched in accordance with ASTM C685, shall be mixed in accordance with the requirements of this Specification and the Manufacturer's recommendations. The continuous mixer shall be an auger type mixer or any other type suitable for mixing concrete to meet the requirements for uniformity specified in ASTM C685,

101.10 TEMPERING BATCHED CONCRETE

101.10.1.1 The slump of a concrete mix sampled at final discharge shall comply with the requirements of TABLE 101.C. Non complying material shall be removed from the structure as directed by the ENGINEER.

101.10.1.2 A load of concrete may only be tempered with water after the mix cycle is complete when, upon arrival at the job site, the slump of the concrete is less than specified, and the time limit and revolution limit specified in 101.9 are not exceeded.. When additional water is required, the total water in the truck shall not exceed the maximum water to cementitious ratio specified in the authorized design mix when the concrete is discharged. When tempering is required and allowed as defined by the water to cementitious ratio for the design mix, the water shall be injected into the mixer and the drum or blades turned a minimum of 30 revolutions at mixing speed before discharge as long as the revolution limit specified in 101.9 is not exceeded.. Additional water shall not be added to the batch after tempering without authorization by the ENGINEER.

101.10.1.3 When the slump of a sample taken within the time limits specified in 101.9 the specification requirements of TABLE 101.C, the mixer truck may be mixed a minimum of 15 revolutions at mixing speed, as long as the revolution limit specified in 101.9 is not exceeded, sampled and tested. If the slump of the second sample exceeds the maximum specified slump by 0.25 in (6 mm), the load may be rejected as directed by the ENGEINEER.

101.10.2.1 The air content in air entrained concrete, when sampled from the transportation unit at the point of discharge, shall comply with the requirements of this specification. Non complying material shall be removed from the structure as directed by the ENGINEER.

101.10..2.2 When a preliminary sample taken within the time limits specified in 101.9 and prior to discharge for placement shows an air content below the minimum specified level, the CONTRACTOR may add additional air entraining admixture to achieve the specified air content, if the revolutions on the drum counter are less than 300, and the total revolutions, after air entrainment addition will not exceed 300 following mixing a minimum of 30 revolutions at mixing speed after dosage with the admixture. Additional air entraining admixture may not be added to the batch after the initial air entraining admixture tempering. Air entraining admixture shall be batched in accordance with 101.7.2. In addition to sampling and testing for compliance after tempering with the air entraining admixture, a sample shall be taken during discharge from the second half of the load to verify slump and entrained air compliance through the load with the specification.

101.10.2.3 When the entrained air exceeds the specified requirements, the load may be mixed a minimum of 15 revolutions, sampled and tested, if the drum revolutions do not exceed 300, and will not exceed 300 following mixing. If the entrained air exceeds the specification by 0.1 %, the load may be rejected as directed by the ENGINEER.

101.10.3 High range water reducing admixtures, superplasticizers shall be batched as recommended by the manufacturer.

101.10.4 Aggregates and cementious material may not be used to temper a batched load of portland cement concrete.

101.10.5 All samples shall be tested for slump, entrained air, and unit weight after tempering..

101.10.6 The field dosage amounts of admixtures and water shall be reported on the truck ticket.

101.10.7 The OWNER shall pay for quality assurance sampling and testing specified 101.15, or as directed by the ENGINEER.

101. 11 DELIVERY & DISCHARGE:

101.11.1 Discharge of the concrete shall be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. These limitations may be waived by the ENGINEER if (1) the concrete is proportioned and certified for use after mixing/agitation time in excess of 1-1/2 hrs, or (2) is of such a slump that it can be placed and finished, without the addition of water to the batch after the time limit noted above is exceeded. In hot weather or under conditions contributing to quick stiffening of the concrete, a time less than 1-1/2 hrs. may be specified by the ENGINEER.

101.11.2 The minimum discharge temperature of concrete in cold weather shall be equal or greater than the temperature specified in Table 101.D.

TABLE 101.D - Cold Weather Construction
Concrete Temperature, min [1]

Ambient Air Temperature	Thin Sections	Heavy Sections & Mass Concrete [2]
30 to 45 ^{O}F	60^{o}F	50^{o}F
0 to 30 ^{O}F	65^{o}F	55^{o}F
Below O ^{O}F	70^{o}F	60^{o}F

[1] The maximum concrete discharge temperature of all concrete, except “high early release concrete”, produced with heated aggregates, heated water, or both, shall be 70^{o}F. The discharge temperature of “high early release concrete” in cold weather shall be 70 ^{o}F - 76 ^{o}F.

[2] Sections having dimensions in all directions greater than 2 feet (24 inches)

101.11.3 The discharge temperature of concrete in hot weather should be kept as cool as possible. Concrete supplied to a project site having a discharge temperature greater than 90 ^{o}F may be rejected by the ENGINEER if the concrete cannot be placed and finished after a single tempering with water as authorized under 101.10. Retarding admixtures may be used to control setting in hot weather. The discharge temperature of “high early release concrete”in hot weather shall be specified by the CONTRACTOR.

101.11.4 The CONTRACTOR shall provide to the ENGINEER with each batch of concrete batched and/or delivered to the job site, before unloading at the site, a delivery batch ticket on which the information specified in TABLE 101.E is printed, stamped or written, certifying said concrete. One copy of the ticket shall be available for the ENGINEER and one copy of the ticket shall be available for the quality assurance testing program.

TABLE 101.E
BATCHING TICKET INFORMATION
REQUIREMENTS

A. Name of Concrete Supplier
B. Delivery Ticket Number
C. Date of Delivery
D. Contractor
E. Project Name (Optional)
F. Design Mix Number
G. Volume of Concrete in Load
H. Time loaded
J. Batched Weight (mass) of Cement
K. Batched Weight (mass) of Fly Ash
L. Batched Weight (mass) of Fine Aggregate
M. Batched Weight (mass) of Coarse Aggregate(s)
N. Batched Weight (mass) or Volume of Each Admixture
O. Weight or volume of water batched at the plant
P. Design Mix Target Proportions
Q. Weight or volume (gal.) of temper water added at the site
R. Weight or volume of each temper admixture added at the site
S. Signature and name (printed) of CONTRACTOR’S representative who authorized the tempering, if any, at the site and affiliation to project

101.12 PLACEMENT

101.12.1 Portland cement concrete shall be placed to the lines, sections, grades and elevations, with the procedures specified in the CONTRACT documents. The material shall be consolidated to eliminate all voids, internal rock pockets and defects in the finish concrete. Casting subgrade and formed surfaces shall be damp, at the placement of the concrete. Removable forms shall be treated with a form release agent prior to placement of the forms for ease of removal of the forms without damage to the supported concrete. Forms shall be sealed to prevent leakage. Form release agents shall not stain the adjacent concrete. Placement and finishing shall be completed prior to the start of the initial set of the

concrete.

101.12.2.1 The CONTRACTOR shall submit a concrete pumping plan to the ENGINEER for review and authorization one week prior to the start of a pumped concrete construction program for placements complying with 101.1.1. The submittal should identify the pump manufacturer, size and type, rated capacity(s) for the line diameter(s) to be used and distance(s) to be pumped.

101.12.2.2 Pumping shall conform to the recommendations of the pump manufacturer. The pump manufacturer's operation manual shall be available on the pump equipment, and submitted to the ENGINEER, upon request.

101.12.2.3 Concrete shall be pumped in a uniform continuous flow to point of discharge, with all lines kept full, during the pumping operation. The CONTRACTOR shall provide either a system for controlled discharge of the concrete, or the last 5 feet of the pump line, immediately prior to the line discharge opening, shall have a slope equal or less than 10:1, horizontal to vertical, during the pumping of concrete, as authorized by the ENGINEER. The concrete shall not be dropped a vertical distance greater than four feet at discharge from the pump line without a tremey. Concrete placed by pump shall conform to the requirements of this specification after discharge from the pump line. Pumping of concrete shall not commence without authorization by the ENGINEER.

101.13 FINISHING

The CONTRACTOR shall finish Portland cement concrete as required by the CONTRACT documents, Supplemental Technical Specifications, or as directed by the ENGINEER.

101.14 CURING CONCRETE

The CONTRACTOR shall cure concrete as required by the CONTRACT documents, SECTION 349 of this specification, the Supplemental Technical Specifications, or as directed by the ENGINEER. A concrete structure or element shall not be released to service loads until it has achieved a minimum of 85% of the design strength, f'c, at the time the structure is placed in service, or the curing program specified in SECTION 349 is completed, or as directed by the ENGINEER. Service loads shall include construction loads, design loads and environmental exposure.

101.15 QUALITY ASSURANCE SAMPLING AND TESTING

101.15.1.1 Quality assurance sampling and testing shall be performed in accordance with the requirements of this Specification, the Supplemental Technical Specifications, or as required by the ENGINEER. Concrete shall be sampled and tested by a technician/engineer certified as either an ACI certified Concrete Field Testing Technician Grade I, or the equivalent National Institute for Certification of Engineering Technologies Technician, with Specialty Concrete Work Elements Level I 82001, 82002, and Level II 84002, 84003, 84004, 84010.

101.15.1.2 Quality assurance testing and analysis shall be performed in a laboratory accredited in accordance with the requirements of the New Mexico State Highway and Transportation Department "Procedure for Approval of Testing Laboratories to Perform Inspection, Testing, and Mix Design Services", April 13, 1998 Edition, under the direct supervision of a New Mexico Registered Professional Engineer.

101.15.1.3 Testing equipment used in the performance of specified testing shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certification records shall be maintained at the laboratory for review by the ENGINEER. A copy of the certifications shall be submitted upon request to the ENGINEER. Quality assurance testing shall be directed by the ENGINEER and paid by the OWNER

101.15.2.1 Samples will be taken in the field by the ENGINEER, in accordance with ASTM C172, at discharge to the structure/application after all tempering at the job site has been completed.

101.15.2.2 A sample shall be taken for each design mix of concrete placed each day, once for each 100 cu yd of concrete, once for each 5000 sq.ft. area of slabs or walls, or fractions thereof, whichever is greater, or as directed by the ENGINEER. Hi-lo thermometers will be provided by the CONTRACTOR to monitor field curing concrete temperatures and companion test specimens while in the field , as directed by the ENGINEER.

101.15.3 Slump tests will be performed on each quality assurance sample in the field in accordance with ASTM C143. Concrete used for slump tests shall not be used in specimens for strength tests. The slump shall not exceed the maximum value defined in TABLE 101.C plus 0.25 in (6 mm). Slumps shall be reported to the nearest 1/4 inch (1 mm).

101.15.4 Entrained air tests will be performed on each quality assurance sample in accordance with the requirements of ASTM C231 for normal weight concrete, and ASTM C173, light weight concrete as specified in TABLE 101.C. Concrete used for entrained air tests shall not be used in specimens for strength tests. The entrained air shall not be less than the minimum nor greater than the maximum entrained air specified plus 0.1 % . Entrained air shall

be reported to the nearest one tenth of one percent.

101.15.5.1 The cement content per cubic yard for a load of concrete shall be determined on each quality assurance sample in accordance with ASTM C138. The unit weight shall be reported to the nearest one tenth of a pound per cubic foot (one kilogram per cubic meter). The cement factor shall be reported to the nearest pound per cubic yard (kilogram per cubic meter).

101.15.5.2 The portland cement content per cubic yard for a load of concrete shall be calculated by dividing the batched weight of the portland cement reported on the truck ticket for the load represented by a quality assurance test sample, by the yield, in cubic yards, determined in 101.15.1. The cement content shall be reported to nearest one pound per cubic yard. The portland cement content shall not be less than the minimum cement content for the application specified in TABLE 101.C.

101.15.5.3 The water to cementitious ratio for a load of concrete sampled and tested under this specification shall be calculated by comparing the total water in a load, by weight, the batched water reported on the load's batch ticket plus any water added in the field, to the sum of the portland cement and fly ash reported on the batch ticket. The weight of the water shall be divided by the weight of the cementitious materials and reported to the nearest one hundredth value (xx.xx). The water to cementitious ratio shall be less than or equal to the water to cementitious ratio for the application specified in TABLE 101.C.

101.15.6 A non complying field test, slump test, entrained air test, cement content, shall be verified by sampling and testing a second sample from the same load represented by the non complying sample/tests. If the second sample/tests determine the material is in compliance, the load may be authorized for placement and the all quality assurance tests required shall be performed. If the second test confirms the initial test results, the concrete load may be rejected as directed by the ENGINEER. If the second test confirms the initial sample non complying test, the second sampling and testing shall be payed by the CONTRACTOR, as specified. The OWNER shall pay for all complying test.

101.15.7.1 Quality assurance compressive strength concrete specimens/cylinders shall be molded in accordance with ASTM C31. Cylinders shall be sealed metal or plastic molds complying with ASTM C31. The specimens will be submerged in water during the initial field curing at the site when the average ambient temperature is equal or greater than 60 ^{O}F, site conditions permitting, as directed by the ENGINEER. If the initial field cure submersion procedure is not used, high-low thermometers shall be used to monitor the initial field cure temperature of the quality assurance specimens, and the recorded temperatures shall be reported in the sampling and testing report. If the curing temperature recorded on the high-low thermometer exceeds 85 ^{o}F, concrete compressive test strengths shall be reported as information only, and the lab of record shall revise the initial cure procedure for the assurance specimens to control the curing temperature to less than 85 ^{o}F. Cylinders left in the field longer than the maximum specified time shall be so identified and reported "for information only". A sample may be taken to the testing laboratory for testing and casting provided the cylinders can be molded within 15 minutes after sampling.

101.15.7.2 Strength specimens shall be molded and tested in accordance with ASTM C31, C39, C78 & C93, C192, and this specification. The number and type of compressive strength test cylinders shall be a minimum of four (4) 6"dia. x 12"H cylinders for channel concrete, and normal concrete with nominal maximum size aggregate of 1.5 inch to 2.0 inch. The number and type of compressive strength test cylinders shall be a minimum of four (4) 4" dia x 8" cylinders for normal concrete with nominal maximum size aggregate 1 inch and less. The number and type of cylinders shall be a minimum of six (6) 4" dia x 8" cylinders for high early release concrete compressive strength tests. The number and type of Modulus of Rupture flexure test beams shall be a minimum of three (3) 6"x6"x42" beams or equivalent for Modulus of Rupture Tests, as directed by the ENGINEER. Strength specimens shall be cast using concrete from the same load as the concrete field tests. When 4"dia. x 8" cylinders are used, they shall be cast in two equal lifts, each lift rodded twenty five times with a three eights inch (9.5 mm) diameter rod with a three eights inch (9.5 mm) semi spherical tip. The rodding of a lift placed on a lift of concrete shall penetrate into the top of the preceding lift.

101.15.7.3 When strength tests are required for stripping of forms or release of structure, a minimum of 2 test specimens complying with the specimen type specified in 101.15.7.2 for each test shall be molded and cured at the site under the same conditions as the concrete represented by the specimens. The specimens shall be returned to the Lab at the end of the field curing period and tested in accordance with ASTMC39. The test strength shall be the average of the test strengths of the two specimens. The critical concrete compressive strength (f'_c) shall be a minimum of 85% of the specified design strength.

101.15.7.4 Concrete strength test specimens shall be tested at 7 days and 28 days. One specimen shall be tested at 7 days and 2 specimens shall be tested at 28 days, and reported to the Engineer. The test strength shall be the average of the test strengths of the two specimens tested at either 28

days, or as specified in the Supplemental Specifications, drawings, or by the ENGINEER.

101.15.7.5 High early release concrete strength test specimens shall be tested at 3, 7, and 28 days for concrete. One specimen shall be tested at 3 days and 2 specimens shall be tested at 7 and 28 days, and reported to the ENGINEER. The test strength for high early release concrete shall be the average of the test strengths of two specimens tested at 7 days, or as specified in the Supplemental Specifications, drawings.

