

**SPECIFICATIONS FOR
Ogallala Water 2014-1
FOR
Ogallala, Nebraska**

AGENCY APPROVAL



**T.C. ENGINEERING INC.
CONSULTING ENGINEERS**

**ONE SOUTH SYCAMORE
PO BOX 832
NORTH PLATTE, NE 69103-0832
(308) 534 – 9245
(308) 534-3735 Fax
tcw@tcengineeringinc.com
brb@tcengineeringinc.com**

SPECIFICATIONS
Ogallala Water 2014-1
FOR
Ogallala, Nebraska

December 3rd, 2013

T.C. Engineering Inc.
North Platte, Nebraska

TABLE OF CONTENTS

	<u>pp</u>
Notice to Bidders	1
Information for Bidders	3
Bid Form	5
General Conditions	12
Additional Conditions	4
01010 Summary of the Work	1
01150 Project Meetings	1
01200 Progress and Payment	3
01300 Submittals	1
01400 Testing Laboratory Services	1
01500 Temporary Facilities	2
01600 Material and Equipment	1
01700 Project Closeout	1
02010 Subsurface Exploration	1
02020 Removal of Structures and Obstructions	1
02100 Clearing	1
02221 Excavation, Trenching and Backfilling	2
02551 Water System	6
02552 Conductive Tracer Wire	3
02610 Asphalt Paving	3
02820 Seeding	3
03310 Cast in Place Concrete	5

INSTRUCTIONS TO BIDDERS

To be considered, Bids must be made in accord with these Instructions to Bidders.

IB-01. DOCUMENTS: Copies of the Contract Documents may be obtained from the Engineer, between the hours of 8:00 AM and 12:00 N and 1:00 PM and 5:00 PM, Central time, North Platte, Nebraska, Monday through Friday.

IB-02. EXAMINATION: Bidders shall carefully examine the Contract Documents and construction site to obtain firsthand knowledge of existing conditions. Contractors will not be given extra payments for conditions which can be determined by examining the site and Contract Documents.

IB-03. QUESTIONS: Submit all questions about Contract Documents to the Engineer. Replies will be issued to all Prime Bidders of record as Addenda to the Drawings and Project Manual, and will become part of the Contract. The Engineer and the Owner will not be responsible for oral clarification. Questions received less than forty-eight (48) hours before the Bid opening cannot be answered.

IB-04. SUBSTITUTIONS: To obtain approval to use unspecified products, Bidders shall submit written requests at least ten (10) days before the Bid date and hour. Requests received after this time will not be considered. Requests shall clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. If the Product is acceptable, the Engineer will approve it in an Addendum issued to all Prime Bidders of record.

IB-05. ADDENDA AND INTERPRETATIONS: No interpretation of the meaning of the Contract Documents will be made to any Bidder orally.

Every request for such interpretation shall be in writing addressed to the Engineer, and, to be given consideration, must be received at least ten (10) days prior to the date fixed for receiving Bids. Any and all such interpretations and any supplemental instructions will be in the form of written Addenda to the Contract Documents which, if issued, will be mailed by certified mail with return receipt requested to all Bidders of record (at the respective address furnished for such purposes), not later than three (3) days prior to the date fixed for the receipt of Bids. Failure of any bidder to receive any such Addendum or interpretation shall not relieve such bidder from any obligation under his Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

IB-06. BASIS OF BIDS: The bidder must include all unit cost items shown on the Bid Form; failure to comply may be cause for rejection. No segregated Bids or assignments will be considered.

IB-07. BID SECURITY: A certified check; Bid Bond, or other surety in an amount not less than percent five (5%) total amount of the Base Bid, payable to the City of Ogallala, Nebraska, shall accompany each Bid in a separate sealed opaque envelope, bearing on the outside the bidder's name and address, and marked "**Bid Security for Ogallala Water 2014-1, Ogallala, Nebraska**", and marked with the division of Work or Contract it represents.

If a Bid Bond is submitted, it shall be issued by a surety company authorized the State of Nebraska to issue such bonds, shall be acceptable to the Owner, and shall be submitted on AIA Document A310, February 1970 or later edition.

Bid Security will be returned to the Bidders as soon as the successful bidder has executed and delivered the Contract, and has furnished satisfactory Bonds.

IB-08. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT: Upon his failure or refusal to execute and deliver the Contract and bonds required within ten (10) days after receiving notice of the acceptance of his Bid, the successful Bidder shall forfeit to the Owner the security deposited with his Bid as Liquidated Damages for Such failure or refusal.

IB-09. PERFORMANCE BOND OR OTHER APPROVED SURETY in the amount equal to one hundred percent (100%) of the Contract Price, shall be furnished by the successful Bidder in accord with the General and Supplementary Conditions and General Requirements.

IB-10. POWER OF ATTORNEY: Attorneys-in-fact who sign Bid Bonds and Contract Bonds must file with each Bond a certified and dated copy of their power of Attorney.

IB-11. SALES AND USE TAX: FINAL DETERMINATION OF TAXABLE STATUS OF PROJECT MATERIAL SHALL BE DETERMINED BY THE DEPT. OF REVENUE. IT SHALL BE THE BIDDERS RESPONSIBILITY TO DETERMINE THE TAXABLE STATUS OF MATERIAL AND LABOR FOR THIS PROJECT PRIOR TO THE BID.

IB-12. EQUIPMENT LIST: Bids shall be accompanied with an accurate list of major items of equipment to be used in assembling the installation including all items of equipment specified herein.

IB-13. PREPARATION OF BIDS: Bids shall be made on unaltered Bid Forms furnished by the Engineer. In ink or typewritten words and figures, fill in all blank spaces for Bid Prices and submit on (1) copy. Bids shall be signed by the person or persons legally authorized to bind the bidder to a Contract, with the name or names typed below the signature or signatures. Bids submitted by an agent shall have a current Power of Attorney attached certifying the authority of the agent to bind the Bidder.

IB-14. SUBMITTALS: Bids shall be submitted in opaque, sealed envelopes bearing on the outside the name and address of the Bidder, and marked "bid for **Ogallala Water 2014-1**". If Bids are sent by mail, they shall be received until 2:00 p.m. April 16th, 2014, 411 East 2nd, Ogallala, Nebraska, 69153. If Bids are faxed they shall be received by 308-284-6565.

IB-15. MODIFICATION AND WITHDRAWAL: No Bid may be withdrawn or modified after the Bid opening, except where the award of the Contract has been delayed for thirty (30) days.

IB-16. DISQUALIFICATION: The Owner reserved the right to disqualify Bids before or after opening, upon evidence of collusion with the intent to defraud or other illegal practices upon the part of the Bidder.

IB-17. OPENING: Bids will be received until the appointed hour at which time they will be publicly opened and read aloud. Bids received after this time will not be accepted.

IB-18. BID AWARD: The Contract will be awarded to the responsive, responsible Bidder submitting the lowest Base Bid with or without alternates provided his Bid is reasonable and it is in the Owner's interest to accept it. The Owner reserves the right to reject any and all Bids received. The Owner shall have the right to reject any or all Bids and to reject bids not accompanied by required Bid Security.

IB-18. FAIR LABOR STANDARDS: Each Bid shall be accompanied with a statement from the bidder that he is complying with, and will continue to comply with, Fair Labor Standards according to law, in the pursuit of his business and in the execution of the Contract on which he is bidding.

IB-19. BID AWARD: The Contract will be awarded to the responsive, responsible Bidder submitting the lowest Base Bid and/or applicable alternates provided his Bid is reasonable and it is in the Owner's interest to accept it. The Owner reserves the right to reject any and all Bids received. The Owner shall have the right to reject any or all Bids and to reject bids not accompanied by required Bid Security.

IB-20. SPECIAL BID REQUIREMENT: Due to the projects being a water and sewer connection districts, each project must independently and on a stand alone basis. "Tying" of bids are not accepted, any Contractor bid form found to be "Tying" the connection districts will be rejected.

BID FORM FOR OGALLALA WATER 2014-1
WATER IMPROVEMENTS

OGALLALA, NEBRASKA

Bid of _____,

a corporation organized and existing under the laws of the

State of _____;

a partnership consisting of _____

_____ partners; or,

a sole proprietor;

hereinafter called the Bidder.

To: City of Ogallala
411 East 2nd Street
OGALLALA, NE 69028

The undersigned acknowledges that he has received, and has familiarized himself with the following:

Project Manual: Ogallala Water 2014-1
Drawings: Sheets 1 through 6

Addenda: No. ___ through ___.

The undersigned further acknowledges that he has visited the site, and has familiarized himself with local conditions affecting the cost of the Work at the place where the Work is to be done.

In submitting this Bid, the undersigned agrees:

1. To furnish all material, labor, survey stakes, tools, dewatering, expendable equipment, bailing, shoring removal, overhead, profit, insurance, etc., and all utility and transportation services necessary to perform and complete, in a workmanlike manner, any individual Project Contract or Contracts for which Bids are submitted, in accord with the Bidding Documents prepared by T.C. Engineering Inc., for the consideration hereinafter set forth.
2. To hold his Bid open for Thirty (30) days after the receipt of Bids and to accept the provisions of the Instructions to Bidders regarding disposition of Bid Security.

3. To enter into and execute a Contract, if awarded on the basis of this Bid, to furnish a Performance Bond and a Labor and Material Bond or approved surety in accord with the General Conditions and General Requirements of this Contract, and to deliver executed Contract and Bonds to the Engineer within ten (10) days after Notice of Award. The Bid Security shall become the property of the Owner in the event the Contract and Bonds are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

4. To complete the tests specified in Section 01400.

5. To start the Work within Thirty (30) calendar days from the date of the Contract, and complete the Work by September 1, 2014.

6. Acknowledges that he has reviewed and read the Drawings, Project Manual (Specifications), General Conditions, Addendums and Special Conditions, and that there are no errors in, or omissions from, the Drawings and Project Manual. In the event there are errors in, or omissions from, the Drawings and Project Manual, he never-the-less accepts same as is.

That if he neglects, fails or refuses to complete the Work within the Contract Time, or an extension as determined by the Owner and Engineer, he shall pay the Owner the sum of Eight Hundred Fifty Four Dollars and Forty Cents (\$854.40)/day, not as a penalty but as liquidated damages for such breach of Contract, for each and every day that he defaults after the time stipulated for completing the Work, as provided in the General Conditions.

Liquidated Damages Calculation:

Administration cost = \$ 35.00/hr
Engineering cost = \$ 90/hr (weighted average)
Mileage = \$0.60/mile

Interest on short term borrowing = 8 %
Interest on long term borrowing = 3 %

Annual cost equivalent:

Administration: 365 x 1/hr/day x \$ 35.00 =	\$ 12,775.00
Engineering: 365 x 8/hr/day x \$90.00 =	\$ 262,800.00
Mileage: 365 x 120/mi/day x \$0.60/mile =	\$ 26,280.00
Interest: \$ 200,000 x (.08 - .03) =	\$ 10,000.00
Annual cost =	\$ 311,855.00
Daily cost =	\$ 854.40/calendar day

BID SCHEDULE: The quantities are estimated. Unit Prices are for the complete installation of each item and related work thereto. (Amounts shall be shown in both Unit Prices and Total Amounts. In case of discrepancy, Unit Prices shall govern.).