101.15.8. Not Used.

101.15.9.1 Evaluation and acceptance of concrete shall meet the criteria established in Chapter 5, Section 5.6, "Evaluation and acceptance of concrete," ACI 318-89. Each strength test result shall be the average of two cylinders from the same sample tested at 28 days or the specified age. The strength level of the concrete will be considered satisfactory if the averages of all sets of three consecutive strength tests results equal or exceed the required f'c and no individual strength test result falls below the required f'c by more than 500 psi. Quality assurance compressive strength specimens sampled and cast when the average ambient temperature is greater than 60 °F, and cured with an initial field cure procedure other than submersion method specified in

101.15.7.1, shall be evaluated using the highest curing temperature recorded by the high-low thermometer provided for the field cure and Table 101.E. The test compressive strength shall be compared to the estimated strength corresponding to the highest initial cure temperature indicated in Table 101.E. An assurance compressive strength test shall be equal or greater than the compressive strength defined by Table 101.E when the initial field cure temperature is equal or greater than 85 °F and the initial field cure is not the submerged method specified in 101.15.7.1.

TABLE 101.E

MINIMUM COMPRESSIVE STRENGTH, f_C

f_c ≥ P_{TI} x f'_c / 100, psi

°F [2]	73	80	85	90	95	100	105	110	115	120
Cure Day(s)	P_{TI}, % of Specified Strength, f'_c [1,3]									
3	100	108	114	120	122	123	125	120	115	110
7	100	101	102	103	100	98	95	91	78	75
28	100	97	95	93	90	88	85	82	78	75

Notes: 1. Reference ACI 306, 6.6.1
2. The Non Submerged assurance cylinder cure recorded maximum initial field cure temperature. If a high- low thermometer was not used, the highest ambient temperature recorded for the initial cure period by the national weather service will be used as the initial cure temperature.
3. f'_c specified compressive strength

101.15.9.2 If individual tests of either laboratory-cured specimens produce strengths more than 500 psi (3.4 MPa) below f'c, or, if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is adequate. If the presence of low-strength concrete is confirmed and computations indicate that the load-carrying capacity may have been significantly reduced, tests of cores drilled from the area in question shall be required in accordance with ASTM C42, as directed by the ENGINEER. Three cores shall be taken for each case of an individual cylinder test more than 500 psi (3.4 MPa) below f'c or where the average of any set of three consecutive strength test results is below f'c. If the concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60 to 80 °f and relative humidity less than 60 percent) for seven days before test and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be immersed in water for at least 48 hours and tested wet. If coring is required a coring plan will be prepared by the ENGINEER no later than 42 calendar days after the placement date. Coring shall be completed and a report submitted no later than 56 calendar days after placement. Core sampling for non complying tests shall be taken at the direction of the ENGINEER and paid by the OWNER. The CONTRACTOR shall be responsible for material

replacement of the same design mix in adjacent concrete at no cost to the OWNER where samples are removed.

101.15.9.3 Concrete in the area represented by core tests shall be considered structurally adequate if the average strength of three (3) cores is equal or greater than 85% of the specified design strength (f'c), and no single core has a compressive strength less than 75% of the specified design strength. To check testing accuracy, locations represented by erratic core strength may be retested. If these strength acceptance criteria are not met by the core tests, and if structural adequacy remains in doubt, The OWNER and ENGINEER may order load tests as outlined in Chapter 20, ACI 318 for the questionable portion of the structure. Load tests shall be paid for by the CONTRACTOR.

101.15.9.4 If the structure under consideration does not satisfy the above strength acceptance criteria or the criteria of Section 20.2 or 20.4, ACI 318 The OWNER may order The CONTRACTOR to remove and replace any portion of the structure which is not in compliance with the above. If so ordered, the CONTRACTOR shall perform such work at his own expense. The CONTRACTOR shall patch all core sample holes with the same or similar materials adjacent to the core hole. The patching concrete shall be placed and cured in accordance with the requirements of this specification.

101.15.10 TEST REPORTS

101.15.10.1 Test reports shall include but not limited to the following, as directed by the ENGINEER.

A. Field Data
1. Date of Sampling
2. Time of Sampling
3. City of Albuquerque Project or
4. City of Albuquerque project or Permit Number
5. Contract Title
6. Portland Cement Concrete Supplier
7. Delivery Ticket Number
8. Design Mix Number
9. Sampling location as defined by the Project Plans and Specifications
10. Ambient temperature at time of sampling, ^{O}F
11. Material temperature at time of sampling, ^{O}F
12. Mixer drum revolution count at start of discharge of concrete

B. Field Tests Results, with specifications.		Accuracy
1 Slump, in (mm)	0.25	1
2 Entrained Air, %	xx.x	
3 Unit Weight, pcf (kg/m^3)	xxx.x	(xxxx)
4 w:(c+fa) ratio	x.xx	x.xx
5 Cement Factor, C.F., lbs/yd^3 (kg/m^3)	xxx	(xxxx)
6 Cement pay factor determined in accordance with 101.16.2		

C. Comments
1. Report any addition of water and materials and amounts by either volume or weight, prior to and after sampling.
2. Report mixer revolutions count at time of discharge.
3. Record number of mixer revolutions after field tempering with water and/or admixtures, and @ what mixer speed, mixing or agitating speed.

D. Laboratory Tests		
1 Calendar reference and day count from date of sampling for each strength test sample		
2 fc compressive strength test result reported to psi/ MPa	10	1
3 M.R. Modulus of rupture reported to psi/ MPa	5	0.5

E. Analysis & Certification

The testing laboratory shall provide certification the sampling and testing were performed in compliance with the requirements of the specifications. Certification shall be provided by the New Mexico Registered Professional Engineer in direct responsible charge of the laboratory testing program.

101.15.10.2 Test results shall be reported to the ENGINEER, CONTRACTOR, concrete supplier and OWNER in writing, within 7 working days of completion of the test, as directed by the ENGINEER. Non-complying tests shall be reported within one working day of completion of the test.

101.16 MEASUREMENT AND PAYMENT

101.16.1 Measurement for Portland cement concrete supplied under this specification shall be by LOTS as the area, volumes, and as specified in the contract documents, as directed by the ENGINEER.

101.16.2 Payment for Portland cement concrete supplied under this specification shall be for each LOT, at the contract unit price adjusted in accordance with the formula below and TABLE 101.F, as directed by the ENGINEER. A LOT shall be defined as either the volume or area of concrete for each design mix placed on a project in a day as defined in the CONTRACT. The adjusted unit price shall be calculated using the formula below and the pay factor, CF_P, defined in TABLE 101.F. The pay factor shall be defined by the number of samples representing a LOT, and, the % variance of the mean/average (M) portland cement content of the LOT from the minimum cement content specified in TABLE 101.C for the application, as determined by field quality assurance sample test results. Acceptance samples for a LOT shall be sampled and tested in accordance with 101.15. All acceptance samples taken in one day for a type of concrete shall represent a LOT of that type of concrete.

$UP' = PF \times UP$

UP', Adjusted Contract Unit Price

PF, Pay Factor , $PF = 0.50 \times (1.00 + CF_P)$

UP, Contracted Unit Price

TABLE 101.F - CEMENT PAY FACTOR CALCULATION, CF_P

n, number of samples	Deficiency, D = (C - M)/C	CF_P
3, OR MORE	D ≤ 0.0	1.00
	0.0 < D ≤ 1.0	1.00
	1.0 < D ≤ 2.0	0.95
	4.0 < D ≤ 6.0	0.90
	6.0 < D ≤ 8.0	0.85
	8.0 < D ≤ 10.0	[1]
	D > 10.0	Remove and Replace

D,	Deficient cement content as % of C, minimum
C,	Minimum cement content specified for the application in TABLE 101.C
M,	Average or mean (M) cement factor for a LOT. The cement factor shall be calculated as the average of cement factors of all tests taken for a LOT, but not less than three tests, determined in accordance with 101.15.6.
[1]	If determined by the ENGINEER to be more practical to accept the material, the LOT may be accepted under written agreement between the OWNER and the CONTRACTOR at an assigned pay factor CFp= 0.70.

SECTION 121

PLASTIC PIPE

121.1 GENERAL: Plastic pipe for pressure and non-pressure uses shall be manufactured from polyvinyl chloride (PVC), high-density polyethylene (HDPE) or ultra-high molecular weight materials.

121.2 REFERENCES.

121.2.1 American Society for Testing and Materials (Latest Editions) (ASTM):

D1248 Specification for Polyethylene Plastics Molding and Extrusion Materials
D1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
D1599 Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings
D1601 Test Method for Dilute Solution Viscosity of Ethylene Polymers
D1693 Test Method for Environmental Stress -Cracking of Ethylene Plastics
D1784 Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
D2239 Specifications for Polyethylene (PE) Plastic Pipe(SIDR-PR) Based on Controlled Inside Diameter
D2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
D2657 Heat-Joining Polyolefin Pipe and Fittings
D2737 Specification for Polyethylene (PE) Plastic Tubing
D3034 Specification for type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
F477 Specification for Elastomeric Seals (Gaskets) for joining Plastic Pipe
F679 Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
F794 Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
F894 Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe

121.2.2 American Water Works Association (Latest Edition (AWWA):

C900 AWWA Standards for Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in. for Water.
C905 AWWA Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameter 14 in through 36 in.
C909 Molecular Oriented Polyvinyl Chloride (PVCO) Pressure Pipe 4 in. through 12 in. for Water Distribution

121.2.3 THIS PUBLICATION:

SECTION 800 WATER TRANSMISSION, COLLECTOR DISTRIBUTION AND SERVICE LINES

SECTION 900 SANITARY AND STORM SEWER FACILITIES.

SECTION 1502 SUBMITTALS

121.3 CERTIFICATION: The CONTRACTOR shall submit certification from the manufacturer of the pipe as specified in Section 1502 as to the pipe material and that the pipe meets or exceeds the required testing. Only pipe manufactured in the United States of America will be acceptable.

121.4 GENERAL PLASTIC PIPE REQUIREMENTS

121.4.1 POSITIVE IDENTIFICATION: All plastic pipe shall be coded in accordance with the applicable material standard to eliminate future confusion and prevention accidental damage and service interruption of the facilities.

121.4.2 LINE LOCATOR: Metallic tape shall be used as a locator for all plastic pipe which is installed less then 10 feet deep. The tape should be installed 3 ft. to 6 ft. below top of ground and centered over the pipe. When feasible, the tape shall be fastened to metallic appurtenances associated with the installation (i.e. valves, fittings, manhole rings, etc.) in an effort to enhance its detectability.

121.4.3 PIPE STORAGE: All types of plastic pipe shall be stored in a manner that the pipe will not be deformed as recommended by the manufacturer. PVC or PVCO pipe is subject to potential degradation when exposed to prolonged periods of sunlight. Material degradation is generally indicated by a discoloration of the pipe. PVC or PVCO pipe shall be stored inside a building, under a cover or covered up totally. All discolored pipe shall not be installed and shall be immediately removed form the project.

121.4.4 JOINING SYSTEMS

121.4.4.1 All plastic pipe which is connected to a manhole, junction box, inlet or similar structure shall be installed with an approved manhole connection adapter

or water-stop such that each connection is leak-free and that there is no detrimental affect resulting from the material property characteristic differences between the plastic pipe and the structure.

121.4.4.2 Bell and Spigot Joints: Pipe with gasket joints shall be manufactured with a socket configuration, which will prevent improper installation of the gasket and will ensure that the gasket remains in place during joining operations. The gasket shall be manufactured from a synthetic elastomer material and shall conform with the requirements of ASTM F 477. The spigot end of each joint of pipe shall be marked circumferentially to indicate the proper home mark. Pipe, which is field- cut, shall be chamfered and the home mark identified in accordance with the applicable criteria.

121.4.4.3 Heat-Welded Joints: HDPE pipe, which is manufactured without the standard bell and spigot joint configuration shall be joined by a heated fusion process in accordance with ASTM D 2657.

121.5 MATERIALS AND UTILIZATION.

121.5.1 Polyvinyl Chloride (PVC) and Molecular Oriented Polyvinyl Chloride (PVCO) Pressure Pipe:

121.5.1.1 The material in PVC and PVCO pipe shall be in accordance with ASTM D 1784. Also, the material in PVCO pipe shall be in accordance with Molecular Oriented and Polyvinyl Chloride.

121.5.1.2 Pipe shall be suitable for use in the conveyance of water for human consumption. The pipe shall be marked with two seals of the testing agency that certified the pipe material is suitable for potable water use.

121.5.1.3 PVC and PVCO pipe shall be approved by the Underwriters Laboratories (UL) and be furnished in cast iron pipe-equivalent outside diameters. Joints shall be push-on flexible elastomeric gasketed.

121.5.1.4 Pressure pipe shall have a minimum working pressure of 150 psi (DR 18) or as specified on the plans or in the Supplemental Technical Specifications.

121.5.1.5 Pipe lengths shall contain one bell-end or couple with an elastomeric gasket. Gasket shall meet the requirements of ASTM F 477. The bell shall be an integral part of the pipe length and have the same strength and DR as the pipe. The spigot pipe end shall be beveled.

121.5.1.6 PVC pressure pipe in sizes 4-inch through 12-inch shall meet the requirements of AWWA C 900. PVCO pressure pipe in sizes 4-inch through 12 inch shall meet the requirements of AWWA C 909.

121.5.1.7 PVC pressure pipe in sizes 14-inch through 24-inch shall meet the requirements of AWWA C 905.

121.5.2 Polyvinyl Chloride (PVC) Gravity Flow Pipe:

121.5.2.1 The material in PVC pipe shall be in accordance with ASTM D 1784.

121.5.2.2 PVC gravity flow pipe may be used for sanitary sewer and storm drainage applications for sizes 8-inch and greater, except for installation resulting in a depth of cover (to subgrade elevation) less than 3.1 feet or when the Contract documents specifically prohibit its use.

121.5.2.3 Lateral line connections shall be made at manholes or at factory manufactured saddles or tees only, unless specifically authorized by the ENGINEER.

121.5.2.4 PVC gravity flow pipe in sizes 8-inches through 15-inches shall meet the requirements of ASTM D 3034. Only solid wall pipe shall be used. Minimum wall classification shall be SDR 35.

121.5.2.5 PVC gravity flow pipe in sizes 18-inch and larger shall meet the requirements of ASTM F 679 or ASTM F 794. Minimum pipe stiffness shall be 46 psi.

121.5.2.5.1 Sewer service line connections to this pipe will not be permitted, unless specifically authorized in the plans and/or Supplemental Technical Specifications and/or by the ENGINEER.

121.5.3 Polyethylene (PE) Pipe:

121.5.3.1 The material in PE pipe shall be in accordance with ASTM D 1248.

121.5.3.2 High Density Polyethylene (HDPE) Profile Wall Gravity Flow Pipe:

121.5.3.2.1 High-density polyethylene (HDPE), large diameter, profile wall, gravity flow pipe shall meet all general requirements for plastic pipe and shall conform to requirements in ASTM F 894 for diameters of 30-inch and larger.

121.5.3.2.2 Minimum wall thickness in pipe waterway shall be RSC 63. When using ASTM D 2412 for determining the strength value of pipe, the E' number (E = modulus of soil reaction) shall not exceed 1500 psi. The pipe manufacturer shall provide certification to the CONTRACTOR and ENGINEER that the class of pipe used is adequate for the specific pipe laying conditions, including, but not limited to, depth of bury, soil characteristics and groundwater conditions.

121.5.3.2.3 Sewer service line connections to this pipe will not be permitted, unless specifically authorized in the

plans and/or Supplemental Technical Specifications and/or by the ENGINEER.

121.5.3.2.4 Lateral line connections shall be made at manholes or at factory manufactured tees or saddles only, unless specifically authorized by the Engineer.

121.5.3.3 All water service lines shall be copper per these specifications.

121.6 MEASUREMENT AND PAYMENT: Plastic pipe used for both pressure and gravity flow shall be measured and paid for at the contract unit pipe as specified in Section 800 and 900 and/or as defined in the Bid Proposal.

SECTION 129

DUCTILE IRON PIPE

129.1 GENERAL

Ductile iron pipe is acceptable for use in the installation of water lines for sizes 4 inches to 64 inches. Ductile iron pipe shall only be used for sanitary sewers where specifically required by the plans *or* authorized by the ENGINEER. The size and thickness class for ductile iron pipe shall be as specified herein or on the plans.

129.2 REFERENCES

129.2.1 ASTM:

A 674
A 746

129.2.2 AWWA:

C 104 C 105
C 111 C 115
C 150 C 151
C 600

129.2.3 This Publication

Section 130
Section 801
Section 900

129.3.1 The ENGINEER shall determine the required class of ductile iron pipe based on the laying condition, depth of cover and loading factors in accordance with AWWA C 150 but in no case shall the ductile iron pipe be less than pressure class 150. If a pressure class higher than 150 is required, it will be specified on the plans or in the Supplemental Technical Specifications.

129.3.2 Ductile iron pipe shall be manufactured in accordance with AWWA C 151 and shall be cement mortar lined with a bituminous seal coat in accordance with AWWA C 104.

129.3.3 Ductile iron pipe joints for underground installations shall be rubber-gasketed push-on, *or* mechanical type in accordance with AWWA C 111.

129.3.4 Where specified on the construction drawings, the ductile iron flanged joint pipe shall meet the requirements in AWWA C 115. Flanged joints shall only be utilized in above ground installations or within structures, such as: valve pits or vaults.

129.3.5 Ductile iron pipe connections to fittings shall be as specified in Section130.

129.3.5 Ductile iron pipe connections to fittings shall be as specified in Section 130.

129.3.6 Ductile iron pipe shall be installed in accordance with AWWA C 600 and Section 801. When specified or authorized by the ENGINEER, polyethylene encasement shall be installed and shall conform to AWWA C 105.

129.4 DUCTILE IRON SANITARY SEWER PIPE

129.4.1 Ductile iron pipe, utilized for sanitary sewer installation, shall be asphaltic lined in accordance with ASTM A 746, unless otherwise specified on the plans or in the Supplemental Technical Specifications.

129.4.2 All pipes shall be a minimum of pressure class 150.

129.4.3 When specified or authorized by the ENGINEER, polyethylene encasement shall be installed in accordance with ASTM A 674.

129.5 MEASUREMENT AND PAYMENT

Ductile Iron pipe with or without polyethylene encasement for both pressure and gravity flow shall be measured and paid for at the contract unit price as specified in Section 801 and 900 and/or as defined in the Bid Proposal.

SECTION 501

EXCAVATION AND BACKFILL FOR STRUCTURES

501.1 GENERAL

The work performed under this specification shall include, but not be limited to providing the equipment, labor and materials for the excavation and backfill of areas related to structures, such as bridges, foundations, walls, storm drain inlets, as specified on the plans and therein or as authorized by the ENGINEER.

501.2 REFERENCES

501.2.1 ASTM:

C136	D422
D423	D424
D698	D1557
D2922	D3017
D4253	D4254

501.2.2 This Publication:

Section 207
Section 301

501.3 EXCAVATION

501.3.1 All excavation for structures shall be made in accordance with applicable regulations such as the Department of Labor's Occupational Safety and Health Administration Standards 29CFR Part 1926, Subpart P or any applicable amendments.

501.3.2 When slope limit for structural excavation is shown on the plans. Those limits are to establish the pay quantities for structural excavation and backfill only and in no way shall relieve the CONTRACTOR from meeting the requirements of 501.3.1 above.

501.3.3 The bottom width of the excavation shall be a minimum of the bottom width of the structure foundation plus one foot (1') on each side to provide space for erection and removal of forms. Additional bottom area may be required due to the type and size of compaction equipment the CONTRACTOR chooses to use.

501.3.4 CONTRACTOR shall be responsible for obtaining and maintaining a temporary storage site for usable excavated material during the period of construction. CONTRACTOR may request through the ENGINEER, approval of the OWNER to store excavated material within the street right-of-way or on OWNER’s property.

501.4 COMPACTED BACKFILL

501.4.1 Backfill material shall be Class I, II, III, or Class IV soils as defined in TABLE 501.4.A, or Lean Fill complying with the requirements of Section 207. The CONTRACTOR shall not place backfill against a portland cement concrete structure until the concrete has attained 80% of the design strength as determined by the average strength of two field cured cylinders. The field cured cylinders shall be cured in the field under the same condition as the concrete in the structure, represented by the cylinders.

501.4.2 The CONTRACTOR shall remove unsuitable material which either will not compact readily or serve the intended purpose and replace it with suitable material as authorized by the ENGINEER.

501.4.3 All forms, braces, and debris shall be removed before start of backfilling.

501.4.4 Backfill material shall be placed in level lifts and each compacted lift shall not exceed 6 inches.

501.4.5 Soil used for the backfill around structures shall be compacted to a dry density of not less than 90% of maximum dry density in a moisture range of optimum moisture +/-2% as determined in accordance with ASTM D1557 (modified). unless the soil contains 35% or more finer than the No.200 sieve. If the soil used has 35% or more finer than the No.200 sieve, it shall be compacted to a dry density of 90% of maximum dry density in a moisture content range of at least optimum moisture to +4% above optimum as determined in accordance with ASTM D698 (Standard).

501.4.6 When structural backfill is within the roadway area, this area shall be compacted to 90% dry density as specified in 501.4.5 and rework and compacted to 95% dry density at the same time as the surrounding subgrade area is compacted as specified in Section 301.

TABLE 501.4.A

EMBEDMENT SOILS CLASSIFICATIONS

SOILS CLASS	SOIL TYPE	DESCRIPTION
CLASS I SOILS*		Manufactured angular, granular material, ¼ to 1-1/2 inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells, complying with the requirements of Class II soils.
CLASS II SOILS**	GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean
CLASS II SOILS**	GP	Poorly graded gravels and gravel-sand mixtures, little or nor fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SW	Well-graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS III SOILS***	GM	Silty gravels, gravel-sand-silt mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SM	Silty sands, sand-silt mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SC	Clayey sands, sand-clay mixtures. More than 50% if coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS IV SOILS	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS IV SOILS	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.

CLASS V SOILS	OL	Organic silts and organic silty clays or low plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS V SOILS	OH	Organic clays of medium to high plasticity. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	PT	Peat, muck and other highly organic soils.

* Soils are as defined in ASTM D2487, except for Class I soils which is defined in ASTM D2321.
** In accordance with ASTM D2487, less than 5% passes No. 200 sieve.
***In accordance with ASTM D2487, soils with 5% to 12% passing No. 200 sieve fall in a borderline classification that is more characteristic of Class II than Class III

501.5 GRAVEL DRAINS

501.5.1 The construction plans may require the installation of weep holes in the concrete walls to relieve the surcharge pressure of ground water. Gravel drains are intended to provide a drainage course to the weep holes. The size, shape, and location of the gravel drain will be shown on the construction plans.

501.5.2 Gravel drain material shall consist of a material complying with the following gradation, and having the same or similar gradation curve as defined by the specification limits when graphically plotted on a standard aggregate gradation chart.

SIEVE SIZE	% PASSING
3 inch	100
1/2 inch	70-100
no.4	50-80
no.16	25-50
no.50	5-15
no.200	0-5

Liquid Limit NV (no value)

Plasticity Index NP(non plastic)

**The drain material shall comply with the following material size ratios:

$$12 < / = RS0 < / = 58$$

$$RSO = \frac{\text{50-percent size GDM}}{\text{50-percent size BM}}$$

$$12 < / = R15 < / = 40$$

$$R15 = \frac{\text{15-percent size GDM}}{\text{15-percent size BM}}$$

where:

GDM-represents the Gravel Drain Material
BM -represents the Base Material (surrounding soil)

501.5.3 A separator (membrane type) geotextile fabric shall be used to encase the Gravel Drain Material in areas where the surrounding solid has 30% or greater of its material passing the no. 200 sieve.

501.6 MEASUREMENT AND PAYMENT

501.6.1 Measurement:

501.6.1.1 Unless specified on the plans, in the Supplemental Technical Specification and/or in the Bid Proposal no separate measurement will be made for excavation and backfill for structures. This work shall be considered incidental to and part of the cost of the structure.

501.6.1.2 When specified on the plans, in the Supplemental Technical Specifications and/or in the Bid Proposal excavation and backfill for structures shall be measured by the cubic yard of excavation.

501.6.1.3 Gravel drains will be measured by the cubic foot based on the neat line volume shown on the plans or as authorized by the ENGINEER.

501.6.2 Payment:

501.6.2.1 Payment for excavation and backfill for structures shall be made at the contract unit price per structure or per cubic yard of excavated quantity, complete in place, which price shall include all equipment, labor and materials required to excavate, stock pile, backfill, compact, and the removal and disposal of excess material.

501.6.2.2 Payment for gravel drains shall be made at the contract unit price per cubic foot, complete in place, which price shall include all equipment, labor and materials required in furnishing the gravel and geotextile fabric, the installation of both and the compaction required.

SECTION 701

TRENCHING, EXCAVATION AND BACKFILL

701.1 GENERAL

Trench excavation and backfill for underground utilities, sanitary sewer, storm sewer, water lines, and appurtenances shall conform to these specifications or as specified in the Supplemental Technical Specifications or as authorized, in writing, by the ENGINEER.

701.2 REFERENCES

701.2.1 ASTM:

D-422	D-698
D-1557	D-2321
D-2487	D-2922
D-3017	D-4318

701.2.2 This Publication:

Section 207
Section 301
Section 302
Section 336
Section 337
Section 340

701.3 TERMINOLOGY

701.3.1 For the purpose of these specifications in this Section, the descriptive terms "flexible," "plastic" and "non-rigid" are similarly interchangeable as utilized in these specifications and appurtenant reference material.

701.3.2 Rigid pipe: shall be reinforced concrete, concrete cylinder, and vitrified clay pipes.

701.3.3 Flexible pipe shall be polyvinyl chloride, polyethylene, ductile iron, and corrugated metal pipes.

701.3.4 Standard Detail Drawings show the trench cross-sections which identify the meaning and limits of terminology used in these specifications for the terms "foundation, bedding, haunching, initial backfill, final backfill, embedment, pipe zone, cover, springline, and pipe width."

701.3.5 The Unified Soil Classification System in ASTM D2487 Shall be utilized for the purpose of material classifications. See Table 701.3.A for a listing of referenced soil classes.

701.4 NOTIFICATION OF FORTHCOMING WORK

701.4.1 To assure that the construction work progresses in a timely manner and that good public relations are maintained with the property owners, the following actions are considered essential:

701.4.1.1 Prior to the start of construction the CONTRACTOR shall assist the ENGINEER in notifying the adjacent property owners as to when construction will start, the estimated completion date, anticipated access blockages.

TABLE 701.3.A
EMBEDMENT SOILS CLASSIFICATIONS

SOILS CLASS	SOIL TYPE	DESCRIPTION
CLASS I SOILS*		Manufactured angular, granular material, ¼ to 1-1/2 inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells, complying to the requirements of Class II soils.
CLASS II SOILS**	GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SW	Well-graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS III SOILS***	GM	Silty gravels, gravel-sand-silt mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SM	Silty sands, sand-silt mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SC	Clayey sands, sand-clay mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS IV SOILS	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays, Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS IV SOILS	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	OL	Organic silts and organic silty clays or low plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS V SOILS	OH	Organic clays of medium to high plasticity. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	PT	Peat, muck and other highly organic soils.

* Soils are as defined in ASTM D2487, except for Class I Soil which is defined in ASTM D2321
** In accordance with ASTM D2487, less than 5% passes No. 200 sieve.
*** In accordance with ASTM D2487, soils with 5% to 12% passing No. 200 sieve fall in a borderline classification that is more characteristic of Class II than of Class III.

701.4.1.2 Prior to the start of trenching operations, including pavement cutting and removal, the CONTRACTOR should coordinate with the ENGINEER any problem areas and involving traffic control, access to private properties, stockpiling of excavated materials, and other utility conflicts.

701.4.1.3 The CONTRACTOR shall provide the ENGINEER with the name and telephone number of at least two contact persons during non-working hours.

701.5 TRENCH SAFETY

The CONTRACTOR shall be responsible for maintaining all trenches in a safe condition; thereby protecting the workers and the general public. Trench slopes and other protection shall be in accordance with applicable regulations such as the Department of Labor's Occupational Safety and Health Administration Standards 29CFR Part 1926, subpart P *or* any applicable amendments.

701.6 BRACING EXCAVATIONS

701.6.1 Excavation for pipe shall normally be by open unsupported trenches unless local conditions warrant trench bracing.

701.6.2 Excavations shall be braced and sheeted. to provide complete safety to persons working therein and bracing shall comply with applicable Federal (OSHA), State and local laws and ordinances. Support systems for trenches in excess of 20 feet deep and adjacent to existing improvement or subject to vibrations or ground water shall be in accordance with OSHA regulations. The CONTRACTOR shall be fully responsible for sufficiency and adequacy of bracing excavations with respect to work under construction and adjacent utility lines and private property.

701.6.3 If the soil conditions within the trench area require support, the CONTRACTOR may elect to use tight sheeting, skeleton sheeting, stay bracing, trench jacks, or movable trench shield to support the trench during pipe laying operations, such as: bedding preparation, pipe laying, backfilling of haunches and initial zone.

701.6.4 No sheeting shall be permitted to remain in the trench except when, in the opinion of the ENGINEER, field conditions or type of sheeting or methods of construction used by the CONTRACTOR, warrant the supports must remain. The ENGINEER may opt to have the lower portion (within the pipe zone) of the sheeting to remain. If the CONTRACTOR plans on removing the sheeting, he shall submit method to the ENGINEER for approval to treat the void created by the removal of the sheeting within the pipe zone and below.

701.6.5 When a movable trench shield is used, the trailing half of the shield should be notched to the height of the top of the pipe. This will allow the haunch area of the pipe to be compacted properly to the wall of the trench. If the trench shield is not notched, a subtrench shall be excavated for pipe installation such that the bottom of the trench shield does not enter the pipe zone.

701.7 DEWATERING

701.7.1 Trenching and pipe laying operations may encounter standing water or ground water which would preclude the proper placing of bedding, backfilling, and laying pipe. The water shall be removed by pumps and associated equipment, such as well points, to lower the water level. Dewatering shall continue for a minimum 24 hours after placement of any concrete.

701.7.2 Dewatering operations shall remove the water to achieve a stable foundation for pipe embedment and backfilling. The ENGINEER shall determine if adequate foundation has been attained. The ground water shall be lowered to a minimum depth of 6 inches below pipe grades. Should over excavation be necessary due to unsuitable foundation conditions, the ground water shall be additionally lowered as necessary.

701.7.3 The CONTRACTOR shall submit a plan for approval by the ENGINEER as to how and where the waste water will be disposed. Waste water will not be discharged into traffic and pedestrian lanes or onto private properties.

701.7.4 The CONTRACTOR shall obtain permit from the New Mexico State Engineer prior to commencing dewatering operations.

701.7.5 The CONTRACTOR shall also responsible for any adverse effect his dewatering operation has to private property, including providing temporary water to residences and/or business necessitated by the effect on private wells.

701.7.6 The CONTRACTOR shall arrange dewatering operation in a neat and orderly manner such that access to adjacent, properties is maintained, the discharge system does not leak and that any power generation complies with applicable noise
limit regulations .

701.8 REMOVAL OF EXISTING PAVEMENT SIDEWALK, AND DRIVEWAY

701.8.1 Existing concrete pavement, sidewalk, or driveway removed in connection with construction shall be replaced , neatly sawed edges. Cuts shall be neat and to true straight lines with no shatter outside the removal area. If a saw cut would fall within 30 inches of a construction joint, cold joint, expansion joint, or edge, the concrete shall removed and replaced to the joint or edge. Concrete sidewalk and/or driveway may removed so that a minimum of 30-inch square is replaced. If the saw cut would fall within 12 inches of a score mark, the score mark.

701.8.2 Existing bituminous pavement removed in connection with construction shall be cut with a saw, pavement break cutting wheel, or other suitable tool approved by the ENGINEER. Care shall taken to assure that the edge of removed pavement does not vary from a straight line more than 2 inches from r mean.