WATER IMPROVEMENTS 2014-1: Contract No. 1- Ogallala Water 2014-1:

The undersigned agrees to perform all of the Work required to complete Ogallala Water 2014-1 for the following Unit Prices based upon Measurements in accord with Section 01200 Progress and Payment:

MISCELLANEOUS ITEMS CALLED FOR ON THE DRAWINGS OR INCLUDED IN THE SPECIFICATIONS OR PROJECT MANUAL, AND NOT SPECIFICALLY NAMED IN THE BID FORM SHALL BE CONSIDERED INCIDENTAL EXPENSES AND INCLUDED IN THE UNIT PRICE BID FOR THE INSTALLATION OF THE 14" WATER PIPE. NO ADDITIONAL PAYMENT SHALL BE MADE FOR INCIDENTAL EXPENSES.

Item No.	Approximate Quantity Description and Unit	Unit Price	Total Amount
----------	--	------------	--------------

Fittings, including installation, followers, glands, nuts, bolts, gaskets, connections and appurtenances dresser couplings are solid body.

Connections, backfill, soil retarder and appurtenances shall be included in Fire Hydrants, Corporation, Saddle , Air Release Assembly, Gate Valve and Box prices.

1.	8" PVC C-900 Water Pipe Directionally Drilled 1020 LF	\$ _____	\$ _____
2.	8" Tee 4 ea.	\$ _____	\$ _____
3.	8" Dresser 3 ea.	\$ _____	\$ _____
4.	8" Plug 1 ea.	\$ _____	\$ _____
5.	8"x 6" Tee 3 ea.	\$ _____	\$ _____
6.	8" Gate Valve & Box 5 ea.	\$ _____	\$ _____
7.	6" Fire Hydrant including connections, thrust blocks, crushed rock, backfill, testing, disinfection, bollards, and appurtenances 1 ea. - 5½' bury	\$ _____	\$ _____
8.	6" C-900 Water Pipe 1420 LF	\$ _____	\$ _____
9.	6" Tee 1 ea.	\$ _____	\$ _____

10.	6" Dresser 3 ea.	\$ _____	\$ _____
11.	6" 90° Elbow 1 ea.	\$ _____	\$ _____
12.	6" Gate Valve & Box 3 ea.	\$ _____	\$ _____
13.	6"x 4" Tee 2 ea.	\$ _____	\$ _____
14.	4" Dresser 2 ea.	\$ _____	\$ _____
15.	1" Service Line 300 LF.	\$ _____	\$ _____
16.	Curb Stop 18 ea.	\$ _____	\$ _____
17.	1"x6" Saddle and Corps 18 ea.	\$ _____	\$ _____
18.	Concrete Removal Up to 12"t 130 sy	\$ _____	\$ _____
19.	New 8"t PC Concrete Paving including joints, crack sealing, expansion (47-B 1PF Concrete) 130 sy	\$ _____	\$ _____
20.	Flowable Fill Lump Sum	\$ _____	\$ _____
21.	12 Gauge Underground Locating wire Includes placement 2440 LF	\$ _____	\$ _____
22.	Seeding, mulching and fertilizing disturbed areas 1 Ls	\$ _____	\$ _____
23.	Gravel Pipe Bedding 120 CU. YDS.	\$ _____	\$ _____

TOTAL OGALLALA WATER 2014-1: \$ _____

TOTAL OGALLALA WATER 2014-1 written in words

EXPERIENCE DATA: Each bidder shall supply the following data on their experience on attached form or below:

Name of Bidder: _____

<u>Owner Contact</u>	<u>Name and Phone No.</u>	<u>Project Location</u>	<u>Project Description (type and cost)</u>	<u>Completion Date</u>

Additional Data: _____

The undersigned has submitted the required Bid Security and other items required in the Instructions to Bidders. The undersigned certifies that he is complying with, and will continue to comply with, Fair Labor Standards according to law, in the pursuit of his business and in the execution of the Contract on which he is Bidding.

In submitting this Bid, it is understood that the right to reject any and all Bids and to waive irregularities in the bidding has been reserved by the Owner. The undersigned agrees to abide by the decision of the Owner to accept that Bid with or without alternates, which the Owner deems most beneficial to the City of OGALLALA, Nebraska.

Dated this _____ day of _____, 2014

Respectfully Submitted:

Signature

Date: _____

Title

Corporate Seal:

Address

License # : _____

Address

FAX # _____

Address

Telephone

Email Address

GENERAL CONDITIONS

1. Definitions
2. Additional Instructions and Detail Drawings
3. Schedules, Reports, and Records
4. Drawings and Specifications
5. Shop Drawings
6. Materials, Services and Facilities
7. Inspection and Testing
8. Substitutions
9. Patents
10. Surveys, Permits, Regulations
11. Protection of Work, Property, Persons
12. Supervision by Contractor
13. Changes in the Work
14. Changes in Contract Price
15. Time for Completion and Liquidated Damages
16. Correction of Work
17. Subsurface Conditions
18. Suspension of Work, Termination and Delay
19. Payments to Contractor
20. Acceptance of Final Payment as Release
21. Insurance
22. Contract Security
23. Assignments
24. Indemnification
25. Separate Contracts
26. Subcontracting
27. Engineer's Authority
28. Land and Rights-of-Way
29. Guaranty
30. Arbitration
31. Taxes

1. DEFINITIONS

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

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

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

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

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

1.6 CHANGE ORDER- A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS- The contract, including Advertisement For Bids, Information For Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, AND ADDENDA.

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

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

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

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

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

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

1.14 NOTICE OF AWARD- The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

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

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

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

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

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

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

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

1.22 SUBSTANTIAL COMPLETION- That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS or such requirements that may be imposed by applicable state laws.

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

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

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

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

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

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

3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

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

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

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

4. DRAWINGS AND SPECIFICATIONS

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

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

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

5. SHOP DRAWINGS

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

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

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

6. MATERIALS, SERVICES, AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

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

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

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

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

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

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

7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the

CONTRACT DOCUMENTS.

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

7.5 Inspections, tests or approvals by the engineer or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

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

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

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may required, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction, and an appropriate CHANGE ORDER shall be issued.

8 SUBSTITUTIONS

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

9. PATENTS

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

10. SURVEYS, PERMITS, REGULATIONS

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

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that any be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS.

Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. HE will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. HE will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR

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

13 CHANGES IN THE WORK

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

13.2 The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACT shall document the basis for the change in CONTRACT PRICE or TIME, within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

14. CHANGES IN CONTRACT PRICE

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

- (a) Unit prices previously approved.
- (b) An agreed lump sum.

(c) The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the work. In addition there shall be added an amount to be agreed upon but not to exceed fifteen (15) percent of the actual cost of the WORK to cover the cost of general overhead and profit.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

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

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

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

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

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

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

16. CORRECTION OF WORK

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

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

17. SUBSURFACE CONDITIONS

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

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

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

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

18. SUSPENSION OF WORK, TERMINATION AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged a bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

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

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

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

18.6 IF the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. PAYMENTS TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect his interest therein, including applicable insurance. The

ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all work covered by the CONTRACT DOCUMENTS. The OWNER at any time, however, after fifty (50) percent of the WORK has been completed, if he finds that satisfactory progress is being made, shall reduce retainage to five (5%) percent on the current and remaining estimates. When the WORK is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced below five (5%) percent to only that amount necessary to assure completion. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

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

19.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.5 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, material, men, and furnishes of machinery, and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been full discharged where- upon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

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

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

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

21 INSURANCE

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

21.1.1 Claims under workmen's compensation disability benefit and other similar employee benefits;

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

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

21.1.4 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting there from.

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

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

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

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

21.4 The CONTRACTOR shall procure and maintain at his own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the state in which the work is performed. Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any work is sublet, the CONTRACTOR shall required such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

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

22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance Bond and a Payment Bond in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS.

Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared a bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR.

No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

23. ASSIGNMENTS

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

24. INDEMNIFICATION

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

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

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.

25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

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

25.3 IF the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to the starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or other involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefore as provided in Sections 14 and 15.

26. SUBCONTRACTING

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

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

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

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

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

27. ENGINEER'S AUTHORITY

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

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

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

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

28. LAND AND RIGHTS-OF-WAY

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

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

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

29. GUARANTY

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one (1) year from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such correction as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. IN the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

30. ARBITRATION

30.1 All claims, disputes and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by the making and acceptance of final payment as provided by Section 20, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association. This agreement to arbitrate shall be specifically enforceable under the

prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the demand for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and with the American Arbitration Association, and a copy shall be filed with the ENGINEER. Demand for arbitration shall in no event be made on any claim, dispute or other matter in question which would be barred by the applicable statute of limitations.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing

31. TAXES

31.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

ADDITIONAL CONDITIONS

1.0 ENGINEER

1.1 Whenever reference is made to the Engineer, it shall mean T.C. Engineering Inc., One South Sycamore, Box 832, North Platte, NE 69103.

1.2 The Contract Documents shall not be construed to create any contractual relationship of any kind between the Engineer and the Contractor, but the Engineer shall be entitled to performance of obligations intended for his benefit, and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Engineer and any Subcontractor or Sub-subcontractor.

1.3 The Engineer will visit the site at intervals appropriate to the stage of construction to familiarize himself generally with the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract documents. However, the Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ON the basis of his on-site observations as an Engineer, he will keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor.

1.4 The Engineer will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and he will not be responsible for the contractor's failure to carry out the Work in accordance with the Contract Documents.

1.5 Based on the Engineer's observations and an evaluation of the contractor's partial payment estimate, the Engineer will determine the amounts owing to the Contractor and will approve partial payment in such amounts, as provided in the General Conditions.

1.6 Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred initially to the Engineer for decision which he will render in writing within a reasonable time.

2.0 CONTRACTOR

2.1 The Contractor warrants to the Owner and the Engineer that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects, and in conformance with the Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

2.2 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with any materials or equipment.

2.3 Cutting and Patching of Work

2.3.1 The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.

2.3.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor without his prior written consent to cutting or otherwise altering the Work.

2.4 Cleaning Up

2.4.1 The Contractor at all times shall keep the premises free from accumulation of waste materials caused by his operations. At the completion of the Work, he shall remove all his waste materials caused by his operations, **Contractor shall leave site in a "HAND-RAKED" finish.**

2.4.2 If the Contractor fails to clean up at the completion of the Work, the Owner may do so and the cost thereof shall be charged to the Contractor.

2.5 The Contractor shall forward all communications to the Owner through the Engineer.

2.6 The Contractor shall maintain at the site for the Owner one record copy of all Drawings, Specifications, Addenda, Change Orders and other modifications, in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be available to the Engineer, and shall be delivered to him for the Owner upon completion of the Work.