701.8.3 Saw cutting shall be 1-1/2 inches in depth or 1/4 the thickness of the pavement, sidewalk, or driveway, whichever is greater. All saw cuts or other scoring shall be made perpendicular to the surface of the material to be cut.

701.8.4 Any unnecessarily irregular breakage or cracking caused by the CONTRACTOR shall be removed and replaced by the CONTRACTOR without added expense to the OWNER.

701.8.5 The CONTRACTOR shall be responsible for the disposal of removed materials.

701.8.6 Saw cutting is required on all concrete or asphalt paving on State maintained streets or roads.

701.8.7 Paving cuts for manholes and valve boxes and other utility appurtenances shall be square and at dimensions specified the Standard Detail Drawings or on the construction plans.

701.9 MAXIMUM LENGTH OF OPEN TRENCH

In developed areas, no more than 300 feet of trench shall be opened in advance of pipe laying operations. This distance may be reduced due to traffic control considerations. Backfilling shall begin as soon as pipe is laid and inspected and shall keep pace with the pipe laying. In advance of trenching operations in undeveloped areas, the CONTRACTOR shall submit in writing or on plans for the ENGINEER'S approval, the maximum length of trench that will be open at anyone time. Except by permission of the ENGINEER, the maximum length of open trench in anyone location where concrete structures are cast in -p1ace will be that which is necessary to permit uninterrupted progress. Construction shall be pursued as follows: excavation, formwork, and setting of reinforcing steel, placing of floor slab, walls, and cover slab or arch shall follow each other without anyone of these operations preceding the next nearest operation by more than 200 feet. Failure by the CONTRACTOR to comply with the limitations specified herein or as may be specifically authorized by the ENGINEER may result in a written order from the ENGINEER to halt progress of the work until such time as compliance with this paragraph has been achieved and the work can be proceeded in an orderly sequence of operations.

701.10 WIDTH OF TRENCHES

Trench widths will vary according to the type of pipe used, size of pipe, depth of trench, and soil conditions, The minimum width requirements, indicated below, are for proper laying, aligning and jointing of pipe as well as trench grading, bedding preparation, and backfilling.

701.10.1 TRENCH WIDTH FOR RIGID PIPE MATERIALS: Trench widths from bottom of pipe to a point 12 inches above the top of the pipe shall be kept to the practical minimum required for properly laying, aligning, grading, jointing, and backfilling of the pipe, but no less width than pipe outside diameter plus 16 inches. For stable soils which will stand a vertical cut, the maximum trench width at a point 12 inches above the top of pipe or at a point 5 feet above the bottom of the trench, whichever is less, shall be as follows:

- The pipe outside diameter plus 2 feet for pipes 27 inches in diameter and smaller.

- 1.6 times the nominal diameter for pipes 30 inches in diameter or larger.

701.10.1.3 When soil will not stand vertical. the trench sides shall be sloped to provide not less than the outside diameter plus 16 inches at the pipe invert.

701.10.2 TRENCH WIDTH FOR NON-RIGID PIPES: The minimum clear width of the trench measured at the springline of the pipe should be 1 foot greater than the outside diameter of the pipe. The maximum clear width of the trench at a point 1 foot above the top of the pipe is equal to the pipe outside diameter plus 2 feet. If the maximum recommended trench width must be exceeded *or* if the pipe is installed in a compacted embankment, then pipe embedment should be compacted to a point of at least 2-1/2 pipe diameters from the side of the pipe or to the trench walls.

701.11 ROCK EXCAVATION

701.11.1 Rock is defined as material which cannot be excavated without drilling and blasting. All stone or boulders less than 8 cubic feet in volume will be classified as earth; all larger boulders shall be classified as rock. If blasting is necessary to excavate such materials as shale, hardpan, soft sandstone, cemented gravel, or loose rock which normally can be classified as earth excavation, then this excavation shall be classified as rock excavation. Whenever a ledge of solid rock encountered with earth below it or where alternate layers of solid rock and earth occur, the earth shall be included in the allowance for rock when the thickness of the layer of earth is less than 12 inches, thus requiring it to be removed by blasting along with the ledges of rock. Blasting will be considered necessary when the soil and rock cannot be excavated at a rate of 50 cubic yards per hour by a competent operator with a back-hoe that has a minimum bucket curling force of 25,000 pounds (John Deere 690 or equivalent).

701.11.2 Whenever rock is encountered in the trench or elsewhere in any excavation required to be made, it shall be excavated to the line and grade as shown on the plans and within the limits described therein, unless otherwise authorized, in writing, by the ENGINEER.

701.11.3 For trenches, rock shall be excavated to a depth of 6 inches minimum below the outside bottom of the conduit except at points of rock and earth transitions at which points the rock shall be excavated to a minimum of 12 inches below the outside bottom of the conduit as shown on the detail sheets for trench cuts and backfill of rock. Any depression in the bottom of the trench caused by overshoot and/or excavating and being 6 inches or greater in depth from a theoretical bottom of trench grade shall be filled to the theoretical bottom of the trench with select soils. The trench shall be backfilled with select backfill material to a point 1 foot above the top of the conduit. The remainder of the trench shall be backfilled as specified herein. The complete trench backfill from the bottom through to the top of the subgrade shall meet the compaction and/or moisture requirements as specified herein.

701.11.4 BLASTING: Suitable weighted covering or mats shall be provided to confine all materials lifted by the blasting within the limits of the trench and to prevent injury of persons or damage to property. Blasting shall be under the supervision of a person qualified and experienced in the use and handling of explosives. All blasting operations shall be done in accordance with applicable local, state, and federal laws, ordinances, and codes regulating the transportation, storage, and use of explosives. Forty-eight hours prior to blasting operations, the CONTRACTOR shall notify the local law enforcement agency.

701.12 FOUNDATION

701.12.1 All pipe shall be bedded on a stable foundation in a trench which is completely free of water. The ENGINEER shall determine the adequacy of the foundation. Class V soils shall not be used as a foundation. If Class V soils are encountered at the bottom of the trench it shall be removed to the depth authorized by the ENGINEER and replaced with Class I, II or III soils.

701.12.2 Where an unstable foundation condition is encountered, it must be stabilized before laying pipe or alternative foundation methods utilized. The CONTRACTOR will be paid for foundation stabilization when required by the ENGINEER. Failure to notify the ENGINEER of an obvious unstable foundation condition prior to proceeding with placement of the pipe shall result in complete removal of the affected pipe, foundation stabilization, and replacement of the pipe at the CONTRACTOR'S expense.

701.12.3 Should the trench be inadvertently over-excavated below the foundation, the area of over-excavation shall be filled with select material in 6 inch lifts and compacted to a density of not less than 95 percent of maximum density, as determined by ASTM D 1557.

701.12.4 Unless specifically approved in writing by the ENGINEER, the CONTRACTOR shall not proceed with pipe embedment in a trench where water is present or the foundation is saturated. Adequate dewatering, as specified in Section 701.7, shall be utilized.

701.13 PIPE EMBEDMENT

701.13.1 GENERAL:

701.13.1.1 The class of bedding used for each pipe shall be as shown on the plans or as specified in the Supplemental Technical Specifications.

701.13.1.2 The CONTRACTOR may request a change in the class of bedding required on a pipe, if authorized by the ENGINEER, all increase in the cost of labor and materials required to include upgrading of the pipe class will be at the CONTRACTOR'S expense with no additional cost to the OWNER.

701.13.2 RIGID PIPE EMBEDMENT:

701.13.2.1 The trenches shall be excavated in conformance with the trench width requirements in Section 701.10 and 701.5.

701.13.2.2 Embedment material shall be Class I, II, III, or IV soils, or lean fill as specified in Section 207.

701.13.2.3 All soil in the embedment zone shall be placed in lifts not exceeding 8 inches in uncompacted depth, except that material along the side of the pipe shall not be placed above the spring1ine until the haunch area of the pipe is adequately filled and sliced such that no voids remain.

701.13.2.4 All soil shall be compacted to a density not less than 90 percent of maximum density, as determined by ASTM D 1557. The CONTRACTOR shall take care to assure that the pipe is not damaged or misaligned during compaction of the embedment.

701.13.3 FLEXIBLE PIPE EMBEDMENT:

701.13.3.1 Proper placement of soils in the embedment zone is extremely important in achieving a satisfactory installation of flexible pipe. The CONTRACTOR shall be aware that the soil classes have differing requirements relative to embedment. There are also differing requirements for embedment in dry and wet conditions (wet conditions meaning that the embedment zone will be subject to ground water).

701.13.3.2 Embedment material shall be Class I, II, or III soils, or lean fill as specified in Section 207.

701.13.3.3 Embedment soil shall be placed in lifts not exceeding 8 inches loose depth. The haunch shall be properly compacted by hand tampers utilizing due caution such that the pipe is not damaged or misaligned. Mechanical tampers shall not be utilized directly over the pipe in the embedment zone.

701.13.3.4 The CONTRACTOR may utilize acceptable on site soils in the embedment area which are in conformance with these specifications. The CONTRACTOR has the option of importing a different soil, however, additional compensation will only be allowed if the on site soils are Class IV or V.

701.13.3.5 Class I soil shall comply with the requirements of Section 302, AGGREGATE BASE COURSE.

701.13.3.6 Class II and III soils shall be compacted to a density of not less than 95 percent of maximum density in the embedment area, as determined by ASTM D 1557. The moisture content shall not exceed 5 percent above optimum.

701.14 FINAL BACKFILL

701.14.1 Final backfill shall consist of homogeneous soil except that boulders, frozen clumps, rubble, and Class V soils are excluded.

701.14.2 Final backfill shall be compacted to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557 unless otherwise specified in the Contract Documents.

701.14.3 The upper portion of the final backfill may require specific soils and compaction in order to provide a suitable foundation for pavements, curb and gutter, sidewalk, or other type of structure.

701.15 COMPACTION METHODS

701.15.1 The CONTRACTOR shall be responsible for the compaction method utilized during foundation preparation, embedment placement, and final backfill except as otherwise specified herein or in the Supplemental Technical Specifications.

701.15.2 The use of mechanical vibratory compactors directly over the pipe is prohibited in the embedment area. Extreme care shall be taken

when utilizing mechanical compactors in the haunch and initial backfill area in order to avoid damage to or misalignment of the pipe. The ENGINEER shall examine any damaged pipe and has the authority to direct that it be replaced with new pipe at no additional cost to the OWNER.

701.15.3 Flooding or jetting shall be allowed if the subsurface soils are compatible to its usage, as authorized by the ENGINEER. It shall not be used for compaction of flexible pipe, when the soil has a plastic limit of 7 or greater, and in areas of collapsible soils. The CONTRACTOR shall take any necessary precautions to minimize to negligible flotation of the pipe.

701.15.4 The CONTRACTOR shall, at the direction of the ENGINEER, excavate the compacted fill as necessary for the purpose of determining the adequacy of the compaction.

701.16 PAVEMENT

701.16.1 Either new street construction or pavement replacements shall satisfy the following design and construction requirements:

701.16.1.1 Unless permanent pavement is specified to be placed immediately, a temporary dust-free patch shall be placed wherever excavation is made through existing pavements, sidewalks, or driveways. The patch shall be placed, rolled, and maintained by the CONTRACTOR to provide a smooth surface for traffic until a permanent pavement is constructed within the time frame specified by the ENGINEER.

701.16.1.2 The subgrade preparation of the area to be paved shall be in accordance with Section 301 of these specifications. The asphalt pavement placed shall be in accordance with Section 336 and the concrete pavement shall be in accordance with Section 337. The placement of the other roadway items shall be in accordance with Section 340.

701.16.1.3 Material thickness for all pavement replacements within residential or arterial streets shall conform to the plans or the Standard Detail Drawings or match the existing pavement as authorized by the ENGINEER.

701.16.1.4 Pavement cuts of 8 ft. or more in width and 100 ft. or more in length shall be paved with a laydown machine.

701.16.1.5 When authorized by the ENGINEER, asphalt concrete base course may be used to replace surface course thickness requirements on streets that are scheduled for overlay.

701.16.1.6 The edges of all trenches at the base course level shall be neatly trimmed before beginning any paving replacement. All edges of the existing pavement adjacent to the trench cut shall be inspected. Undermined, broken, cracked, or unevenly cut portions shall be removed and the pavement edges retrimmed prior to pavement replacement. All vertical edges of the existing asphalt pavement adjacent to the trench cut and all surface areas for a width of at least 4 inches and no greater than 8 inches, shall be thoroughly cleaned and a tack coat applied prior to placing any hot mix asphalt. The finished surface of the pavement replacement shall be graded to conform to the existing contour both in cross section and profile.

701.16.1.7 Concrete pavement to replace cuts made in concrete paved streets, arterials, etc., shall conform to the Standard Detail Drawings for concrete pavement or in accordance with New Mexico Department of Transportation requirements where applicable.

701.16.1.8 When more than one-half of the surface area of a manhole, lamphole or valve box is found to extend into the area to receive a permanent asphaltic hot-mix surfacing and/or base pavement replacement, the existing pavement surrounding the manhole, lamphole, or valve box shall be removed to within those limits which will permit a permanent pavement replacement to be made in accordance with the approved plans.

701.16.1.9 Asphaltic hot mix shall not be placed upon the concrete collar, nor shall traffic be permitted upon the collar for at least 24 hours, or longer, if so directed by the ENGINEER. A tack coat of asphaltic emulsion may be applied after the concrete has taken its final set. During this time adequate barricading of the area shall be maintained by the CONTRACTOR.

701.16.1.10 If in the course of a pavement removal, a manhole, lamphole, and/or valve box is encountered and has a concrete collar about it and the collar is performing adequately, no special construction need be made in the permanent pavement replacement.

701.16.1.11 The CONTRACTOR shall make any small grade or alignment adjustment of the manhole, lamphole, and/or valve box encountered that is necessary to provide a smooth riding surface between the existing pavement and the patch and/or within the patch itself.

701.16.1.12 TESTING

701.16.1.12.1 A sample of each type of soil encountered shall be classified in accordance with the requirements of ASTM D2487, and the moisture density relationship determined in accordance either ASTM D698 or D1557, whichever is applicable.

701.16.1.12.2 A compaction test shall be taken for each 2 feet depth per 200 feet trench length or less, as directed by the ENGINEER. Compaction tests shall be taken in accordance with ASTM D2922 and D3017. Areas represented by non-complying tests shall be reworked and re-tested for compliance.

701.17 MEASUREMENT AND PAYMENT

701.17.1 TRENCHING, BACKFILLING, AND COMPACTION:

701.17.1.1 Trenching, backfilling, and compaction shall be combined into one unit and shall be measured and paid for as follows:

701.17.1.2 Measurement shall be made along the center1ine of the pipe.

701.17.1.3 The unit of measurement shall be by the linear foot *per* pipe diameter per specified increment of depth.

701.17.1.4 The following depth increments will apply:

701.17.1.4.1 For water line installations the costs for trenching, backfilling and compaction shall be included in the unit price per linear foot of pipe per pipe diameter for maximum depth, such as: 4 to 14 inch diameter at 6 feet, 16 to 24 inch diameter pipe at 7 feet and all pipe larger than 24 inch at 8 feet. Separate payment will be specified in the Bid Proposal when required depths exceed the above depths.

701.17.1.4.2 For sewer installations the increments shall be 8 feet or less, 8 feet to 12 feet, 12 feet to 16 feet, 16 feet to 20 feet and thereafter at 4 foot intervals.

701.17.1.4.3 All depths shall be measured to the nearest foot.

701.17.1.5 All depths shall be measured from the invert of the pipe to the top of existing ground elevation. The existing ground elevation shall be the elevation of the surface that exists along the centerline of the pipe at the time of construction staking for said trenching.

701.17.1.5.1 Whenever a special pipe embedment detail is specified, on the plans, the trench depth shall be measured from the bottom of the embedment to the top of existing ground elevation. However, no additional trench depth shall be measured as a result of inadvertent over-excavation nor to accommodate trench dewatering.

701.17.1.6 Payment will be made at the unit price per linear foot per diameter of pipe per depth increment as specified in the Bid Proposal, and will include trenching, backfilling, and compaction for all trench zones. No additional payment will be made for compacted materials to bring trench backfill up to required depth.

701.17.2 OVER-EXCAVATION: Required over-excavation for foundation stabilization shall be measured by the cubic yard of material removed and replaced with compacted suitable material. Payment will be made at the unit price per cubic yard of compacted replacement material and shall include excavation, backfill material, and compaction.

701.17.3 ROCK EXCAVATION: Rock excavation will be measured by the cubic yard within the specified limits of the trench configuration. Blasting will be included in the rock excavation. Payment will be made at the unit price per cubic yard.

701.17.4 UNSUITABLE MATERIALS: Removal and disposal of unsuitable materials from the construction site shall be measured by the cubic yard of excavated material. Payment will be made at the unit price per cubic yard of excavated material.

701.17.5 PAVEMENT. SIDEWALK, AND DRIVEWAYS: Removal and disposal of existing pavement, sidewalks, and driveways will be measured by the square yard or square foot whichever is apropos. Payment will be made at the unit price per square yard or square foot as specified in the Bid Proposal.

701.17.6 SELECT MATERIALS: Where selected material is required in the backfilling operations, the quantity of material will be measured by the cubic yard of compacted material in place in the trench. Payment will be made at the unit price per cubic yard of select material as indicated above.

701.17.6.1 Whenever a special pipe embedment detail is specified, measurement and payment shall be as identified in the Bid Proposal.

701.17.7 DEWATERING: Dewatering operations for trench work shall be measured by the linear foot along the center-line of that portion of the trench which requires dewatering. Payment will be made at the unit price per linear foot of dewatered trench.

701.17.8 PAVEMENT:

701.17.8.1 Permanent or temporary pavement surfacing shall be measured and paid for in accordance with the paving section elements as defined under Section 300 for the specific item of work.

701.17.8.2 Permanent resurfacing or permanent surface patching will be measured on the basis of the square yard for new surfacing as provided in the applicable section of these specifications. For payment purposes, the normal maximum pavement cut width shall be as defined in the Table No. 701.17.8.2

TABLE No. 701.17.8.2

NORMAL MAXIMUM PAVEMENT CUT WIOTHS ALLOWED FOR PAYMENT PURPOSES

Soil Stability	Trench Depth (TD)	Pipe Size	Max. Pavement Cut Width
Stable. Soil stands in a vert. cut	Less than or equal to 5 feet	ND less than or equal to 27"	00 + 2 feet
"	Greater than 5'	ND less than or equal to 54"	TD + 2 feet
"	"	ND greater than 54"	1.6 X ND + TD + 3'
Unstable. Soil does not stand in vert. cut	Any	Any	2 X TD + OD

NOTES: 1. TD is trench depth; ND is nominal pipe diameter; and OD is outside pipe diameter.

2. Individual locations or conditions may warrant greater cut widths than those specified above. The ENGINEER shall authorize in writing the increase in the above pavement cut widths.

SECTION 801

INSTALLATION OF WATER TRANSMISSION, COLLECTOR AND DISTRIBUTION LINES

801.1 GENERAL

The water facilities and materials, specified herein, are associated with water transmission, collector and distribution lines.

801.2 REFERENCES

801.2.1 American Water Works Association (Latest Edition) (AWWA):

C110 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids
C203 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines -Enamel and Tape-Hot-Applied
C206 Field Welding of Steel Water Pipe
C207 Steel Pipe Flanges for Waterworks Service-Sizes 4 in. through 144 in.
C502 Dry Barrel Fire Hydrants
C504 Rubber-Seated Butterfly Valves
C509 Resilient-Seated Gate Valves for Water and Sewerage Systems
C600 Installation of Ductile-Iron Water Mains and Their Appurtenances
C651 Disinfecting Water Mains
C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution
C905 Polyvinyl Chloride (PVC) Water Transmission Pipe Nominal Diameter 14 in. through 36 in.
C909 Molecular Oriented Polyvinyl Chloride (PVCO), Pressure Pipe 4" - 12" for water distribution.
M9 Concrete Pressure Pipe
M23 PVC Pipe-Design and Installation

801.2.2 This Publication:

SECTION 121 PLASTIC PIPE
SECTION 127 STEEL WATER PIPE
SECTION 128 CONCRETE CYLINDER PIPE
SECTION 129 DUCTILE IRON PIPE
SECTION 130 GRAY IRON AND DUCTILE IRON FITTINGS
SECTION 340 PORTLAND CEMENT CONCRETE CURBS, GUTTERS, WALKS,DRIVEWAYS, ALLEY INTERSECTIONS, SLOPE PAVING, AND MEDIAN PAVING
SECTION 343 REMOVAL AND DISPOSAL OF EXISTING PAVEMENT, CURBS, GUTTERS, SIDEWALKS & DRIVEPADS
SECTION 701 TRENCHING, EXCAVATION AND BACKFILL
SECTION 1502 SUBMITTALS

801.3 MATERIALS:

801.3.1 GENERAL:

801.3.1.1 The CONTRACTOR shall submit certification from the manufacturer of the pipe as specified in Section 1502 as to the pipe material and that the pipe meets or exceeds the required testing. Only pipe manufactured in the United States of America will be acceptable.

801.3.1.2 Main line pipe and fittings shall be as specified in the Reference Section in this publication as listed above or as specified in the Supplemental Technical Specifications and/or as authorized by the ENGINEER.

801.3.2 PIPE:

801.3.2.2 Limitations of pipe materials versus pipe sizes will be as follows, unless otherwise specified on the plans or Supplemental Technical Specifications:

Pipe Type	Sizes
Ductile Iron	3" thru 64"
Concrete Cylinder(AWWA C303)	16" and larger
Plastic (PVC)	4" thru 20"
Welded Steel Pipe (AWWA 200)	16" and larger

801.3.2.3 The type of pipe used shall be approved by the ENGINEER. Steel pipe will be used only where specified on the drawings. All pipe shall be of domestic manufacture and origin. Unless otherwise approved by the ENGINEER, all pipe installed shall be identical from valve to valve.

801.3.3 GATE VALVES:

801.3.3.1 Gate valves shall only be used for pipe sizes of 12 inches and smaller, unless otherwise noted on the plans or in the Supplemental Technical Specifications.

801.3.3.2 Resilient seat gate valve shall be used and shall conform to AWWA C 509. The gate valve shall be a non-rising stem type with inside screw and "O" ring seals. The valve shall have a standard hub which opens counter-clockwise. Type valve ends shall be mechanical joints, unless otherwise specified on the plans. "O" ring retainer shall be

secured with nuts and bolts.

801.3.3.3 The resilient seat shall be mechanically retained or bonded on the valve gate (wedge disc).

801.3.3.4 All brass or bronze parts used on gate valves shall comply with AWWA C 509.

801.3.3.5 The outside of the valve body shall be painted with coal tar enamel or corrosion-resistant coating. The inside shall be protected with corrosion resistant coating, approved for potable water.

801 .3.3.6 The valve stem shall comply with AWWA C 509. The material for the valve stem shall be brass or bronze, and shall have a minimum yield strength of 20,000 psi and minimum tensile strength of 60,000 psi.

801.3.3.7 Gate valves shall have a 2 inch square operating hub nut. Gate valves in vaults with valve covers at ground level shall have a handwheel with the 2" nut welded to the center.

801.3.3.8 Maximum input torque to open and/or close the valve shall be 200 foot pounds for a 4-inch valve and 300 foot pounds for 6-inch under a working pressure of 200 psi.

801.3.3.9 No Project will be accepted by the OWNER until all valves are operational and accessible.

801.3.3.10 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed “Water Valve Data Card”, as shown on Pages 801-5 and 801-6. The ENGINEER shall forward the card to OWNER.

801.3.4 RUBBER SEATED BUTTERFLY VALVES:

801.3.4.1 Butterfly valves will be used for sizes of 14 inches and larger, and shall comply to AWWA C 504.

801.3.4.2 Only short body, Class 150B valves are acceptable. Wafer type valves are not acceptable. Valve ends may be either mechanical joint or flanged.

801.3.4.3 The rubber seat shall be field replaceable on valve sizes 24 inches and larger. The rubber seat may be mechanically retained or bonded on the disc or valve body.

801.3.4.4 Butterfly valves shall have a 3 inch square operating hub nut. Butterfly valves in vaults with valve covers at ground level shall have a handwheel with the 3" nut welded to the center.

801.3.4.5 The valve shaft and disc shall be installed horizontally. The valve disc shall pivot and rotate on the horizontal axis.

801.3.4.6 The maximum input torque to open and/or close the valve shall not exceed 150 foot pounds under a minimum working pressure of 150 psi, and the butterfly operator shall be compatible with this pressure. Maximum operating torques shall be in accordance with AWWA C 504, Table 1, Class 150B. The manufacturer of the valve shall be responsible for the operator.

801.3.4.7 No project will be accepted by the OWNER until all valves are operational and accessible.

801.3.4.8 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed “Water Valve Data Card,” as shown on pages 801-5 and 801-6. The ENGINEER shall forward the card to the OWNER.

801.3.5 VALVE BOXES: Valve boxes shall consist of Polyvinyl Chloride (PVC) C-900, or High Density Polyethylene Pipe, (HDPE), with corrugated exterior and smooth interior pipe cut to accommodate the required depth. No joints shall be allowed. Pipe diameter shall be 10 inches for valves in paved areas to accommodate the cover and lid specified here-in. The pipe shall be centered and placed true to vertical around the axis of the operating nut. Valve covers and lids for re-use water shall be different than those used for potable water, and shall be as shown on re-use project construction plans.

801.3.6 COMBINATION AIR AND VACUUM VALVES: Air and vacuum valves shall be the type and size shown on the plans.

801.3.7 FIRE HYDRANTS:

801.3.7.1 Fire hydrants and their extensions shall be in accordance with AWWA C 502, traffic type. Fire hydrants shall have one 5 1/4 inch diameter valve opening; 6 inch mechanical joint inlet connection; two 2 ½ inch hose nozzle connections; and one 4 ½ inch steamer nozzle with National Standard Fire Hose Coupling Screw Threads. Fire hydrants shall have a bronze or cast iron, pentagon, operating nut, be designed for 150 psi. working pressure service, and have a normal bury of 4 to 4 ½ feet unless field conditions require a deeper bury, in which case extensions will be used so as to bring the bottom of the break-off flange 2 to 8 inches above the top of finish grade.

801.3.7.2 The pipe fittings and fire hydrants starting at the street main and ending at the fire hydrant itself shall be lying in a line perpendicular to the street's centerline or radially on a curvilinear installation. Fire hydrants shall have no more than ½ inch variation from a vertical line between the breakaway flange and the top of the fire hydrant.

801.3.7.4 Hydrants shall be dry barrel, post-type with compression main valve closing with pressure. They shall have a field lubrication capability. Hydrants shall have a bronze seat ring threaded into a bronze drain ring or bronze or cast iron bushing.

801.3.7.5 Exterior of hydrant, below the ground line, shall be coated with asphalt varnish, and the exterior painted from the top to a point one foot below the ground level flange, consisting of one coat rust inhibitive primer and one coat "chrome yellow" enamel. The bonnet shall then be painted with a reflectorized paint using a color as close to “chrome-yellow” as possible.

801.3.7.6 The bottom plate of the main valve shall be epoxy coated. The shoe of the fire hydrant shall have a 6-inch mechanical joint connection and the inside shall be epoxy coated to prevent corrosion. The nozzle shall be threaded in place and retained by stainless steel locks. Hydrant body shall be threaded to receive the threaded nozzle. Nozzle shall be secured by a stainless steel locking device.

801.3.7.7 Fire hydrant shall contain two drain outlets. The drain outlets shall be constructed of bronze. Hydrant shall be provided with a pentagon operating nut to open counter clockwise and shall have an anti-friction washer between the hold-down nut and the operating nut.

801.3.7.8 To prevent loss of brass operating nuts due to theft or vandalism, the following shall be included in or on the fire hydrant:

801.3.7.8.1 Attach OWNER approved anti-theft device to the hydrant; or

801.3.7.8.2 The bonnet must be removed in order to remove the operating nut; or

801.3.7.8.3 Use a cast iron operating nut.

801.3.7.9 Fire hydrants shall be installed at locations as shown on construction plans and in accordance with Standard Detail Drawings.

801.3.7.10 Fire hydrants shall be properly restrained in accordance with Section 130. If mechanical restraint is used, each joint on the hydrant leg shall also be restrained.

801.3.8 PRESSURE REDUCING VALVE (PRV): Pressure reducing valve shall be a globe pattern, flanged end, pressure Class 125. Submittals for approval shall be made to the ENGINEER and approval must be received before installation. The following items are required in the PRV:

801.3.8.1 Materials:

801.3.8.1.1 Main valve-cast iron with brass trim.

801.3.8.2 Pilot Control System:

801.3.8.2.1 Adjustment from 15 psi to 75 psi.

801.3.8.2.2 Shut-off cock on all pilot control system lines.

801.3.8.2.3 Inlet flow strainer.

801.3.8.2.4 Closing speed control.

801.3.8.2.5 Opening speed control.

801.3.8.2.6 Flow stabilizer.

801.3.8.2.7 Tubing shall be copper.

801.3.8.3 Installation shall be as per the construction plans. ENGINEER shall determine final settings on PRV.

801.3.8.4 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a "Water Valve Data Card”. The ENGINEER will forward the card to the OWNER.

801.3.9 TAPPING SLEEVES: (For other than Concrete Cylinder Pipe) For either taps greater than 2/3 line size, or size on size taps 12 inches or less, only approved, long body, fully gasketed tapping sleeves shall be allowed. During installation of the tapping sleeve, the pipe shall be fully supported to support the weight of the tapping sleeve and tapping machine.

801.3.9.1 Tapping sleeves of heavy welded steel bodies shall meet the following requirements:

801.3.9.1.1 Epoxy coated.

801.3.9.1.2 Bolts and nuts to be stainless steel.

801.3.9.1.3 Gaskets to be Buna-N rubber.

801.3.9.1.4 Flange to be flat face steel and comply with AWWA C-207.

801.3.9.1.5 Class D-ANSI 150 lbs. drilling.

801.3.9.1.6 Designed to sustain an operating pressure of 150 psi.

801.3.9.1.7 May be used on all water mains, 4" and larger.

801.3.9.2 Tapping sleeves of cast iron bodies shall meet the following requirements:

801.3.9.2.1 Mechanical joint type with a working pressure of 200 psi .

801.3.9.2.2 Outlet flange to be Class 125, ANSI B16.1.

801.3.9.2.3 Sleeves to include side and end gaskets of Buna-N rubber.

801.3.9.2.4 Eight high strength steel bolts and nuts to secure the halves of the sleeve to the pipe.

801.3.9.2.5 May be used on all water mains, 4" and larger.

801.3.9.3 Tapping sleeves of short sleeve cast iron shall meet the following requirements:

801.3.9.3.1 Working pressure of 150 psi.

801.3.9.3.2 Outlet flange to be Class 125, ANSI B16.1.

801.3.9.3.3 Outlet half to have an enclosed gasket in a groove for a pressure seal.

801.3.9.3.4 Four high strength steel bolts to secure halves of tapping sleeve to the pipe.

801.3.9.3.5 May be used on all water mains, 4" and
larger.

801.4 WATER VALVE DATA CARD: Water Valve Data Card, as shown on pages 801-5 and 801-6 shall be prepared for all types of valves (Gate Valves, Butterfly Valves, Pressure Reducing Valves, Air Release Valves, etc.) according to the following instructions.

801.4.1 A Water Valve Data Card will be prepared for each valve installed.

801.4.2 The Valve Number will be assigned by the OWNER at a later date.

801.4.3 Valve Size is the nominal diameter of the valve, i.e., 6-inch, 14-inch or 48-inch. In the case of compound valves give size of main valve and bypass valve, i.e., 24-inch and 4-inch, or 36-inch and 6-inch.