3.0 WORK BY OWNER OR SEPARATE CONTRACTOR

3.1 Mutual Responsibility

3.1.1. The Contractor shall afford the Owner and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate his Work with theirs as required by the Contract Documents.

3.1.2 If any part of the Contractor's Work depends for proper execution of results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Engineer any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor to report shall constitute an acceptance of the Owner's or separate contractors' work as fit and proper to receive his Work, except as to defects which may subsequently become apparent in such work by others.

3.1.3 Any costs caused by defective or ill-timed work shall be borne by the party responsible therefore.

3.1.4 Should the Contractor wrongfully cause damage to the work or property of the Owner, or to other work on the site, the Contractor shall promptly remedy such damage as provided in the General Conditions.

3.1.5 Should the Contractor wrongfully cause damage to the work or property of any separate contractor, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings at the Owner's expense, and if any judgment or award against the Owner arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or arbitration costs which the Owner has incurred.

3.2 Owner's Right to Clean Up

3.2.1 If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up as required by Paragraph 2.4, the Owner may clean up and charge the cost thereof to the contractors responsible therefore as the Engineer shall determine to be just.

4.0 MISCELLANEOUS PROVISIONS

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

4.3 Rights and remedies

4.3.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

4.3.2 No action or failure to act by the Owner, Engineer or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

5.0 PAYMENTS AND COMPLETION

5.1 Before the first partial payment estimate, the Contractor shall submit to the Engineer a schedule of values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Engineer may require. This schedule, unless objected to by the Engineer, shall be used only as a basis for the Contractor's partial payment estimates.

5.2 The Contractor warrants that title to all Work, materials and equipment covered by a partial payment estimate will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances; and that no Work, materials or equipment covered by an Application for Payment will have been acquired by the Contractor, or by any other person performing Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

5.3 The approval of a partial payment estimate will constitute a representation by the Engineer to the Owner, based on his observations at the site as provided herein and the data comprising the request for payment, that the Work has progressed to the point indicated; that, to the best of his knowledge,

information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of any subsequent tasks required by or performed under the Contract Documents, to minor deviations from the Contract documents correctable prior to completion, and to any specific qualifications stated in writing; and that the Contractor is entitled to payment in the amount approved. However, by approving a partial payment estimate, the Engineer shall not thereby be deemed to represent that he has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that he has reviewed the construction means, methods, techniques, sequences or procedures, or that he has made any examination to ascertain how or for what purpose the Contractor has used the moneys previously paid on account of the Contract Price.

5.4 No approval of a partial payment estimate, nor any payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance or any Work not in accordance with the Contract Documents.

6.0 ACCEPTANCE OR DEFECTIVE OR NON-CONFORMING WORK

6.1 IF the Owner prefers to accept defective or non-conforming Work, he may do so instead or requiring its removal and correction, in which case a Change Order will be issued to reflect a reduction in the Contracted Price where appropriate and equitable.

7.0 DRAWINGS AND SPECIFICATIONS AT THE SITE

7.1 The Contractor shall maintain at the site for the Engineer one copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, and other Modifications, in good order, and marked to record all changes made during construction. These shall be available to the Engineer. The Drawings, marked to record all changes made during construction, shall be delivered to him upon completion of the work.

8.0 ENUMERATION OF THE DRAWINGS, PROJECT MANUAL AND ADDENDA

8.1 Following are the Drawings, Project Manual, and Addenda which form a part of this Contract as set forth the accompanying General Conditions of the Contract for Construction:

Drawings: Sheets 6 .

Project Manual

Addenda: As Issued

9.0 FINAL QUANTITIES

9.1 The Owner reserves the right to increase or decrease, within reasonable limits, any of the quantities shown. The term "reasonable limits" shall mean a twenty-five percent (25%) increase or decrease in the quantities on any one Contract or Bid item. In the event that the actual quantities differ more than the reasonable limits, an equitable revision of the Unit Price shall be made when requested by either the Owner or Contractor, in writing.

DIVISION 1

<u>GENERAL REQUIREMENTS</u>	<u>Pages</u>
Section 01010 Summary of the Work	01010-1
Section 01150 Project Meetings	01150-1
Section 01200 Progress and Payment	01200-1; 2
Section 01300 Submittals	01300-1;
Section 01400 Testing Laboratory Services	01400-1
Section 01500 Temporary Facilities	01500-1; 3
Section 01600 Material and Equipment	01600-1
Section 01700 Project Closeout	01700-1

SECTION 01010

SUMMARY OF THE WORK

1.0 THIS CONTRACT includes all material, labor, tools, expendable equipment, utility and transportation services, and all incidental items necessary to perform and complete, in a workmanlike manner, the Work required for the construction of the **Ogallala Water 2014-1, Ogallala, Nebraska.**

Contractor shall include the installation of pipeline, firehydrants and valves as shown, pipe bedding, gravel surfacing, and appurtenances.

2.0 WORK ON SUNDAYS AND HOLIDAYS. Except for strictly emergency work of for protection of property or work required by these Specifications, no work shall be performed by the Contractor on Sundays or holidays without permission from the Engineer. The intent of this requirement is that the public or any individuals shall not be unduly disturbed by the construction operations on the said days.

SECTION 01150

PROJECT MEETINGS

1.0 PRECONSTRUCTION CONFERENCE. The Contractor shall attend a preconstruction conference to discuss and clarify contract administration procedures, requirements under which the construction operation is to proceed. The Owner and the Engineer may also attend. The Engineer will notify the Contractor of the date, time, and location of the conference.

SECTION 01200

PROGRESS AND PAYMENT

1.0 APPLICATION FOR PAYMENT shall be submitted to the Engineer on the twenty-fifth (25) day of each month for Work completed and material stored up to five days prior to the day on which the Application for Payment is submitted. Applications for Payment shall be submitted in triplicate on forms provided by the Engineer.

2.0 PAYMENT Upon certification by the Engineer, the Owner shall, at the next regularly scheduled meeting, pay to the Contractor, on account of the contract, 90 percent of the value of labor and materials incorporated in the Work and 90 percent of materials suitably stored in accord with the General Conditions.

3.0 REDUCTION IN RETAINAGE AFTER WORK IS FIFTY PERCENT COMPLETE. After 50 percent of the Work is complete, and upon receipt of Applications for Payment accompanied by Consent of Surety to Reduction in or Partial Release of Retainage, executed in duplicate on AIA Documents G707A, June 1971 Edition, the Engineer, if he finds satisfactory progress is being made, will certify reduction in retainage to five percent, and 50 percent of the funds previously retained will be released to the Contractor. A cash bond or irrevocable letter of credit may be accepted in lieu of all or part of the retainage when it reaches five percent or less.

4.0 REDUCTION IN RETAINAGE AFTER SUBSTANTIAL COMPLETION. After substantial Completion, and upon receipt of Applications for Payment accompanied by Consent of Surety to Reduction in or Partial Release of Retainage executed in duplicate on AIA Document G707A, June, 1971 Edition, the Engineer will certify reduction in retainage to the amount necessary to assure completion.

5.0 FINAL PAYMENT. After final Completion of any Project Contract, and upon receipt of Applications for Payment accompanied by Consent of Surety Company to Final Payment and Contractor's Affidavit of Payment of Debts and Claims executed in duplicate on AIA Documents G707 and G706, April, 1970, Editions respectively, and upon certification of the Engineer, the Owner shall pay the Contractor the entire balance of the Contract Sum applicable to the Project Contract.

6.0 MEASUREMENT

6.1 ASPHALT shall be measured by the ton of mixed aggregate and asphalt as specified in-place, and shall be paid for at the unit price bid per ton which price shall constitute full payment for cleaning base or underlying course, for producing, furnishing, transporting, stock piling, heating, drying, and screening for aggregate materials; for furnishing, handling, measuring, mixing, manipulating and placing of materials; for hauling placing, shaping, compacting, and finishing of the paving mix; for tacking and tack oil; for improving unsatisfactory areas; for reconditioning underlying courses; for furnishing samples; for furnishing those tests specified; for maintenance of the completed Work until final acceptance; for all materials necessary to complete the Work as described in the Project Manual or Specification and Drawings or Plans.

6.2 PIPE AND CASING shall be measured on the surface of the ground from center to center of junctions in the pipelines, or from center of junction to end of pipe line for dead-end lines or service lines. No deductions for length of line will be made for fittings, manholes and valves installed in the line. Payment will be made on this basis at the price per foot of line of the various sizes installed. Connections shall be made to existing pipe lines at no additional compensation, but the cost thereof shall be included in the unit price bid for main. No additional payment shall be made for couplers, followers, glands, lugs, nuts, rivets, washers, and the like. No additional payment shall be made for jacking or boring service lines beneath pavement or sidewalks.

6.3 FITTINGS shall be measured by the piece and shall be paid at the Unit Price bid per piece. Measurement shall be for the fitting only, and bolts, flanges, glands, followers and other appurtenances shall not be included in the measurement.

6.4 PAVEMENT removed and replaced, or installed during the water main construction shall be paid as per the unit price bid for asphalt or concrete repair. Pavement cuts exceeding the following shall be repaired but not included in the quantity for payment:

10"-14" Pipe	60" Trench Width
8" Pipe	60" Trench Width
4" or 6" Pipe	48" Trench Width
2" Pipe	18" Trench Width
less than 2" Pipe	10" Trench Width
Valves	10 SF/ea
Fittings	5 SF/ea
Fire Hydrants	20 SF/ea

THE ENGINEER SHALL MAKE THE FINAL DETERMINATION AS TO THE RESPONSIBILITY OF CUTS.

6.5 EXCAVATION shall be determined by the "average end area" method for all materials measured in its original position at the actual start of construction. The average end area method shall be computed using a minimum of three elevations, one/side and one/center line, at a maximum of 100-ft. intervals. Payment shall be made per cubic yard of material removed as specified. No additional payment shall be made for material scarified and re-compacted in-place, including compacted subgrade beneath pavement and curb and gutter. Unacceptable subgrade material shall be removed at the same unit price per cubic yard as for the excavation bid price.

6.6 INDIVIDUAL ITEMS including valves, fire hydrants and the like shall be paid at the unit price bid for the various kinds and sizes installed.

7.0 MISCELLANEOUS ITEMS called for on the drawings or included in the specifications or project manual, and not specifically named in the Bid Form shall be considered Incidental Expenses and included in the unit price bid for the asphalt. No additional payment shall be made for Incidental Expenses. Examples include testing, signs or poles removed and replaced, off-site fill material, connections, traffic control, miscellaneous tunneling, storm sewer repair or reconstruction.

8.0 TREES required to be removed for construction shall be removed as an Incidental Expense by the Contractor, and at no additional cost to the Owner. No additional payment shall be made for trimming trees.

9.0 PIT-RUN, SAND, AND GRAVEL shall be included in the unit price bid per cubic yard. The weight of sand, gravel and cobble shall be determined by using 2,700 pounds per cubic yard. Weight tickets shall be furnished to the Engineer for the sand and gravel.