801.4.4 Valve Type is the general description of the valve, such as: Resilient-Seal Gate Valve, Butterfly Valve, Globe Valve, Check Valve, etc.

801.4.5 Make and Model refers to the manufacturer, make and model number to identify the valve for replacement parts. This information should be available from the shop drawings.

801.4.6 Number of Turns and Direction to Open is the number of revolutions of the operating nut to make the valve travel from fully closed to fully open, and the direction is either clockwise or counterclockwise, i.e., 54 turns counterclockwise. All standard valves shall open counterclockwise. Operation, turn count, and direction to open will be verified by the ENGINEER prior to installation.

801.4.7 Under Project Name is the assigned work order number.

801.4.8 Date Warranty Expires is the expiration date, under the contract, for requiring warranty repairs.

801.4.9 Street Location: Give both Block number and street name. For valves in intersections give both streets, i.e., 5200 San Mateo Blvd. NE and 3000 Candelaria NE.

801.4.10 The section on coordinate location shall be completed with information furnished by the ENGINEER.

801.4.11 All applicable items on the "Water Valve Data
Card" should be filled in. However, accuracy is more unknown and cannot be determined, leave the space blank.

801.4.12 Depth to "Operator" is vertical distance from the top of actual valve operating nut to top of valve box cover.

801.5 FIRE HYDRANT DATA CARD
Fire Hydrant Data Card, as shown on page 801-8 shall be prepared for all installations of fire hydrants, according to the following instructions.

CARD NO. 801.4
WATER VALVE DATA CARD
(Front Side)

MAP NO.	VALVE NO.	SIZE / TURNS	TYPE ☐ -B.F.V. ☐ -B.V. ☐ -R.S.G.V.	MAKE	MODEL	PROJECT	EMD ☐ -YES ☐ -NO

CHECKED													
DATE													
CREW													

"CHECKED" CODE:

O - OK L - LOST E - EXTENSION NEEDED C - NEEDS CLEANING

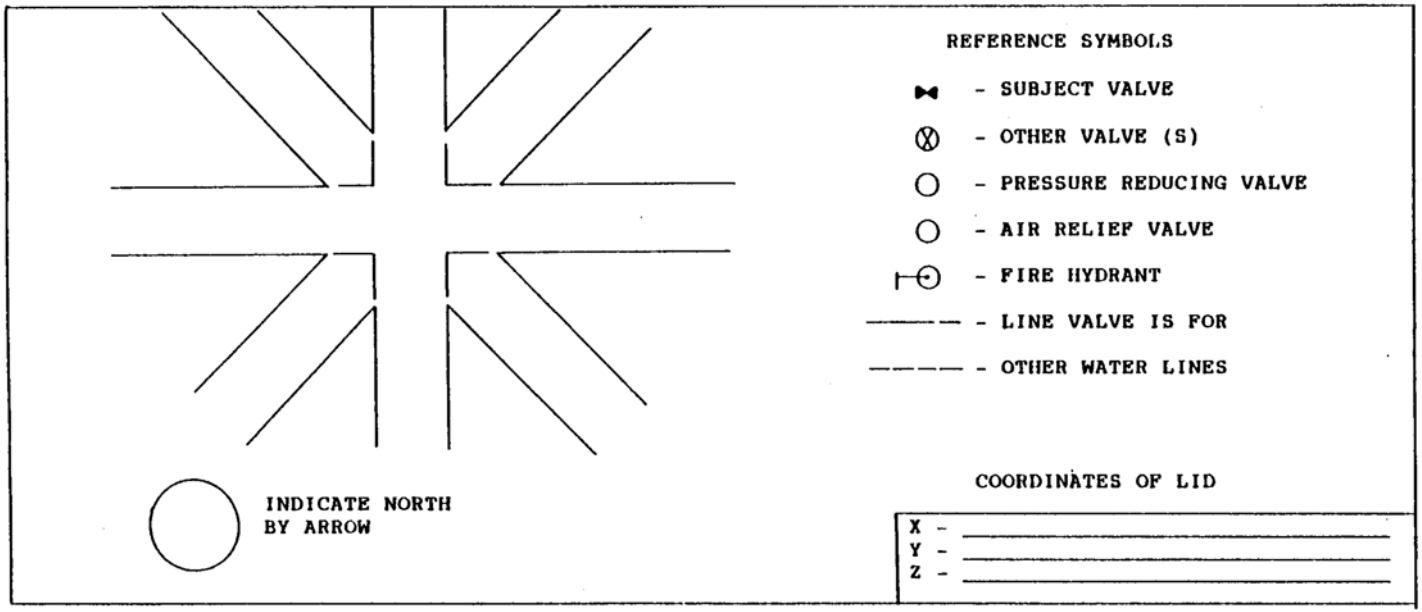
B - BROKEN M - LID MISSING R - RAISE TO GRADE

WARRANTY EXPIRES DEPTH TO OPER. LOCATION

CONTRACTOR EXTENSION LENGTH SKETCH EXACT LOCATION BELOW

NOTES: 1. Available at Water Systems Division.
2. Size 4 inches x 8 inches.

CARD NO. 801.4
WATER VALVE DATA CARD
(Reverse Side)



801.5.1 Fire hydrant number will be assigned by the OWNER at a later date.

801.5.2 Fire hydrant type refers to the manufacturer's make and model.

801.5.3 Location. Indicate both block number and street name. At intersections indicate both street names.

801.5.4 Date installed. Indicate actual date the hydrant was installed.

801.5.5 Depth. Indicate the actual depth in feet of the lower barrel of the fire hydrant. This depth is measured from the shoe to the break-away flanges of the hydrant.

801.5.6 On the reverse side of the card indicate the location of fire hydrant on the sketch.

801.6 WATER LINE CONNECTIONS

801.6.1 GENERAL : All new water line tie-ins to the existing water system shall be directly inspected and approved by the ENGINEER. This includes non-pressurized or pressurized connections that will result in extension of the existing system.

801.7 LOCATIONS OF WATER MAINS AND SEWER LINES

801.7.1 Unless otherwise authorized by the ENGINEER, parallel water and sewer lines shall be installed at least 10 feet apart horizontally, and the water line shall be at a higher elevation than the sewer. Separate trenches will be required in all cases (this shall be effective even though one line has been installed prior to the other), and the water line shall be at least 18 inches above the sewer; when water and sewer lines cross each other, the water line shall be at least 18 inches above the sewer; otherwise the sewer shall be of pressure class pipe extending between manholes, or concrete encased for 10 feet on each side of the water line as shown in the Standard Detail Drawings. The crossings shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.

801.7.2 Water mains shall not be constructed under walkways, sidewalks, curbs and gutters, drivepads, or similar concrete structures by tunneling underneath them. Trenchless technologies may be allowed with prior approval by the OWNER. The CONTRACTOR will cut these structures by using a concrete saw or, at his option, he may remove and replace the section of the concrete structure to the nearest full expansion joint or edge.

801.8 TRENCHING AND BACKFILLING

801.8.1 All trenching and backfilling shall be in full accordance with Section 701. The minimum cover over distribution lines shall be 3 feet, and 4 feet of cover over transmission and collector lines.

801.9 GENERAL INSTALLATION ITEMS

801.9.1 Trenching, bedding, and backfilling shall comply with the requirements set forth in Section 701.

801.9.2 Pipe and accessories shall be new and unused and shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating. No other pipe or material of any kind shall be placed inside of a pipe or fitting after the coating has been applied.

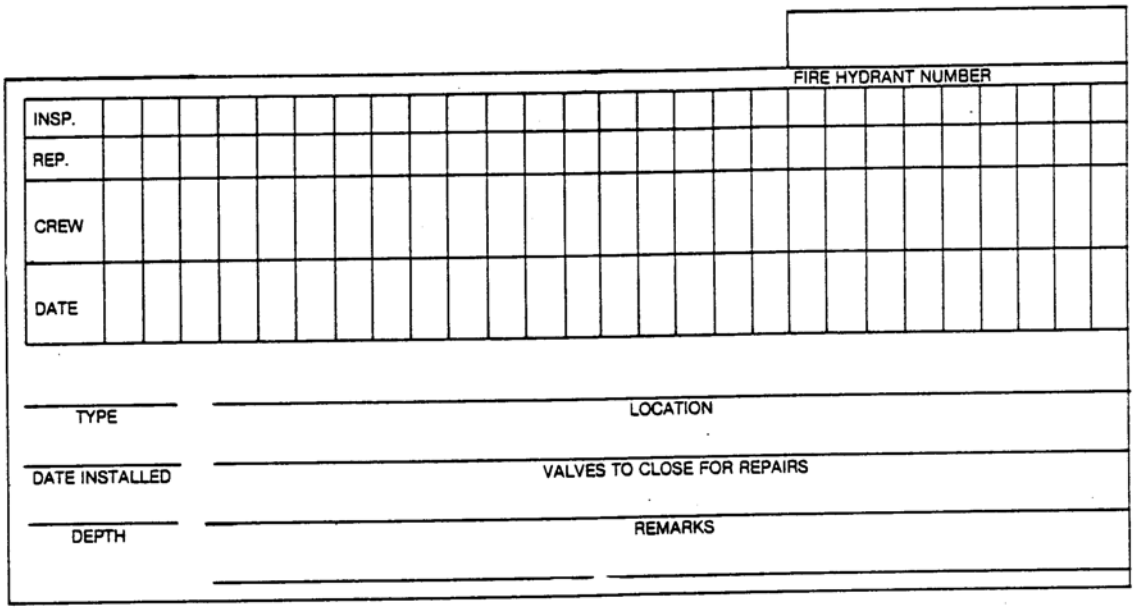
801.9.3 The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during operations by plugging or other approved methods. When work is not in progress, open ends of pipes and fittings shall be securely closed so that no other substances will enter the pipes or fittings. Any section of the pipe found to be defective before or after laying shall be replaced with sound pipe without additional expense to the OWNER.

801.9.4 All nuts and bolts utilized in underground pipe connections shall be stainless steel, high strength cast iron or high grade, high strength steel. The full length of each section of pipe shall rest solidly upon the bed, with recesses excavated to accommodate bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipes shall not be laid in water or when trench or weather conditions are unsuitable for the work except by as authorized by the ENGINEER. All unconnected ends of pipes shall have a valve, plug, or cap installed on it.

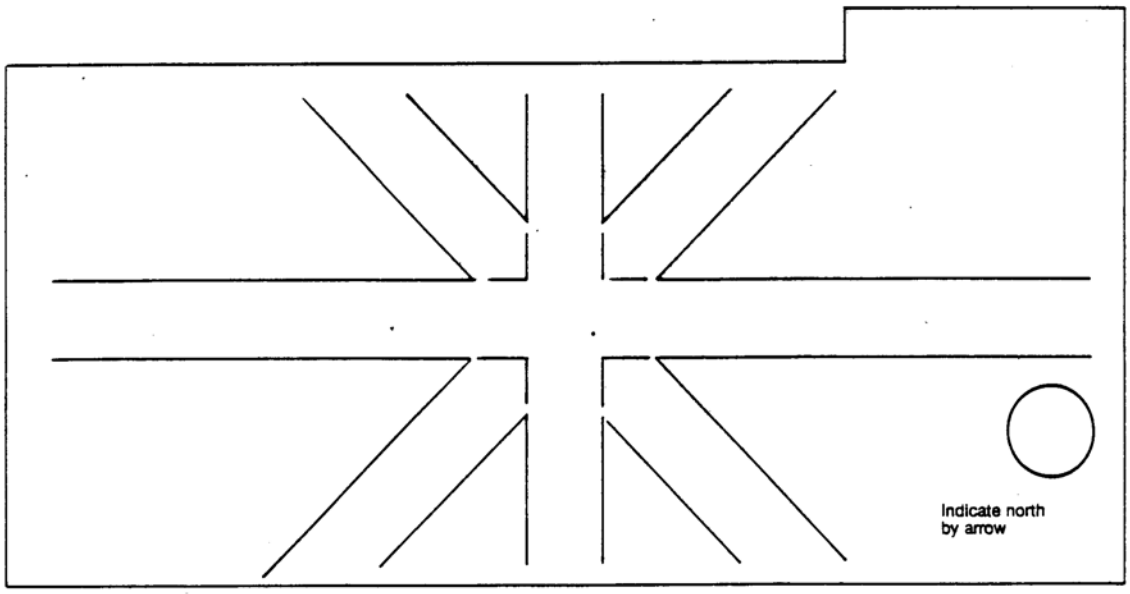
801.9.5 Pipe shall be laid to line and/or grade shown on the plans or as staked in the field. Changes in horizontal or vertical alignment of the pipe at a joint shall not exceed the manufacturer’s recommended deflection for the type and size pipe being laid. When the change required is more than the recommended deflection, a fitting or several short joints of pipe shall be used. PVC pipe may not be deflected at the joints.

CARD NO. 801.5

FIRE HYDRANT DATA CARD



FRONT SIDE



REVERSE SIDE

801.9.6 When new pipe is to be connected to an existing pipe or when crossing an existing pipe line, the CONTRACTOR shall excavate the existing lines well in advance of the laying of the new pipe line to enable the ENGINEER to verify their elevation and placement and to make any changes in grade and/or alignment of the new pipe line that may be required.

801.9.7 On all push-on-joints (bell and spigot, fluid-tite, and ring-tite) the rubber gasket shall be removed, cleaned, the groove cleaned, the gasket replaced, and the bell or plain end cleaned before jointing. The gasket and the bell or plain end of the pipe to be jointed shall both be lubricated with a suitable soft vegetable soap compound to facilitate jointing. Care shall be taken to insure that neither the bell or collar, or the pipe being jointed is damaged as it is being pushed home.

801.9.8 Flanged and mechanical joints shall be made with machine bolts and nuts of the proper size only. All components of these types of joints shall be cleaned before jointing. Only one (1) gasket will be permitted in a flange joint. In a mechanical joint the plain end pipe shall be fully seated before the gasket and gland is slipped up to the bell. Nuts on both types of joints shall be tightened by alternating nuts 180 degrees apart. The CONTRACTOR shall be responsible for assuring that proper torque is achieved and shall have a torque wrench available for verification by the ENGINEER.

801.9.9 When laying PVC pipe, a metalized detectable warning tape shall be installed a minimum of 1 foot above the top of pipe and 3 to 6 feet below the final surface. The tape shall be detectable with a standard metal pipe locator. The color of tape shall be safety precaution blue and will be inscribed at 10-foot intervals with the words, “CAUTION BURIED WATER LINE BELOW.” Tape shall be 2 inches wide. The tape shall be constructed of material that is impervious to alkalis, acids, chemical reagents, and solvents found in the soils.

801.9.10 When laying pipe, Electronic Marker Disks (EMDs) shall be installed in accordance with Section 170.

801.10 SPECIFIC PIPE LAYING REQUIREMENTS

801.10.1 Ductile iron pipe shall be installed in accordance with AWWA C 600 and as herein specified.

801.10.2 Steel pipe shall be installed in accordance with AWWA C 206 for welded joint and as herein specified. All field welded joints shall have one coat of coal-tar enamel of 3/32 inch thickness.

801.10.3 Plastic pressure pipe shall be installed in accordance with AWWA M 23 and C 900 and/or manufacturer’s printed recommendations, whichever is applicable. Where a conflict arises with this Specification, this Specification shall control. Trenching, embedment and backfill shall be specified in Section 701. A reference mark (a distinct circumferential line) is placed on the pipes spigot by the manufacturer to indicate the correct depth of the spigot penetration into the pipes gasket joint. If the pipe is seated too deep or too shallow, the pipe may buckle or separate due to thermal expansion/contraction, therefore particular attention must be exercised when jointing pipe. The reference mark must be showing and not farther than ½" from the leading edge of the bell. The CONTRACTOR shall verify that the manufacturer’s reference mark is correct per manufacturer’s literature.

801.10.4 All welded steel and concrete cylinder pipe shall have two small bond wires of low resistance, or other approved method, welded across the joint to make the joint electrically continuous. Where rigid joints are specified they shall be provided as specified herein. The outside joint recess shall be completely filled with a rich low shrinkage cement grout. The concrete surface in contact with the joint mortar shall be moistened with water just prior to pouring the joint recess. The mortar shall be poured into the joint recess against a waterproof paper or cloth diaper laid around and lapping the outside field joint. The diaper shall completely and snugly enclose the joint recess, being held in place by metal box strapping or wire. The mortar shall be poured into an opening slightly to one side on the top of the pipe and rodded by a flexible wire rod into place until it appears on the opposite side completely. After the joint recess has been filled with mortar, adjoining pipe sections shall not be disturbed. After the joint has been made, the concrete lining surfaces of the joint shall be moistened and the interior recess tightly jointed and troweled flush and smooth with the inside pipe surface. Grout for painting the interior joints shall be of a stiff consistency and shall have low shrinkage characteristics. In sizes of pipe smaller than 24", the mortar shall be buttered all around the shoulder inside the bell before the spigot is entered. A backing-up tool, such as an inflated rubber ball wrapped with burlap, shall be pulled through the joint to compact the mortar, completely fill the inside annular space and wipe off the excess mortar. Each joint will be inspected by the ENGINEER for proper and complete closure prior to final acceptance. Flanges shall be protected by “cocoon” type protection coating of coal-tar and felt in accordance with AWWA C 203. When moving individual pipe sections, the pipe shall be lifted using two web or belt type slings which support the pipe between the third and outside quarter points.

801.10.5 All fittings and valves shall be installed as per the type of joint as stated herein and/or as shown on the plans.

801.10.6 All couplings, clamps, sleeves, etc shall be installed as per the manufacturer's printed recommendations and as approved by the ENGINEER. The CONTRACTOR shall properly restrain all appurtenances as necessary.

801.10.7 All waterlines installed as part of a re-use system or other non-potable use shall be purple in color or shall be encased in purple PVC wrap.

801.11 CUTTING: The cutting of any type of pipe shall be done as per the manufacturer's printed recommendations, as approved by the ENGINEER. Care shall be taken in cutting any pipe that has an internal and/or external lining or coating.

801.12 BLOCKING AND RESTRAINED JOINTS

801.12.1 All restrained joints shall be by mechanical means unless directed or approved otherwise by the ENGINEER.

801.12.2 All tees, bends shall be restrained by mechanical means. Valves in runs need not be restrained, except that butterfly valves shall be flanged. Where rigid joints are called for on concrete cylinder pipe, the joints shall be flanged or field welded bell and spigot joints in accordance with the manufacturer's recommendation.

801.12.3 All caps and plugs on dead end lines will be mechanically restrained when feasible. Blocking may also be required when adequate restrain length is not available.

801.12.4 Where restrained joints on ductile iron pipe, or PVC pipe are called for on the plan, the mechanical restraining system employed shall conform to the recommendations of the pipe manufacturer. The restrained joint will be subject to the hydrostatic test specified herein.

801.13 RESTRAINING JOINTS FOR WELDED STEEL AND CONCRETE CYLINDER PIPE

801.13.1 Restrained joints in welded steel and concrete cylinder pipe for thrust restraint shall be produced by continuous welding the pipe joints and as shown on the plans.

801.13.2 Unless otherwise stated in the supplemental specifications the working pressure (operating plus transient) shall be 150 psi. The value for weight of overburden and the coefficient of friction shall be stated in the supplemental specifications.

801.14 TAPS INTO EXISTING CONCRETE CYLINDER PIPE

801.14.1 OBJECTIVE: The intent of this Subsection is to establish procedural and design criteria for making taps into existing concrete cylinder pipe for water distribution line extensions, and will be applicable to 4-inch and larger size water taps.

801.14.2 NEW WATER LINES: No non-factory taps will be allowed on newly-installed concrete cylinder pipes.

801.14.3 EXISTING WATER LINES:

801.14.3.1 Taps to existing concrete cylinder pipe must be approved in writing by the OWNER. The requester shall provide the following information:

801.14.3.1.1 Justification for the tap,

801.14.3.1.2 Project name and number, if applicable,

801.14.3.1.3 Date tap required,

801.14.3.1.4 Name of the CONTRACTOR who will be making the tap.

801.14.3.2 The CONTRACTOR shall coordinate the work with the OWNER before commencing work. The OWNER shall inspect and approve the entire installation of the tap.

801.14.4 INSTALLATION OF FIELD TAP:

801.14.4.1 Installation of field taps on concrete cylinder pipe shall be no smaller than 4 in. and no larger than 2/3 diameter of pipe to be tapped. No "weld neck" or weld on outlets will be used.

801.14.4.2 For field taps larger than 2/3 of pipe diameter, a tee will be inserted into the line.

801.14.4.3 For field taps greater than 4 in. and less than 2/3 diameter of pipe to be tapped an approved tapping saddle will be used. Tapping saddles shall be approved by the ENGINEER

801.15 SALVAGED MATERIALS
All salvaged materials (pipe, fittings, valves and other water line appurtenances) shall be stockpiled on-site in a neat manner by the CONTRACTOR. The ENGINEER and a representative of OWNER will inspect the stockpiled materials for salvage fitness and direct the following disposition:

801.15.1 If the material is considered salvageable, the CONTRACTOR will be directed to deliver the material to the OWNER. The CONTRACTOR will be responsible for the loading, transportation and off-loading of the salvageable materials. When the materials are delivered, the CONTRACTOR shall obtain a signed receipt from the OWNER. Before final acceptance of the project, all signed receipts will be submitted to the ENGINEER for accounting purposes.

801.15.2 Materials that do not have salvageable value will be disposed of by the CONTRACTOR at no additional cost to the OWNER.

801.16 HYDROSTATIC TESTS:

801.16.1 The CONTRACTOR shall be required to perform hydrostatic tests in all water mains, laterals, dead ends, and service lines in accordance with AWWA C 600. The test shall be conducted in the presence of the ENGINEER or his authorized representative. The testing of the lines shall be done without being connected to existing lines unless approved by the ENGINEER. The CONTRACTOR shall provide all temporary plugs required. If connections to the existing lines are allowed by the ENGINEER, it is with the understanding that the CONTRACTOR assumes any and all responsibility in case of damage or failure of the existing system. Water used for disinfecting may be used for hydrostatic testing. Leakage through connections to the existing system, leaks in the existing lines, or leaking existing valves under the test pressure will invalidate the test. The lines shall be tested at 150 pounds, or 1.5 times the normal working pressure of the line, whichever is greater, for not less than two hours. All taps, gauges and necessary equipment shall be provided by the CONTRACTOR as approved by the ENGINEER, however, the ENGINEER may utilize gauges provided by himself if he so elects. Each section of the new line, between valves shall be tested to demonstrate that each valve will hold the test pressure. No installed pipe will be accepted if the leakage is greater than that determined by hydrostatic test sheet calculations in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the test pressure in pounds per square inch gauge. During the test the test pressure should not lose more than 10 psig without being pumped back up to test pressure. The totals of the gallons of water required to hold the test pressure during the two hours and the amount of water required to return the line to the test pressure at the end of the test period is the total leakage. If the total leakage is less than the allowable, the line can be accepted. All visible leaks will be repaired regardless of the amount of leakage.

801.16.2 CONTRACTOR shall submit a testing plan to the ENGINEER for approval. In cases where a new main is being connected to an existing main without the installation of a new valve, the end of the new main shall be temporarily caped and blocked and a hydro-static test performed. Hydro-static tests should not be made such that an existing valve or existing main is included in the test section. Test Sheet on page 801-12 is the standard form which must be completed at the time of the test, signed by the ENGINEER and delivered to the OWNER prior to acceptance of the Project

801.17 DISINFECTING, FLUSHING, AND BACTERIA TESTING OF WATER LINES: New water lines shall be installed in such a manner as to not require cleaning by flushing. This shall require capping of stockpiled line, capping of lines at night and any other time work is not in progress, visual inspection of interior of lines, and cleaning as necessary, prior to placing in the trench. Every effort shall be made to prevent the entry of dirt and debris into pipelines under construction.

801.17.1 Mains shall be disinfected in accordance with AWWA C 651 or as required below with chlorine liquid solution, which is added by an approved method at one end of the lines as water is drawn through the lines and service connections. The chlorine solution shall remain in the line for at least 24 hours. The lines shall then be flushed until the chlorine residual is equal to the normal residual in the existing system or at 0.5 parts per million for unchlorinated water. Dry chlorine will not be used for disinfection of water lines. The flushed water will be disposed of by the CONTRACTOR appropriately.

801.17.2. Prior to the line being placed into service, bacteria samples shall be taken by the OWNER. Should results of the bacteriological analysis be unsatisfactory, the disinfection procedure shall be repeated.

801.17.3 The CONTRACTOR will be granted two free volumes of water for testing, disinfecting and flushing the new installation. All water used for testing, disinfecting and flushing shall be metered. If additional water is needed for these purposes, the water will be paid for by the CONTRACTOR at the current water rates. An approved backflow preventor system shall be used when withdrawing water from any waterlines and hydrants. Direct connection to the water system shall not be used for providing water for disinfecting, testing or flushing.

801.17.4 OWNER or the ENGINEER will collect the water sample to test the water in the existing lines at

TEST SHEET 801.16.2

Test No.:_____ HYDROSTATIC TEST

PROJECT NAME:_____
DATE:_____

PROJECT NUMBER:_____
CONTRACTOR:_____

LOCATION:_____
__

_____
_____

PIPE MATERIAL: _____ DIP _____ PVC _____ CCP _____Fabricated Steel

Test: Length (S) = _____ ft.
Size (D) = _____ inches
Pressure (P) = _____ psi - gauge (average test pressure during the hydrostatic test)
Leakage Allowed (L_{ALL}) - _____ gal / hr ($L_{ALL} = SD \sqrt{P} / 133{,}200$ per AWWA C600-99)

Basis: Only resilient seated gate valves and/or rubber seated butterfly valves are used. No metal seated valves are allowed.

Total Leakage Allowed for 2 hour Test Period: L_{ALL} * 2 hours = _____ gallons

Actual Amount of Water ADDED to maintain 150 psi ± 5 psi for 2 hours = _____ gallons

If actual amount of water added is LESS THAN total leakage allowed, test PASSED
If actual amount of water added is GREATER THAN total leakage allowed, test FAILED

_____ Test Passed _____ Test Failed

_____ _____ _____ _____
Contractor Date Inspector Date

_____ _____
Project Manager Date

COMMENTS:

_____
_____
_____
_____

Note: See Section 801.16 for the Specification for test procedure. A0224B/D2376B
the point of delivery for assurance of clean and

potable water. The water in the existing lines will be used for testing and flushing.

801.18 INTERFERENCE WITH SERVICE AND SCHEDULE OR WORK

801.18.1 The CONTRACTOR shall obtain the permission of the ENGINEER before making any connections with existing mains. The required operation of existing valves will be performed by the OWNER as per Section 18.

801.18.2 Work shall be started after authorization of the ENGINEER and shall be completed in a prompt efficient manner in coordination and cooperation with other utilities concerned.801.18.3 The CONTRACTOR will be required to arrange his construction program with a view of maintaining continuous service to water users, from existing facilities, to the fullest extent possible. He shall, at all times, withhold construction work, where any conflict in the service requirements occur.

801.19 NOTIFICATION OF COMPLETION

The CONTRACTOR shall notify the ENGINEER, in writing, when the CONTRACTOR has completed construction of a water line. This notification should be submitted immediately upon completion; the water line will not be placed in service by the OWNER before the sewer service and the street are in place and until the OWNER has received and accepted all adequate documentation submittals. OWNER shall consider, on a case by case basis, exceptions for fire protection purposes.

801.20 VALVE CAN REHABILITATION

801.20.1 The rehabilitation of existing valve cans as shown on the plans or as authorized by the ENGINEER shall include the following:

801.20.1.1 Removing the existing valve can and ring and cover and installing the new type can and cover.

801.20.1.2 Install a new concrete collar in paved and unpaved areas. Size and direction of the line should be noted on the collar.

801.20.1.3 The existing ring and cover shall be considered salvaged materials.

801.20.1.4 Removal and replacement of the pavement.

801.20.1.5 Excavation, backfill, and compaction.

801.20.1.6 All materials, labor, and equipment necessary to do the work.

801.20.2 The work under this item shall be constructed per the Standard Detail Drawings.

801.21 DOCUMENTATION SUBMITTALS

801.21.1 At the time of the final inspection the following documentation will be submitted to the ENGINEER and OWNER:

801.21.1.1 Hydrostatic test data of the new water line system.

801.21.1.2 Microbiological test reports which were taken at representative locations along the system.

801.21.1.3 Fire hydrant and valve cards. All valves at that time shall be in the open position, unless otherwise authorized by the ENGINEER and OWNER.

801.21.1.4 A marked-up set of construction drawings reflecting as-built conditions. This does not supplant the requirements for record or as-built drawings.

801.22 MEASUREMENT AND PAYMENT

801.22.1 PIPE: Payment for all sizes and types of pipe shall be made on the basis of measurement per linear foot, including the length of fittings, valves, etc. The contract unit price of pipe shall include all jointing and coupling materials necessary for its installation and connections to other sections of pipe, except for fittings, valves or other appurtenances. The cost of hydrostatic testing, flushing and disinfecting of new water lines shall be included in the contract unit price for the item in place. Pipe locator tape for pipe shall be included in the contract unit price of the pipe.

801.22.2 DEPTH OF TRENCH:

801.22.2.1 The contract unit price for pipe and appurtenances in all cases shall include the trenching, installation, and compacted backfilling for trench cuts as specified in Section 701.

801.22.2.2 Payment for additional depth, below the specified limits shall be made on the contract unit price per vertical foot per linear foot, and shall include trenching, installation of pipe and appurtenances, and compacted backfilling in the deeper trench.

801.22.3 REMOVAL AND RELAY, RETURN, OR DISPOSAL OF PIPE:

801.22.3.1 The contract unit price for removal and relaying pipe shall include all labor and new gasket material necessary to remove and reinstall pipe in another location.

801.22.3.2 The payment for removing and the delivery 2-1/4 inch to 14 inch pipe to the Water Utility Division in the City Yard as salvage materials shall be made on the unit price per linear foot. Only cast iron or ductile iron pipe that is undamaged will be considered for salvage.

801.22.3.3 Where there is no salvage value of the pipe, the pipe shall be removed and disposed of by the CONTRACTOR. The payment for removal shall be made on a unit price per linear foot; there will be no additional cost to the OWNER for disposal.

801.22.3.4 The payments for removal and relaying, removal and return, or removal and disposal shall include trenching and compacted backfilling.

801.22.4 CAST IRON AND DUCTILE IRON FITTINGS:

801.22.4.1 All cast iron and ductile iron fittings shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint ends fitting for the type and size of fitting used as specified in AWWA C 110, regardless of the type of ends on the fitting installed. The contract unit price per pound of fittings shall include all gaskets, glands, bolts and nuts required, no separate payment will be made for these items.

801.22.4.2 When the CONTRACTOR installs a OWNER-furnished fitting and replaces that fitting in the OWNER's inventory, the CONTRACTOR shall be paid the full contract unit price of that fitting as outlined above. If the CONTRACTOR does not replace the fitting in the OWNER's inventory the payment to the CONTRACTOR will be at the contract unit price of the fitting less the cost of the fitting itself.

801.22.4.3 Fitting insertion: The insertion of a fitting into an existing pipe line shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint end fitting and if required an all mechanical joint connecting piece (coupling) of the type fitting and size used, as specified in AWWA C 110, regardless of the type of ends on the fitting and coupling installed. This payment shall include all compensation for the excavation, cutting and removal of the existing pipe, installation of the fitting and coupling, if required, the recutting of the existing pipe or new pipe installed between the fitting and coupling, and backfill and compaction complete in place. In addition to the payment for the fitting insertion, the CONTRACTOR shall be paid for one each non-pressurized (wet) connection and if pavement, curb and gutter, sidewalk, drivepad, etc., are removed, these items will be paid for as part of the appropriate item.