10.0 FINAL QUANTITIES. The Owner reserves the right to increase or decrease, within reasonable limits, any of the quantities shown. The term "reasonable limits" shall mean a twenty-five percent (25%) increase or decrease in the quantities on any one Contract or Bid item. In the event that the actual quantities differ more than the reasonable limits, an equitable revision of the Unit Price shall be made when requested by either the Owner or Contractor, in writing.

SECTION 01300

SUBMITTALS

1.0 SUBMITTALS SPECIFIED IN OTHER SECTIONS are as follows:

Section 01400 Testing Reports

2.0 AIA DOCUMENTS which are required for submittals in this or other Sections of these Specifications may be obtained from:

Association Services
1910 South 44th Street
Omaha, Nebraska 68105
402/556-8506

3.0 CERTIFICATE OF INSURANCE, shall be submitted to the Owner's insurance representative by the Contractor prior to the commencement of the Work.

4.0 DELETE

5.0 SHOP DRAWINGS AND PRODUCT DATA, shall be submitted to the Engineer, prior to 50 percent completion of the contract. Failure to submit shop drawings by 50 percent completion shall result in the withholding of contract payment until such time shop drawings are submitted.

5.01 TRANSMITTAL FORMS. Each transmittal shall be accompanied by two (2) Shop Drawing Transmittal Forms furnished by the Engineer and completed and consecutively numbered by the Contractor.

5.02 SHOP DRAWINGS. Submit one sepia print, not exceeding 30 inches x 42 inches in size, for each sheet of shop drawings.

5.03 PRODUCT DATA. Submit in seven (7) copies. Shop drawings and product data shall be submitted for the following:

<u>Section No.</u>	<u>Description</u>
02550	Pipe System, valves, firehydrants

SECTION 01400

TESTING LABORATORY SERVICES

1.0 TESTING LABORATORY for all testing hereinafter specified shall be selected by the Contractor with the approval of the Engineer.

2.0 NOTIFICATION OF TESTING LABORATORY that materials are ready for sampling shall be made by the Contractor. In the case of soils testing, such notification shall be made at least seven (7) days in advance.

3.0 SAMPLING shall be made by the authorized representative of the testing laboratory, except they shall be made by the Contractor when directed by the Engineer.

4.0 REPORTS shall be made in duplicate directly to the Engineer with a copy sent directly to the Contractor, and, in the case of concrete, an additional copy shall be sent directly to the concrete producer.

5.0 PAYMENTS. The Contractor shall include in his Bid the cost of inspection and testing of the earth fill and concrete, as hereinafter specified and as given in the individual specifications sections:

Test Schedule

One Proctor for each type of soil.

Backfill for structures: One density test/structure or one density test/50 cy, whichever is less.

Backfill for pipelines: One test/500 lf of pipe.

Concrete: One compressive test set (3) for each pour.

Backfill for pipelines: One test/500 lf of pipe.

Road: One compaction test/9000 sf of road surface

6.0 PATCHING, if required by the taking of samples, shall be made by the Contractor.

7.0 TESTS ARE SPECIFIED in the following Sections:

02221 Excavation, Trenching, and Backfilling for
 Utilities
02550 Pipe System

8.0 TESTS NOT NAMED IN THIS SECTION BUT CALLED FOR IN ANOTHER SECTION SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE.

SECTION 01500

TEMPORARY FACILITIES

1.0 WATER shall be furnished by the Contractor as may be needed for the entire prosecution of the Work.

2.0 TEMPORARY POWER shall be provided throughout the construction period by the Contractor for use by all trades, Contractors, and Subcontractors for the following purposes:

- Operation of miscellaneous power tools and equipment
- Temporary lighting
- Testing and checking equipment
- Welding units
- Space heating devices
- Night security lighting
- Temporary power to verify equipment operation.

3.0 TEMPORARY LIGHTING shall be provided during the construction period by the Contractor for use by all trades, Contractors, and Subcontractors for safe and adequate working conditions.

4.0 COST OF TEMPORARY POWER used during construction, including the cost of setting and removing temporary service and power transmitted through the permanent system prior to Completion, shall be borne by the Contractor.

5.0 SANITARY CONVENIENCES for use of all persons employed on the Work will be provided and maintained by the Contractor.

6.0 COLD WEATHER PROTECTION. The Contractor shall be responsible for adequately protecting utilities, supplies, and equipment of the Work during cold weather. Items subject to cold weather damage shall be protected by covering, insulating, or storing in heated space.

7.0 FENCES AND GATES

7.01 TEMPORARY REMOVAL AND REPLACEMENT OF FENCES. When it is necessary for the execution of the Work to pass through existing fences, not designated for permanent removal or relocation, the Contractor shall remove and replace such fences, or portions thereof, when and as directed by the Engineer.

7.02 TEMPORARY FENCES AND GATES shall be erected and maintained by the Contractor to properly control the movement of livestock.

7.03 EXISTING GATES shall be maintained closed by the Contractor who shall be responsible for any damage, injury, or loss to property resulting from any gate left in an open condition by the Contractor or any of his Subcontractors or Sub-subcontractors.

8.0 PROTECTION OF UTILITIES

8.01 EXERCISE EVERY PRECAUTION to avoid damage to existing public or private utility lines and appurtenances, including telephone cables and wires, while performing the Work.

8.02 GIVE ADEQUATE AND TIMELY NOTICE to public and private utility owners before commencing work and cooperate with utility owners while performing the Work.

8.03 LOCATE UNDERGROUND PIPE AND CABLE with location and detection equipment well in advance of the Work.

9.0 RESERVED.

10.0 STAKING OUT THE WORK. The work will be staked out by the Engineer or his representative. In order that the Contractor may become familiar with the location of such stakes, he or his representatives shall assist with the staking work and furnished the required help for staking out the Work. **The Contractor shall also furnish the stakes.** Stakes will be set for the pipe lines; construction and control stakes will be set for structures. All lines, grades, and measurements which may be further required to be transferred or extended to the various parts of the structures for their proper construction shall be established and set from the control stakes by the Contractor. The Contractor shall replace stakes or marks which are removed through willful or careless acts or the Contractor before their usefulness is fulfilled.

11.0 LAYING OUT THE WORK. The Contractor shall lay out his work, and shall be responsible for measurements. He shall exercises proper precaution to verify the figures on the Drawings before laying out the Work, and he will be held responsible for any errors therein that enter into construction that otherwise might have been avoided.

12.0 WATER COURSES AND DRAINAGE WAYS shall be maintained in their natural condition or equivalent courses or other means or drainage shall be constructed and maintained by the Contractor.

13.0 STORAGE OF MATERIALS AND EQUIPMENT. The Contractor may store materials and equipment on the site in locations approved by the Engineer.

14.0 PROJECT OFFICES

14.01 OFFICES AND STORAGE FACILITIES FOR THE CONTRACTORS AND SUBCONTRACTORS shall be maintained on the site as necessary for the proper conduct of the Work. After consulting with the Engineer, these shall be located so that they cause no interference to any work performed on the site.

14.02 REMOVAL OF TEMPORARY OFFICES AND STORAGE FACILITIES. Upon completion of the project, or as directed by the Engineer, remove the temporary offices and storage facilities, and leave the premises in the condition required by the Contract.

15.0 TEMPORARY SIGNS

15.01 SIGNS OF CONTRACTOR AND SUBCONTRACTORS. Subject to local regulations, the Contractor and his Subcontractors may erect temporary signs for purposes or identification and controlling traffic. The Contractor shall furnish, erect, and maintain such signs required by safety regulations and necessary to safeguard life and property.

SECTION 01600

MATERIAL AND EQUIPMENT

1.0 MATERIAL AND EQUIPMENT shall be for the manufacture, model, and type specified. Substitute material and equipment approved prior to bidding, in accord with the Instructions to Bidders, are incorporated into these Specifications as Addenda.

2.0 MATERIAL AND EQUIPMENT OF ACCEPTABLE MANUFACTURE. An item of material or equipment may be used in place of an item which is specified by manufacturer and model number or type, provided that all of the following provisions are met:

- .1 The item is manufactured by one of the acceptable manufacturers listed in the Specifications.
- .2 The item of material or equipment meets or exceeds the minimum qualities established by the specified item.
- .3 The item is used throughout the project so that all items of material or equipment used in place of specified items are of the same make and type.
- .4 The entire cost of all modifications which result from the use of items in place of specified items shall be borne by the Contractor who uses such items, at no additional cost to other Contractors or to the Owner.

3.0 REPEATED FEATURES OR MATERIAL must be constructed alike, although detailed or indicated only once. Detail and ornament must continue throughout all moldings, bands, etc. Where items, devices, or equipment are specified singular in number, the Specification shall apply to as many items, devices, or pieces of equipment as are shown on the Drawings or required to complete the installation. Repeated items of material or equipment shall be of the same manufacture, model number, and type.

4.0 WHEN BULKY MATERIAL AND EQUIPMENT ARE FURNISHED BY OTHERS, the Contractor shall, upon receipt of notice in ample time, leave proper openings to permit the installation and properly close such openings afterward.

SECTION 01700

PROJECT CLOSEOUT

1.0 CLEANING UP. At the completion of the Work, the Contractor shall clean up in accord with the General Conditions.

2.0 SUBMITTALS. The following submittals shall accompany the Contractor's final Application for Payment. Submittals shall be submitted in duplicate unless otherwise specified in the Sections indicated.

3.0 INSPECTION CERTIFICATES issued by regulatory agencies shall be submitted to the Engineer before final payment.

4.0 TESTING REPORTS shall be submitted to the Engineer before final payment, and shall include the following:

Concrete Test Reports
Earthwork Compaction Test Reports
Pipe Test Reports

5.0 PROJECT RECORD DRAWINGS (AS-BUILT DRAWINGS) shall be delivered to the Engineer before final payment. Records shall be kept at the project site during construction, and shall be kept up-to date by the Contractor, with measurements relating to underground or concealed work being made and recorded before covering.

SECTION 02010

SUBSURFACE EXPLORATION

1.0 GENERAL

1.01 SUBSURFACE SOIL DATA

1.01.1 SUBSURFACE SOIL INVESTIGATIONS have not been made. The Engineer will not assume responsibility for variations of subsoil quality.

SECTION 02020

REMOVAL OF STRUCTURES AND OBSTRUCTIONS

1.0 GENERAL

1.01 DESCRIPTION

1.01.1 THIS WORK shall consist of the removal, wholly or in part, and satisfactory disposal of all buildings, fences, structures, old pavements, abandoned pipe lines, and any other appurtenances or obstructions shown on the plans which are not designated or permitted to remain, except for the obstructions to be removed and disposed of under other items in the contract.

1.01.2 IT SHALL also include the salvaging of designated materials and backfilling the resulting trenches, holes, and pits.