801.22.5 REMOVAL AND RELAY, RETURN OR DISPOSAL OF PIPE APPURTENANCES:

801.22.5.1 The contract unit price for removal and relaying the appurtenances shall include all labor and new gasket material necessary to remove and reinstall the item in another location.

801.22.5.2 The payment for removing and returning 2 1/4 inch to 36 inch appurtenance to the OWNER as salvaged material shall be made on the contact unit price per each or unit price per pound. Only undamaged material will be considered for salvage.

801.22.5.3 Where there is no salvage value of the appurtenance, the item shall be removed and disposed of by the CONTRACTOR. The payment for removal shall be made on the contract unit price per each or contract unit price per pound; there will be no additional cost to the OWNER for disposal.

801.22.5.4 The payment for removal and relaying, removal and return, or removal and disposal shall include trenching and compacted backfilling.

801.22.5.5 Only cast iron or ductile iron appurtenances will be removed and relaid or removed and returned for salvage.

801.22.5.6 Fire hydrant relocation payment shall be the contract unit price per each for removal and reinstallation and shall include excavation, blocking, aggregate and compacted backfilling, as shown in the Standard Detail Drawings.

801.22.6 CONCRETE CYLINDER OR WELDED STEEL PIPE FITTINGS:

Concrete cylinder or welded steel pipe fittings, such as flanged outlets, bends, reducers, etc., shall be considered as incidental to the contract unit price for installation of the pipe, as shown on the construction plans.

801.22.7 COUPLINGS: The measurement for steel or cast iron couplings shall include payment for all gaskets, bolts, and incidental materials as may be needed for its complete installation. Payment shall be made on the contract unit price per each size of coupling required.

801.22.8 STEEL FITTINGS: Steel fittings shall only be used when authorized by the ENGINEER and

when needed to connect to an existing steel water line. Measurement and payment for steel fittings, when authorized, shall be made at the contract unit per pound based on weights of an all mechanical joint ends fitting of the type fitting and size used, as specified in AWWA C 110. This payment shall include all fabrication and welding required on the fitting.

801.22.9 VALVE AND VALVE CANS:

801.22.9.1 Valves shall be measured and paid for at the contract unit price per each size of valve. The contract unit price for valves 24-inch and larger shall include the bypass valve, fittings and piping, complete in place.

801.22.9.2 Valve boxes shall be measured and paid for at the contract unit price per each per type of valve boxes, which payment shall include the concrete pad with stem extension when required, complete in place.

801.22.10 FIRE HYDRANTS: Fire hydrants shall be measured and paid for at the contract unit price per each per depth of bury, which payment shall include excavation, gravel drain pocket, mechanical restraining system or blocking, backfilling, and compaction complete in place.

801.22.11 VALVE BOX ADJUSTMENTS:

801.22.11.1 Valve box adjustment using the adjustment collar and insert shall be measured and paid for per each complete in place including the concrete pad.

801.22.11.2 When the adjustment height required on a valve box exceeds the height of the adjustment collar or the valve box has been previously adjusted, the valve box will have to be rehabilitated. Measurement and payment shall be made as specified under Valve Box Rehabilitation.

801.22.12 WATER LINE CONNECTIONS:

801.22.12.1 Nonpressurized Connections: Nonpressurized connections shall be measured and paid for at the contract unit price per each for any size or type of pipe, complete in place, which shall include any extra excavation required, shut-off coordination, the removal of any caps or plugs or the cutting of the existing pipe any number of times required to make the connection, drainage plan (if required), pumping or handling of the water, backfilling and compaction. Fittings shall be measured and paid for per pound as specified herein, including all types of couplings.

801.22.12.2 Pressurized Connection: Pressurized connections shall be measured and paid for at the contract unit price per each per location shown on the plans, complete in place, which shall include excavation, the cleaning or removal of existing pipe coatings and coverings, air testing, the tapping, any grouting required, backfilling and compaction. The installation of the tapping sleeve and gate valve is to be paid under separate item or as indicated on the plans.

801.22.12.3 Connection to Steel Water Lines: All connections to existing steel water lines shall be made by using a transition coupling. The measurement and payment for this type of connection shall be made per pound of fitting for a Mechanical-Joint Connecting Piece of the size used based on the weights specified in AWWA C 110.

801.22.13 THRUST RESTRAINTS:

801.22.13.1 CONCRETE BLOCKING: When concrete blocking is used as a substitute for a mechanically restrained joint as authorized by the ENGINEER, the blocking shall be measured and paid for at the contract unit price per cubic yard placed to the neat lines shown on the plans or per the Standard Detail Drawings.

801.22.13.2 RESTRAINING JOINTS FOR WELDED STEEL OR CONCRETE CYLINDER PIPE: Measurement and payment for this item shall be at the contract unit price per linear inch of circumferential weld, complete in place, including protective coating of the weld.

801.22.13.3 MECHANICALLY RESTRAINED JOINTS: Mechanically restrained joint assemblies shall be measured and paid for at the contract unit price per each assembly per size of the pipe per each type (pipe to pipe, pipe to mechanical joint, pipe to fitting, etc.) complete in place.

801.22.13.4 VALVE ANCHORAGE: No separate measurement nor payment shall be made for valve anchorage as per Standard Detail Drawing. The cost of this work shall be included with the cost of the valve.

801.22.14 PRESSURE REDUCING VALVE (PRV): Measurement and payment for furnishing and installing a PRV shall be made at the contract unit price per each per size, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, equipment and material required for the excavation, the PRV, all by-pass piping, fittings and valves both inside and outside the structure, the structure, backfilling and compaction.

801.22.15 AIR RELEASE VALVE (ARV): Measurement and payment for furnishing and installing an ARV shall be made at the contract unit price per each per size of ARV, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, equipment and materials required for the excavation, ARV, piping, fittings, gate valve, can or structure, backfilling, and compaction.

801.22.16 VALVE BOX REHABILITATION: Valve box rehabilitation shall be measured and paid for at the contract unit price per each, complete in place which shall include the removal of the existing valve box, excavation, the new valve box installed, backfilling, compaction and the installation of the concrete collar.

801.22.17 CONCRETE STRUCTURES: The removal and replacement of concrete structures such as sidewalks, drive pads, and curb and gutters etc., required for the installation of water lines shall be measured and paid for as specified in Section 340 and 343.

801.22.18 BEDDING MATERIAL: No separate measurement nor payment shall be made for bedding material required when shown on the plans or when required due to the type of pipe supplied by the CONTRACTOR. The cost of the bedding material shall be included in the unit price of the pipe. If bedding material is not required by the conditions above but is required due to the conditions encountered during construction then the bedding material shall be measured and paid for as specified in Section 701.

801.22.19 SURPLUS MATERIALS: No separate measure nor payment will be made for the removal and disposal of surplus material generated by the pipe, bedding material or the use of lean fill.

SECTION 3010

ABBREVIATIONS AND DEFINITIONS

3010.1 GENERAL

Wherever used in these specifications or in the other Contract Documents, the following abbreviations and definitions have the meanings indicated which are applicable to both the singular and plural thereof:

3010.2 ABBREVIATIONS

Wherever the following abbreviations or symbols are used, they are to be construed the same as the respective expressions represented:

AASHTO	American Association of State Highway and Transportation Officials
AB	Aggregate Base
AC	Asphalt Concrete
ACB	Asphalt Concrete Base
ACI	American Concrete Institute
ACNM	Associated Contractors of New Mexico
ACP	Asbestos Cement Pipe
ACPA	American Concrete Pipe Association
AD	Assessment District
AGC	Associated General Contractors of America, Inc.
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
Asph	Asphalt
ASTM	American Society for Testing and Materials
AWG	American Wire Gage (Nonferrous Wire)
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BC	Beginning of Curve or Back of Curb
BCR	Beginning of Curb Return or Back of Curb Radius
BM	Bench Mark
BWG	Birmingham Wire Gage (Iron and Steel Wire)
C.C. or C/C	Center to Center
Cem.	Cement
CF	Curb Face
CI	Cast Iron
CIP	Cast-iron Pipe
CIPP	Cast-in-Place Pipe
C.L. or CL	Center Line
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CO	Clean Out
Col	Column
Conc	Concrete
Const	Construct
CY	Cubic Yard(s)
DF	Douglas Fir

DG	Decomposed Granite
DIA	Diameter
DIP	Ductile Iron Pipe
DMH	Drop Manhole
D/W	Driveway
EA	Each
EC	End of Curve
EL. or Elev.	Elevation
EMD	Electronic Marker Disk
Ex. or Exist	Existing
F & C	Frame and Cover
FH	Fire Hydrant
FJ	Flanged Joint
FL	Flow Line
FL. EL.	Floor Elevation
FS	Federal Specifications of Finished Surface
FHWA	Federal Highway Administration, Department of Transportation
Galv	Galvanized
GL	Ground Line
Gr.	Grade
H	Height or High
HC	House Connection Sewer
Hor.	Horizontal
ID	Inside Diameter
Inv.	Invert
IP	Iron Pipe
ITE	Institute of Traffic Engineers
LB	Pound(s)
LF	Linear Feet (Foot)
Lin.	Linear
LL	Liquid Limit
Long	Longitudinal
LS	Lump Sum
M	Thousand
m	meter or middle
Max.	Maximum
MH	Manhole
MJ	Mechanical Joint
Min.	Minutes or Minimum
Mon.	Monolithic or Monument
MTD	Multiple Tile Duct
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NGS	National Geodetic Survey
NMSA	New Mexico Statutes Annotated--l978 Compilation as Amended
NMDOT	New Mexico State Department of Transportation
OC	On Center
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
PC	Point of Curvature
PCC	Point of Compound Curve or Portland Cement Concrete
PI	Point of Intersection or Plasticity Index
PL	Property Line or Plastic Limit
PP	Power Pole
ppm	Parts per Million
PRC	Point of Reverse Curve

Prop	Proposed or Property
PRV	Pressure Reducing Valve
psf	Pounds per Square Foot
psi	Pounds per Square Inch
PT	Point of Tangency
Pvmt	Pavement
PVC	Polyvinyl Chloride
PVCP	Polyvinlychloride Pipe
Q	Rate of Flow
R	Radius
RC	Reinforced Concrete
RCP	Reinforced Concrete Pipe
Rdwy	Roadway
Ret. Wall	Retaining Wall
RGRCP	Rubber Gasket-Reinforced Concrete Pipe
R/W	Right-of-Way
s	Slope
SAE	Society of Automotive Engineers
San.	Sanitary
SCCP	Steel Cylinder Concrete Pipe
SD	Storm Drain
Sdl.	Saddle
Sect	Section
SF	Square Feet (Foot)
Spec	Specifications
Sp. MH	Special Manhole
San. S	Sanitary Sewer
St.	Street
Sta.	Station
Std.	Standard
SY	Square Yard(s)
T	Tangent Distance
TH	Test Hole
TMH	Trap Manhole
UL	Underwriters' Laboratories, Inc.
USA	United States of America Standards Institute, Inc.
V	Velocity
VC	Vertical Curve
VCP	Vitrified Clay Pipe
VCPI	Vertical Curve Point of Intersection
Vert	Vertical
VF	Vertical Feet (Foot)
VSF	Vertical Square Feet (Foot)
WI	Wrought Iron

3010.3 AISC ABBREVIATIONS AND SYMBOLS

All abbreviations and symbols used on plans for structural steel construction shall conform to those given in the Steel Construction Manual of the American Institute of Steel Construction.

3010.4 DEFINITIONS

Addenda or Addendum--Any changes, revisions or clarifications of the Contract Documents which have been duly issued by OWNER to prospective Bidders prior to the time of receiving Bids.

Agreement--The written agreement which constitutes a contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement.

Application for Payment--The form which is to be used in requesting progress payments and which is to include the schedule of values and an affidavit of CONTRACTOR that progress payments heretofore received on account of the Work have been applied by CONTRACTOR to discharge in full all of CONTRACTOR's obligations reflected in prior Applications for Payment.

Bid--The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed, also referred to as the Bid Proposal.

Bidder--Any person, firm, or corporation submitting a Bid for the Work.

Bid Proposal--The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed, also referred to as the Bid.

Board--The Governing Body of the OWNER or Contracting Agency.

Bonds--Bid, performance, and payment bonds and other instruments of security, furnished by CONTRACTOR and his surety in accordance with the Contract Documents.

Change Order--A written order to CONTRACTOR signed by OWNER authorizing an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Time issued after execution of the Agreement.

Contract Documents--The Agreement, Addenda, Advertisement for Bids, Instructions to Bidders, Bid Proposal, Bid Bond, Performance Bond, Labor and Material Payment Bond, the Certificates of Insurance, the Notice of Award, the Notice to Proceed, the General Conditions, the Special Provisions, the Technical Specifications, the Supplemental Technical Specifications, the Reference Specifications, Plans and Drawings, and all Modifications, also referred to as the Contract.

Contract Price--The total monies payable to CONTRACTOR under the Contract Documents.

Contract Time--The number of days stated in the Bid Proposal for the completion of the Work.

Contracting Agency--(See OWNER).

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

Day--A calendar day of twenty-four hours measured from midnight to the next midnight.

Defective Work--All unsatisfactory work, all faculty work and all work not conforming to the requirements of the Contrast Documents.

Drawings or Plans--The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents.

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

ENGINEER--The person, either OWNER's employee or agent or a licensed professional with whom OWNER has entered into an agreement, who is responsible for the engineering design or construction contract administration and inspection or both, acting directly or through duly authorized representatives.

Field Order--A written order issued by ENGINEER which clarifies or interprets the Contract Documents.

General Conditions--Conditions which apply to all projects and which can be modified by the Special Provisions.

General Provisions--A term having the same meaning as the term General Conditions.

Modification--(a) A written amendment to the Contract Documents signed by both parties, (b) a Change Order, (c) a written clarification or interpretation issued by ENGINEER (d) a written order for a minor change or alteration in the Work issued by ENGINEER. A Modification may only be issued after execution of the Agreement.

NMDOT Standard Specifications--New Mexico State Highway Department Standard Specifications for Road and Bridge Construction.

Notice of Award--The written notice by OWNER to the apparent successful Bidder stating that, upon compliance with the conditions precedent to be fulfilled by him within the time specified, OWNER will execute and deliver the Agreement to him.

Notice to Proceed--A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform his obligations under the Contract Documents.

OWNER--A municipality, town, village or another political subdivision of the State, for whom the work is to be performed.

Project--The entire construction to be performed as provided in the Contract Documents.

Reference Specifications, Test Methods, and Applicable Codes--All standard specifications and test methods of any society, asssociation, or organization herein referred to are hereby made a part of these Contract Documents the same as if written in full. Reference to such standards refer to the latest published issues as of the first date of publication of the Advertisement for Bids. Reference to local or state codes and laws shall mean the latest adopted and published codes as of the date of the Advertisement for Bids.

Service Connections--Service Connections shall be construed to mean all or any portion of the pipe, conduit, cable, or duct which connects a utility main or distribution line to a building, home, residence, or property, also referred to as service line connection.

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

Special Provisions--Conditions which are written for a specific project and which may modify the General Conditions.

Specifications, also Technical 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.

Standard Details--Standard drawings showing local government construction methods, materials, and practices.

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.

Substantial Completion--The date as certified by ENGINEER when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it was intended; or if there be no such certification, the date when final payment will be specified.

Supplemental Technical Specifications—Specifications which are written to modify the Technical Specifications.

Utility--Overhead or underground wires, pipe lines, conduits, ducts, or structures, operated and maintained in or across a public right-of-way or easement or private easement.

A. Public Utility--Owned and operated by a municipality or another political subdivision of the State.

B. Private Utility--Owned and operated by a private company or corporation.

Work--Any and all obligations, duties, and responsibilities necessary to the successful completion of the Project assigned to or undertaken by CONTRACTOR under the Contract Documents, including all labor, materials, equipment, and other incidentals, and the furnishing thereof.

Appendix

Subsurface Investigation for Proposed Water Transmission Line

For Reference Only – Not Part of Contract Documents