2.0 PRODUCTS

3.0 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

3.01.1 THE CONTRACTOR shall raze, remove, and dispose of all buildings and foundations, structures, fences and other obstructions, except utilities and those for which other provisions have been made for removal. All designated salvageable material shall be removed without unnecessary damage in sections or pieces which may be readily transported and shall be stored at specified places within the project limits. Unusable perishable material shall be destroyed. Basements or cavities or trenches left by structure removal shall be filled to the level of the surrounding ground and, if within the limits of construction, shall be compacted in accordance with Section 02221.

3.01.2 MOVE SIGNS, MAILBOXES, OR OTHER ITEMS as required for construction and replace in a condition equal to that prior to the beginning of construction.

3.02 REMOVAL OF PAVEMENT

3.02.1 PAVEMENT, base course, sidewalks, curbs, gutters, etc., required to be removed or designated for removal shall be saw cut prior to removal, broken into pieces or approximately one cubic foot or less, and disposed of at the nearest licensed sanitary landfill or recycled as rip-rap.

3.02.2 PAVEMENT removal and replacement shall be to the lines and grades staked by the Engineer. Pavement shall be replaced to a depth equal to existing pavement but not less than 3-inches for asphalt and 6-inches for concrete. All pavement cuts shall be sawed to the full depth, except that a "pizza cutter" may be used in asphalt, so long as a clean, even, non-deflected cut in the asphalt can be made.

3.02.3 CURB AND GUTTER not integral with the street, sidewalks and driveways shall be dry bored or tunneled, or may be saw cut and replaced with permission of the Owner.

3.03 DISPOSAL

3.03.1 DISPOSAL OF ALL DEMOLITION MATERIALS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

SECTION 02100

CLEARING

1.0 GENERAL

1.01 DESCRIPTION

1.01.1 THIS WORK shall consist of constructing the Project of the type and dimensions shown on the plans, in conformity with the lines and grades established by the Engineer. Contractor shall verify existing pipe size, type of material, and location (vertical and horizontal) prior to construction.

1.02 RELATED WORK SPECIFIED ELSEWHERE

1.03 PROTECTION

1.03.1 PROTECTION is specified in Section 01500, Temporary Facilities.

2.0 PRODUCTS

3.0 EXECUTION

3.01. CLEARING

3.01.1 FELL, CUT, AND REMOVE TREES AND OTHER VEGETATION designated for removal, together with down timber, vegetation, stumps, roots, and brush in areas to be cleared. Cut off not more than 8-inches above the original ground surface.

3.02 GRUBBING

3.02.1 FELL, CUT, AND REMOVE TREES, MATTED ROOTS, and roots larger than 3-inches to a depth at least 18-inches below the minimum of three hours.

3.02.2 CUT AND REMOVE VEGETATION designated for removal, together with sod, topsoil, down timber, vegetation, roots, and brush areas, to a depth of 6-inches.

3.02.3 REMOVE AND DISPOSE OF OBSTRUCTIONS, such as foundations, walls, pavements, roots, stumps, sidewalks, fences, buildings, rubbish, etc., to a depth at least 12-inches below subgrade elevation or bottom of trench.

3.03 REMOVAL OF MATERIAL

3.03.1 REMOVE CLEARED AND GRUBBED MATERIAL completely away from site and dispose of at the nearest sanitary landfill or as directed by the Engineer and Owner, at Contractors expense.

3.04 STRIPPING OF TOPSOIL

3.04.1 EXCAVATE TOPSOIL to a depth of 4-inches and carefully remove and spread on areas already graded and prepared for topsoil, or deposit in storage piles convenient to areas which are subsequently to receive an application of topsoil. Topsoil, when stored, shall be kept separate from other excavated materials, and shall be piled free of roots, stones, and other undesirable material.

3.05 TRIMMING TREES

3.05.1 TRIM INDIVIDUAL TREES and groups of trees designated to be left standing within the area to be cleared of all dead branches 1-1/2 inches or more in diameter. Trim live branches to such heights and manner as shown or called out in the Drawings or directed by the Engineer. Limbs and branches which require trimming shall be cut neatly and close to the body of the tree or to the main branch. Paint cuts of more than 1-1/2 inches in diameter with a tree wound paint approved by the Engineer.

SECTION 02221

EXCAVATION, TRENCHING AND BACKFILLING

1.0 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

PIPE SYSTEM Section 02550

2.0 PRODUCTS

2.01 MATERIALS

2.01.1 BACKFILL shall be material from on-site excavations, or borrow area, identical to the type of material found in the trench excavation, except free of frozen earth, large clods or stones, cinders, ashes, rubbish or other foreign or deleterious materials.

3.0 EXECUTION

3.01 EXCAVATION AND TRENCHING

3.01.1 PERFORM EXCAVATION of every description and of whatever materials are encountered, to the depths indicated on the Drawings. Pile excavated materials a sufficient distance from the banks of the excavation to avoid overloading, slides or cave-ins, yet providing minimum inconvenience to the public or adjacent property owners.

.1 Remove Excavated Materials not required for fill or backfill and waste as directed by the Engineer.

.2 Make Excavation by open cut. Keep banks of trenches as nearly vertical as practical, or sloped as required to prevent slides or cave-ins, and where required, properly sheathed and braced. Care shall be taken not to injure abutting property. Grade the bottom of trenches accurately to provide uniform bearing and support.

.3 If the Excavation of pipe trenches is made below grade, due to the fault of the Contractor, restore to the proper grade, at the Contractor's expense, with compacted sand and gravel backfill. Backfill of earth under any structure will not be permitted. Fill any excess excavation below the elevations shown with sand and gravel as directed by the Engineer and at the Contractor's expense.

3.01 CONTROL GRADING in the vicinity of the trench excavation to prevent surface water from flowing into trenches. If water does enter trench, remove and dispose of water until pipe, fittings, and other appurtenances are in place and sealed against the entrance of water. Water, earth or any foreign materials shall not be allowed to enter the pipe.

3.02 BACKFILLING

3.02.1 COMPLETE TRENCH BACKFILL immediately after the approval of the pipeline construction, unless otherwise directed. Do not permit water to rise in un-backfilled trenches after pipe has been placed.

3.02.2 COMPACT BACKFILL thoroughly and uniformly in 8-inch layers by use of "jumping jack" compactors or comparable equipment, to the full depth of the trench. The type of tamper or compactor used shall be approved by the Engineer.

.1 Compact Backfill to at least the following percentage of maximum density, at a moisture content within the limits specified above or below the optimum moisture content as determined by Test Procedure ASTM D 698:

<u>Material</u>	<u>Percent of Maximum Density</u>	<u>Percent Above or Below Optimum Moisture Content</u>
Sand and Gravel Backfill	100	+ 2
Earth Backfill under pavement	NA	NA Flowable fill
Earth Backfill	95	+ 2

3.02 BACKFILL under city streets shall be 1 sack cement flowable fill.

3.02.3 IF SETTLEMENT OCCURS WITHIN THE GUARANTEE PERIOD, regardless of the type of compaction or settlement methods used, refill, compact, and smooth off the trench until it is finally made to conform to the ground surface.

3.03 GRADING

3.03.1 Grade to a finish ordinarily obtained from a blade grader, with no abrupt changes in grade or holes that will hold water and so that effective drainage is secured. Finished surface shall be equivalent to "hand-raked" surface.

3.04 SPECIAL PROVISIONS

3.04.1 MOVE MINOR STRUCTURES and restore temporary openings in fences to their original condition. Stockpile and reset, in original locations, any culverts, pipes, cables, or minor structures which are moved. Determine actual condition as to structures and miscellaneous obstacles to move for construction purposes. Removal and replacement of these items shall be considered as part of the Contractor's obligation, and no additional payment shall be made.

3.04.2 LEAVE SHEATHING in place where, in the opinion of the Engineer, damage to the Work may result from the withdrawal of sheathing from trenches or excavations. Where the Engineer directs that sheathing be left in place, the Contractor shall be paid for the sheathing material in accord with the General Conditions.

3.04.3 KEEP EXCAVATIONS generally free of water. By pumping or other means approved by the Engineer, remove any water which accumulates in the trench or excavation regardless of the source of the water.

3.04.4 TEST COMPACTION OF BACKFILL for conformance of density requirements specified. The Engineer shall choose the location for each density test. Any density test not meeting the specified density requirements shall be justification for re-compacting the backfill until the density requirement has been met.

SECTION 02551

WATER SYSTEM

1.0 GENERAL

1.01 DESCRIPTION

1.01.1 THIS WORK shall consist of constructing the potable water line of the type and dimensions shown on the plans, laid in trenches and backfilled in conformity with the lines and grades established by the Engineer. Contractor shall verify existing pipe size, type of material, and location (vertical and horizontal) prior to construction.

1.02 SUBMIT SHOP DRAWINGS AND MANUFACTURERS INFORMATION to the Engineer. These items include, but are not limited to the following:

Valves & Boxes	Pipe
Fittings	Tees
Dresser Couplings	Fittings
Service Goods	Fire Hydrants

1.03 PERMITS.

1.03.1 CONSTRUCTION AND MATERIALS SHALL CONFORM WITH THE STANDARDS OF THE NEBRASKA DEPT. OF HEALTH, THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, AND APPLICABLE STANDARDS OF THE AMERICAN WATER WORKS ASSOCIATION, FOR POTABLE WATER. Permit provisions shall apply to Contractor and his Sub-Contractor as if direct agents for the Owner.

2.0 PRODUCTS

2.01 GENERAL

2.01.1 ALL MATERIALS AND EQUIPMENT TO BE USED shall be approved by the Engineer before being installed. All materials, unless otherwise stipulated, are to be new and of the best grade of their respective kinds for the purpose designated. The Contractor shall furnish to the Engineer the name of the manufacturer of the materials, and other equipment which he is contemplating to install, together with their performance capabilities and other pertinent information.

2.02 PIPE

2.02.1 DUCTILE IRON PIPE SHALL BE Class 50 and shall conform to AWWA C 151, AWWA C 111, and AWWA C 104. Pipe shall have a 1-mil bituminous coating and shall be cement mortar lined with 1/16 inch mortar. Pipe shall be Griffin , Tyler, or equal.

2.02.2 EXPOSED PIPE SHALL BE FLANGED –Class 53 Ductile Iron Pipe and shall conform to AWWA C 151, AWWA C 115, and AWWA C 104. Pipe shall have a 1-mil bituminous coating and shall be cement mortar lined with 1/16 inch mortar.

2.02.3 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE FOR WATER MAIN

.1 PIPE SHALL MEET the requirements of AWWA C 905 for PVC 1120 Class 150 pipe, and shall be DR 18 with cast iron equivalent outside diameter.

.2 ALL PIPE SHALL BE SUITABLE for pressure conduit. Provisions shall be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a locked-in, solid cross

section elastomeric ring which meets the requirements of ASTM F-477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C 900. The bell shall be extruded in one continuous process with the barrel.

2.03 FITTINGS

2.03 FITTINGS shall be cast from gray iron or ductile iron and shall be mechanical joint-type conforming to the latest revision of ANSI A 21.10 (AWWA C 110, C 153) and ANSI A 21.11 (AWWA C 111). Fittings shall be capable of withstanding, without bursting, hydrostatic tests of 3 times the rated working pressure. Fittings shall have a one mil bituminous coating and shall be cement mortar lined with 1/16 inch mortar. Compact mechanical joint ductile iron fittings meeting this specification, similar to Trinity Valley, shall be acceptable.

2.04 DRESSER COUPLINGS shall be Clow mechanical joint cast iron solid sleeves (short) or equal.

2.05 SERVICE GOODS (2-inches or less)

2.05.1 GENERAL. All service goods shall conform to the latest revision of AWWA C800, including Appendix on "Collected Standards for Service Line Materials". All connections requiring a threaded fitting shall be sealed with TFE paste.

2.05.2 CORPORATION STOPS shall be Ford BALLCORP, Mueller Ball Corporation, or equal, brass, with AWWA thread inlet and packed joint or flared outlet, suitable for the type of pipe proposed. Corporation stops shall be tapped using a brass Ford Style FRS 202 stainless steel repair type double band saddle, Mueller, or equal service saddle. Connections between saddle, corporation stop and pipe shall be compatible.

2.05.3 CURB STOPS shall be Ford or Mueller, Ball Valve curbstops with quarter turn check and suitable for pipe proposed. Connection to existing services, including fittings, are the responsibility of the Contractor. Curb box shall be 60" extension type, cast iron lid and arch base, stationary rod and 2 hole Erie pattern lid. 2-inch curb box shall include curb box base. Curb stops connected to existing lines shall be full 1" to 3/4" existing service pipe, which may be steel, pvc, or copper.

2.05.3.1 PE PIPE: PE PIPE shall be CTS, SDR 7, high density polyethylene rated for a working pressure of 200 psi and listed with the National Sanitation Foundation Testing Laboratory, Inc. Materials shall meet ASTM D 2239 and meet or exceed 3406 specifications. Pipe shall be as manufactured by Vanguard Plastics, Clow or equal. Service pipe shall include stainless steel stiffeners. Service pipe shall be 1-inch, otherwise noted. Use clamping method recommended by pipe supplier and furnish copy of the instructions to the Engineer. Pipe shall be printed with manufacturer's name and respective nominal size, working pressure, ASTM specification, NSF approval, AWWA approval, SDR, and Plastic Pipe Institute rating.

2.05.3.2 COPPER PIPE shall be Type K Copper rated for a working pressure of 250 psi and listed with the National Sanitation Foundation Testing Laboratory, Inc. Service pipe shall be 1-inch, unless otherwise noted. Pipe shall be printed with manufacturer's name and respective nominal size, working pressure, ASTM specification, NSF approval, AWWA approval and rating.

2.05.4 FITTINGS for service pipe shall be included as an Incidental Expense and no separate payment shall be made for service pipe fittings. Fittings for non-metallic pipe shall be pack joint type as manufactured by Ford, Mueller or equal. Threaded fittings for connection to metal pipe shall be NPT type.

2.06 NOT USED.

2.07 FIRE HYDRANTS

2.07.1 HYDRANTS SHALL have 5 1/4-inch main valve opening, two 2 1/2-inch hose nozzles for two outlet hydrants and an additional 4 1/2-inch steamer outlet for three outlet hydrants. Hydrants shall be Mueller Centurion, The hydrant shall be mechanical joint type with nozzle threading and size in conformance with Owner standards. Hydrants shall have a working pressure of 150 psi and a minimum burst pressure of 300 psi. Working parts shall be bronze and shall be dry barrel type conforming to the latest revision of AWWA C 502. Hydrants shall have one coat primer and two finish coats of safety red. Hydrants shall be compatible with the type of water main selected and shall be Factory Mutual Approved. Nozzle height above finish grade shall be not less than 18-inches.

2.07.2 CRUSHED ROCK shall be 1 1/2-inch to 3/4-inch well graded aggregate or limestone.

2.08 BACKFILL

2.08.1 SAND AND GRAVEL shall be pit-run sand and gravel and locally available. It is permissible to use dry mined "blow-sand" for backfill around the pipe.

2.08.2 FLOWABLE BACKFILL

2.08.2.1 PREPARATION

- .1 Remove all unsuitable material, or as directed by the Engineer.
- .2 Use flowable backfill as directed by the Engineer, or in excavated areas in frozen ground.

2.08.2.2 MATERIALS

- .1 Portland Cement - Type I or II.
- .2 Coarse Aggregate - Locally available.
- .3 Air Entrainment Agent meeting ASTM C260-77.
- .4 Clean and clear Water.

2.08.2.3 MIX

- .1 Proportions
 - a. Portland Cement per cubic yard - (50 lbs)
 - b. Air Entrainment Agent (4 oz. (+1/2 oz)).
 - c. Coarse Aggregate - (+3100 lbs)
 - d. Water (40 - 44 gallons)
 - e. Slump - of a free flowing nature.

2.09 PLUG FOR WATER LINES shall be 350 psi restrained cap or plug conforming to the latest revision of AWWA C 110.

2.10 GATE VALVES

2.10.1 GATE VALVES 4-inch and larger shall be iron body, resilient seat, bronze mounted, mechanical joint (buried) or flanged (exposed), NRS type and shall conform to AWWA Specification C-500. They shall be manufactured with O-ring stem packing and shall be designed for a working pressure of 200 psi. The operating nut shall be 2-inch square and shall have an arrow cast thereon indicating the direction of operation which shall be by turning counterclockwise. Exposed valves shall have a handwheel. Each valve shall have the manufacturer's name or trademark, pressure rating and year of casting imprinted on the body. Valves shall be compatible with pipe specified in paragraph 2.02 of this Section. Valves shall be Mueller, and include a valve box, if buried. Valve shall rest upon a soil retardant base or be wrapped in visqueen to keep soil from penetrating into the valve box.

2.10.2 VALVE BOXES for 4-inch and larger valves shall be two piece, screw type, cast iron with drop covers,

adjustable for the depths shown. Valve boxes shall be Clow, Mueller or equal.

3.0 EXECUTION

3.01 EXCAVATION

3.01.1 **INSTALL EACH SECTION OF PIPE** to rest solidly upon pipe bed, with recesses excavated to accommodate bells and joints. Clean interior of pipe thoroughly of all foreign matter before lowering into trench, and keep clean during laying operations by means of plugs or other approved methods. Do not lay pipe in water or when trench or weather conditions are unsuitable for work. When work is not in progress, close the open ends of pipe and fittings so that no trench water, earth, or other substances enter pipes or fittings. Replace any section of pipe found to be defective, before or after laying, with new pipe without additional expense to the Owner. Provide a minimum cover over the top of the pipe of 5 feet from existing ground surface or finished grade, whichever is lower, and avoid interference with other utilities. The top lift shall be concrete or asphalt matching the surface of the road adjoining.

3.01.2 **HANDLE PIPE AND ACCESSORIES** in such as to insure delivery on the work in a sound, undamaged condition.

3.01.3 **CUT PIPE** in a neat and workmanlike manner without damage to pipe. Unless otherwise authorized by the Engineer, cut by means of an approved type of mechanical cutter.

3.01.4 **MAKE CONNECTIONS WITH EXISTING PIPE LINES** to new pipe lines in a workmanlike manner, using suitable and proper fittings to suit conditions encountered. Make each connection with an existing water pipe at a time, and under conditions, which will cause the least interference with water service and as authorized by the Owner. Provide suitable facilities for proper dewatering, drainage, and disposal of water removed from de-watered lines and excavations.

3.01.5 **ANY STRUCTURES** along or near the trench shall be protected from any and all damage. The pipe line shall be laid where staked by the Engineer and it shall be the Contractor's obligation to clear the right-of-way to a width sufficient for his needs in constructing the line. Where timber and brush are to be cut in order to clear such right-of-way, the Contractor shall transport all such cuttings to a landfill. Where fences are in the way of construction, the Contractor shall remove and replace fences in a workmanlike manner. The Contractor shall promptly repair all property damaged by him in the process of work. Trees, stumps, brush and debris shall be cleared within 10 feet either side of the centerline of the water or sewer line or as required to do the Work. Guy anchors and pole supports shall be provided as required to construct the line. Foundations, vaults, abandoned pipelines and rocks shall be removed within 6 feet either side of the centerline of the water line as designated by the Engineer.

3.02 PIPE AND FITTINGS

3.02.1 INSTALLATION

.1 **INSTALL PVC PIPE IN ACCORDANCE** with the latest revision of ASTM C 2321, as modified by these specifications.

3.02.2 **TO CLOSE OFF A DEAD END** consisting of a pipe bell, a locking type end plug shall be used. The plug shall be securely backed up to prevent any movement.

3.02.3 **JOINT DEFLECTION ANGLES** shall not exceed manufacturers recommendations. If alignment or grade cannot be obtained within manufacturers recommended deflection, then the Contractor shall at his own expense, install either special bends or a sufficient number of short pipe lengths to provide angular deflections within manufacturers recommendations.

3.02.4 **PIPE** shall be plugged at the end of each days work.

3.02.5 TAP PVC PIPE USING A KNIFE CUTTER.

3.03 DELIVER OLD FIRE HYDRANTS TO THE CITY.

3.04 NOT USED.

3.05 BACKFILLING

3.05.1 BACKFILLING. When all joints and pipes are found to be tight during the tests, to the satisfaction of the Engineer, the tests may be stopped and the backfill may be completed.

3.05.2 BACKFILL MATERIAL free from rocks or lumps shall be hand placed along side and to a depth of one foot over the top of the pipe. The backfill material shall be placed and compacted in a manner to avoid lateral displacement of the pipe.

3.05.3 DURING BACKFILLING OPERATIONS, hydrants, valve boxes or other vertical fixtures shall be held vertical and the top adjusted, where required, to correspond with the elevation established for the fixture.

3.06 UTILITY SERVICE CONNECTIONS Abandon existing water service connections and make new utility service connections in a sequence and a manner that will interrupt service for no longer than eight (8) hours. Give adequate notice to those people whose water service will be interrupted.

3.07 UTILITY CROSSINGS

3.07.1 WATER MAINS crossing sewers shall be laid to provide a minimum vertical distance of 18-inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible.

.2 HORIZONTAL SEPARATION between sewer and water mains shall be 10 feet measured edge to edge, except by special permission of the appropriate reviewing agency. Maintain bottom of the water main at least 18 inches above the top of the sewer main.

3.08 THRUST BLOCKS

3.08.1 MAJOR FITTINGS or fittings that could blow off the line under pressure shall be braced by a concrete wedge block. The block shall be placed between the fitting and the undisturbed vertical trench wall.

3.09 TESTING

3.09.1 WATERLINE testing shall occur at two locations. One at Station **10+69.7** and the other at **15+20**

- .1 A HYDROSTATIC TEST shall be performed. The water main shall be tested at a minimum pressure of 150% of the normally expected service pressure at the highest point in the line. The test shall be conducted for one hour. The allowable pressure loss during the test period shall be 5 psig. Test pressure shall not exceed pipe design or thrust-restraint pressure.

.2 PERFORM A LEAKAGE TEST after completing the hydrostatic test. Maintain the pressure determined for the Hydrostatic Test for two hours.

Measure the water loss by pumping water from a drum or some other measurable container. The maximum allowable leakage shall be determined from the following equation

$$Q = \frac{LD \sqrt{P}}{148,000}$$

Q = Quantity of make up water in gallons per hour

D = Nominal pipe diameter in inches

P = Average test pressure, psig

L = Length of pipe tested in feet.

3.10 PRELIMINARY FLUSHING

3.10.1 PRIOR TO DISINFECTION, the water main shall be flushed at a minimum velocity of 3 feet per second.

3.11 DISINFECT - WATER MAIN AND SERVICE LINES

3.11.1 THE DISINFECTANT to be used may be either chlorine or chlorine water, calcium hypochlorite (HTH, Perchloron, Pittchlor, etc.), liquid sodium hypochlorite or chlorinated lime-water mixture. Disinfectant method and material shall be in accordance with the pipe manufacturer's recommendation. DISINFECTION SHALL CONFORM TO THE LATEST REVISION OF AWWA STANDARD C651, WHICH SHALL GOVERN IN THE EVENT OF A CONFLICT WITH THESE SPECIFICATIONS.

3.11.2 THE DISINFECTANT shall be applied at one extremity of a pipe section and bled at the opposite extremity. The length of the sections and the dosage for such sections shall be determined by the Engineer; however, a uniform dose of at least 25 ppm at the end of the section will be required.

3.11.3 THE DISINFECTING PERIOD shall be 24 hours, unless unfavorable or unsanitary conditions dictate a longer retention period. The chlorine residual at the end of the line after the retention period shall be not less than 10 ppm. The line shall then be bled until all chlorinated water is removed.

3.11.4 SAMPLES FOR BACTERIOLOGICAL EXAMINATION shall then be taken, two at in a 24-hour interval and sent to the State Department of Health or a testing laboratory acceptable to the State. The results of the tests shall be delivered to the Engineer within three days of receipt of the results. Both samples taken consecutively must show absence of bacteria.

3.11.5 IF THE SAMPLES fail the bacteriological examination, the Contractor shall repeat the disinfection procedure and resubmit water samples. Continue this procedure until State standards can be met. The costs of additional disinfection and testing shall be born by the Contractor.

SECTION 02552

CONDUCTIVE TRACE WIRE FOR NONMETALLIC PIPE INSTALLATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section covers the requirements for the installation of a conductive trace wire during the installation of nonmetallic water distribution pipelines. It will be used for locating the pipelines, laterals, services and appurtenances with an electronic pipe locator after installation.

1.02 RELATED SECTIONS

- A. Section 01100 – General Requirements
- B. Section 02551 – Water System

1.04 SUBMITTALS

- A. The Contractor shall submit the manufacturer's data on materials furnished that indicate compliance with the specifications regarding materials used.

1.05 MEASUREMENT AND PAYMENT

- A. Payment shall be in accordance with Section 1200

PART 2 MATERIALS

2.01 TRACE WIRE

- A. Open-Trench Installation: direct burial #12 AWG Solid (0.0808" diameter), steel core soft drawn tracer wire, 250# average tensile break load, 30 mil high molecular-high density polyethylene jacket complying with ASTM-D-1248, 30 volt rating. Color shall be "blue" for domestic water (potable) pipelines and "purple" for raw water (non-potable) pipelines.
- B. Directional Bore or Jacked Installation: direct burial #12 AWG Solid (0.0808" diameter), steel core hard drawn extra high strength horizontal directional drill tracer wire, 1150# average tensile break load, 45 mil high molecular-high density polyethylene jacket complying with ASTM-D-1248, 30 volt rating. Color shall be "blue" for domestic water (potable) pipelines and "purple" for raw water (non- potable) pipelines.

2.02 CONNECTORS

- A. Splices along the continuous run of trace wire for repair of a wire break or replacement of failed segment of wire shall use 3M Brand DBR Direct Bury Splice Kit or approved equal. Approved alternatives must securely connect two or more wires, effectively moisture seal by means of a dielectric non-hardening silicone sealant, manufacturer approved for direct burial and rated for a

minimum of 50V.

- B. Branch connections for laterals, turnouts, services and appurtenances shall use DryConn Direct Bury Lug Aqua, or approved equal. Approved alternatives must securely connect one or two wires to the main trace wire without cutting the main trace wire, effectively moisture seal by means of a dielectric non-hardening silicone sealant, manufacturer approved for direct burial and rated for a minimum of 50V.

PART 3 EXECUTION

Trace wire shall be installed on all water mains and appurtenances. The wire shall be installed in such a manner as to be able to properly trace all pipelines without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.

3.01 INSTALLATION

- A. Trace wire shall be installed in the same trench and inside bored holes and casing with pipe during pipe installation. It shall be secured to the pipe as required to insure that the wire remains adjacent to the pipe. The trace wire shall be securely bonded together at all wire joints with an approved watertight connector to provide electrical continuity, and it shall be accessible at all trace wire access points.
- B. Except for approved spliced-in repair or replacement connections, tracer wire shall be continuous and without splices from each trace wire access point.
- C. Trace wire access points shall be accessible at all new water valve boxes, water meter boxes, blowoffs, ARVs, fire hydrants, and access manholes. Concentrations of multiple proposed valves near pipe intersections, i.e. tees or crosses, may require more than one access point assembly in each concrete valve box collar. Trace wire access points shall be within public right-of-way or public utility easements.
- D. At the point of connection between ductile iron water mains, with any non iron water main, the tracer wire shall be properly connected to the iron pipe with a cad weld or approved equivalent. Tracer wire welds shall be completely sealed with the use of an approved mastic type sealer specifically manufactured for underground use. Mastic shall be applied in a thick coat a minimum of one-quarter inch (1/4") thick and shall be protected from contamination by the backfill material with the use of a plastic membrane.
- E. Tracer wire shall be laid flat and securely affixed to the pipe at 10 foot intervals. The wire shall be protected from damage during the execution of the works. No breaks or cuts in the tracer wire or tracer wire insulation shall be permitted. At water service saddles, the tracer wire shall not be allowed to be placed between the saddle and the water main.
- F. At all water main end caps, a minimum of 6 feet of tracer wire shall be extended beyond the end of the pipe, coiled and secured to the cap for future connections. The end of the tracer wire shall be spliced to the wire of a six pound zinc anode and is to be buried at the same elevations as the water main.

3.02 BRANCHED CONNECTION

- A. Not allowed

3.03 DIRECTIONAL BORING

- A. For directional boring installations, two #12 tracer wires, listed above, shall be installed with the pipe and connected to the tracer wire at both ends, or cad welded to the existing iron pipe at both ends.
- B. The tracer wires shall be laid flat and securely affixed to the top and side of the pipeline at five foot (5') intervals to insure its placement during the boring operation.

3.04 TESTING REQUIREMENTS

- A. Contractor shall perform a continuity test on all trace wire in the presence of the Engineer or the Engineers' representative. If the trace wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire.

3.05 REPAIR / RESTORATION

- A. At all repair locations where there is existing tracer wire, the tracer wire shall be properly reconnected and spliced as outlined above.

SECTION 02560

HDPE PIPE

1.0 GENERAL

1.01 DESCRIPTION

1.01.1 THIS WORK shall consist of constructing of HDPE pipe line of the type and dimensions shown on the plans, directionally drilled or laid in trenches and backfilled in conformity with the lines and grades established by the Engineer. Contractor shall verify existing pipe size, type of material, and location (vertical and horizontal) prior to construction.

1.02 SUBMIT SHOP DRAWINGS AND MANUFACTURERS INFORMATION to the Engineer. These items include, but are not limited to the following:

Valves & Boxes	Pipe
Fittings	Tees
Dresser Couplings	Service Goods

1.03 PERMITS.

1.03.1 CONSTRUCTION AND MATERIALS SHALL CONFORM WITH THE STANDARDS OF THE NEBRASKA DEPT. OF HEALTH, THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, AND APPLICABLE STANDARDS OF THE AMERICAN WATER WORKS ASSOCIATION, FOR POTABLE WATER. Permit provisions shall apply to Contractor and his Sub-Contractor as if directed agents for the Owner.

2.0 PRODUCTS

2.01 GENERAL

2.01.1 ALL MATERIALS AND EQUIPMENT TO BE USED shall be approved by the Engineer before being installed. All materials, unless otherwise stipulated, are to be new and of the best grade of their respective kinds for the purpose designated. The Contractor shall furnish to the Engineer the name of the manufacturer of the materials, and other equipment which he is contemplating to install, together with their performance capabilities and other pertinent information.

2.02 PIPE

2.02.1 The Contractor shall furnish and install a High Density Polyethylene (HDPE) water main or sanitary sewer main by the directional drilling method in accordance with these specifications and the contract plans. The Contractor will take all necessary precautions and shall furnish any and all labor, equipment and materials required to handle all water, storm, seepage, surface, subsurface, flood and tidal storm flows which may be encountered at any time during construction of the work. The methods of providing for these contingencies will be subject to the approval of the Engineer. The pipe provided shall be PE3608/3408 DIP pipe size.

2.02.2 High Density Polyethylene Pipe shall be SDR-9 and shall meet the requirements of ASTM F 714-05, ANSI/AWWA C906 (pipe and fittings 4" to 63"), ANSI/AWWA C 901 (pipe and fittings up to 3")- PPI PE 3408 and ASTM D3350 B PE 345444C. The manufacturer shall prepare and submit the appropriate material to the EIC. The supplier shall provide materials certifications through the Contractor to the Engineer as part of the evidence of acceptability for the material at least 10 days prior to shipment of the product to the job site. The pipe shall be

colored coded for the intended use. A blue stripe shall be used for water pipe and a green stripe for sanitary sewer pipe.

The tracer wire shall be 14 gauge (min.) wire with a 45 mil HDPE jacket manufactured by Kris-Tech Wire or approved equal.

2.03 CONSTRUCTION DETAILS

2.03.1 The alignment and profile of the main shall be as shown on the contract plans.

2.03.2 The rig side work space and the pipe side work space shall be determined subject to the approval of the Engineer. The working areas should not encroach on private property or interfere with existing structures, without prior approval.

2.03.3 Prior to beginning construction, the contractor shall submit to the Engineer a detailed drilling procedure for installation of the crossing, a drill site layout drawing and a proposed work schedule.

2.03.4 The contractors attention is directed to the environmental constraints and restrictions in the permits and elsewhere herein.

3.0 EXECUTION

3.01.1. Installation shall follow pipe manufacturer's recommendations as well as ASTM D 2321-05, ASTM D 2774-04, ASTM F 1962, ASTM F 585-94, ANSI/AWWA C 901-2005 (pipe and fittings up to 3"), and ANSI/AWWA C 906-2006 (pipe and fittings 4" to 63"). Special care in handling shall be exercised during delivery and distribution of pipe to avoid damage. Damaged pipe shall be rejected and replaced at the Contractor's expense. The pipe shall be stored prior to use in such a manner as to keep the interior free from dirt and foreign matter. Any pipe that becomes contaminated shall be hand cleaned and washed before it is incorporated in the work.

3.01.2. The Contractor shall haul, heat fuse joints and hydrostatically test the pipeline in one section. (ASTM F 2620, ASTM D 2657, ASTM F 1290)

3.01.3 The alignment shall conform to the following requirements:

- Angles shall be as listed on the contract drawings, plus or minus 2 degrees.
- Minimum bending radius of the installed pipe line shall be no less than 25 times the O.D. of the HDPE pipe.
- The actual exit point shall be no more than 3 feet left or right of the alignment for the proposed exit point.
- The actual exit point shall be no more than feet short of or 3 feet beyond the proposed exit point.
- The vertical profile as shown on the drawings is the minimum depth to which the pipe line shall be installed.
- Contractor may, at his option and with the permission of the Engineer, elect to install the pipe at a greater depth than shown on the drawings.
- Contractor shall limit the longitudinal pull on the product line so as not to exceed 72% of the specified minimum yield strength (SMYS) of the pipe (or following suppliers requirements for warranty). Contractor shall continuously monitor the longitudinal pulling forces during pipeline pullback and report the same to the engineer.

3.02.1. The drilling operation shall be directed using steering and tracking systems capable of producing the required alignment, and be verified by the Engineer.

3.02.2 The Engineer shall have access at all times to measuring or gauging devices used for the horizontal drill including drilling logs maintained by the Contractor. The Contractor shall mobilize the drilling equipment, erect the rig, drill a pilot hole, enlarge the hole as necessary and pullback the prefabricated pipe string through the borehole.

3.02.3 The pipeline shall be adequately supported on rollers during pullback of the pipeline into the pre-drilled hole. The rollers and cradles shall be of a type that will prevent damage to the pipeline and will be of sufficient number to prevent over stressing during the pullback procedure.

3.02.4 Pullback equipment shall be adequate for the required thrust. A 14-1 gauge tracer wire shall be pulled with

the pipeline.

3.02.5 Procedures should be taken to avoid bentonite leakage.

3.02.6 The Contractor shall supply water for mixing drilling fluid, and shall supply portable mud tanks or construct temporary mud pits to contain excess drill fluids during construction.

3.02.7 Upon completion of the crossing, the Contractor shall dispose of any drill cuttings and excess drill fluids in a manner consistent with the local and state regulations.

3.02.8. In the event that the Contractor must abandon the drill hole before completion of the crossing, the Contractor shall seal the borehole and redrill the crossing at the Contractors expense.

3.02.9. The Contractor is expressly prohibited from laying any pipes and special castings, or other appurtenances, except under the direct observation of the Engineer.

3.0.10 . Shutdowns of any portion of the service, to make connections with the existing mains, will be made only with the approval of the Engineer and the utility owner.

3.0.11 When any main is shut off for such purposes, the work on the connection shall be carried on continuously by the Contractor and with all possible dispatch until the water is again turned into the main.

3.07.4 UTILITY CROSSINGS

.1 SEWER AND WATER MAINS that cross must be laid so that the top of sewer pipe is at least 18 inches below the bottom of the water pipe. When the sewer line cannot be buried to meet the above requirement, relocate the water main to provide the 18 inch separation, or reconstruct with slip-on or mechanical joint cast iron pipe for a distance of 10 feet on each side of the sewer. Center one full length of water main over the sewer so that both joints will be as far from the sewer as possible. Field verification of water lines will be coordinated by the contractor and North Shore Lodge prior to sewer line installation.

.2 HORIZONTAL SEPARATION between sewer and water mains shall be 10 feet measured edge to edge, except by special permission of the appropriate reviewing agency. Maintain bottom of the water main at least 18 inches above the top of the sewer main.

3.09.1 PRESSURIZED PIPE MAIN

.1 A HYDROSTATIC TEST shall be performed. The main shall be tested at a minimum pressure of 150% of the normally expected service pressure at the highest point in the line.

The test shall be conducted for one hour. The allowable pressure loss during the test period shall be 5 psig. Test pressure shall not exceed pipe design or thrust-restraint pressure.

.2 PERFORM A LEAKAGE TEST after completing the hydrostatic test. Maintain the pressure determined for the Hydrostatic Test for two hours.

Measure the water loss by pumping water from a drum or some other measurable container. The maximum allowable leakage shall be determined from the following equation

$$Q = \frac{LD \sqrt{P}}{148,000}$$

Q = Quantity of make up water in gallons per hour

D = Nominal pipe diameter in inches

P = Average test pressure, psig

L = Length of pipe tested in feet.

3.10 PRELIMINARY FLUSHING FOR POTABLE WATER

3.10.1 PRIOR TO DISINFECTION, the water main shall be flushed at a minimum velocity of 3 feet per second.

3.11 DISINFECT - WATER MAIN AND SERVICE LINES

3.11.1 THE DISINFECTANT to be used may be either chlorine or chlorine water, calcium hypochlorite (HTH, Perchloron, Pittchlor, etc.), liquid sodium hypochlorite or chlorinated lime-water mixture. Disinfectant method and material shall be in accordance with the pipe manufacturer's recommendation. DISINFECTION SHALL CONFORM TO THE LATEST REVISION OF AWWA STANDARD C651, WHICH SHALL GOVERN IN THE EVENT OF A CONFLICT WITH THESE SPECIFICATIONS.

3.11.2 THE DISINFECTANT shall be applied at one extremity of a pipe section and bled at the opposite extremity. The length of the sections and the dosage for such sections shall be determined by the Engineer; however, a uniform dose of at least 25 ppm at the end of the section will be required.

3.11.3 THE DISINFECTING PERIOD shall be 24 hours, unless unfavorable or unsanitary conditions dictate a longer retention period. The chlorine residual at the end of the line after the retention period shall be not less than 10 ppm. The line shall then be bled until all chlorinated water is removed.

3.11.4 SAMPLES FOR BACTERIOLOGICAL EXAMINATION shall then be taken, two at a 24-hour interval and sent to the State Department of Health or a testing laboratory acceptable to the State. The results of the tests shall be delivered to the Engineer within three days of receipt of the results. Both samples taken consecutively must show absence of bacteria.

3.11.5 IF THE SAMPLES fail the bacteriological examination, the Contractor shall repeat the disinfection procedure and resubmit water samples. Continue this procedure until State standards can be met. The costs of additional disinfection and testing shall be born by the Contractor.

3.12 TESTING FOR HDPE USED AS GRAVITY SEWER MAIN

3.13 SEWER LINE

3.13.1 AN AIR TEST shall be performed as a measure of exfiltration. The test shall follow ASTM F1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air, latest revision. The pressure gage must use 0.1 psi increments for measurement. The sewer main shall be tested at a pressure of 3.5 p.s.i.g. and the pressure drop shall not exceed 1.0 p.s.i.g. in the time calculated using the following equation:

$$T = 0.085 \times \left(\frac{D \times K}{Q} \right)$$

Where:

T = shortest time (in seconds) allowed for the air pressure to drop 1.0 psig.

K = 0.000419*D*L (but not less than 1.0)

Q = leak rate in cubic feet/minute/square feet of internal surface =0.0015 CFM/SF

D = measure average inside diameter of pipe (in)

L = length of test section (ft)

Based on the above equation, times per 100' foot of pipe are shown in the below table for reference.

Pipe Diameter in inches	Time in Minutes/100 feet of pipe
8"	2.53
10"	3.96
12"	5.70
15"	8.90
24"	22.8

3.13.2 AN INFILTRATION TEST shall be performed by installing a suitable flow measurement device at the low end of the sewer line and measuring the amount of water flowing through the low end of the sewer line for a specific period of time. Infiltration shall not exceed 50 gallons/inch diameter/mile/day.

3.13.3 AN ALIGNMENT TEST shall be performed between manholes to determine whether any displacement of pipe has occurred. Lamping shall be done after pipe trench is compacted and brought to grade or pavement subgrade. "Full moon" shall be visible for grade alignment. No less than "half moon" shall be visible for horizontal alignment.

3.13.4 A 5% DEFLECTION TEST shall be performed on flexible sewer pipe. A rigid ball or mandrel, sized at 95% of the inside diameter of the pipe, shall pass freely through the pipe without the aid of mechanical pulling devices. The test shall be performed after the backfill has been in place at least 30 days.

3.13.5 ALL LEAKS and/or defects appearing during the test shall be repaired and the line retested.

SECTION 02561

RESTRAINED JOINT PVC PIPE

1.0 GENERAL

1.1 This specification covers restrained joint Polyvinyl Chloride (PVC) Pipe, 4" – 16" with cast-iron pipe (CI) outside diameters as well as related couplings which are intended for use in pressure-rated potable water delivery and force main or gravity sewer systems as well as underground fire protection piping systems. Pipe is joined using non-metallic couplings to form an integral system for maximum reliability and interchangeability. High-strength, flexible thermoplastic splines are inserted into mating, precision machined grooves in the pipe and coupling during assembly to provide full 360° restraint with evenly distributed loading.

2.0 Material

2.1 The products represented by this specification are made from un-plasticized PVC compounds having a minimum cell classification of 12454 as defined in ASTM D 1784. The compound qualifies for a Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4°F in accordance with the requirements of ASTM D 2837. Pipe, couplings, and locking splines are completely non-metallic. Couplings shall be designed for use at or above the pressure class of the pipe with which they are utilized, and incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F 477. Joints are designed to meet the zero leakage test requirements of ASTM D 3139.

3.0 Standards

3.1 The products represented by this specification are manufactured from pipe and couplings conforming to AWWA C900/C905 (depending on size). The restrained joint pipe system meets all short and long term pressure test requirements of AWWA C900-07 / C905-10.

4.0 Certifications

4.1 The products represented by this specification additionally conform to the following:

- NSF 61 DRINKING WATER SYSTEM COMPONENTS – HEALTH EFFECTS
(ALL MUNICIPAL WATER PIPE AND COUPLINGS)

- NSF 14 PLASTICS PIPING SYSTEM COMPONENTS AND RELATED MATERIALS
(4" THRU 12" PIPE ONLY)

- UL 1285 PIPE AND COUPLINGS, POLYVINYL CHLORIDE (PVC), AND ORIENTED
POLYVINYL CHLORIDE (PVCO) FOR UNDERGROUND FIRE SERVICE (as defined
below)

5.0 Dimensions

5.1 Nominal outside diameters and wall thicknesses of this restrained joint pipe conform to the requirements of AWWA C900-07/C905-10. Restrained joint pipe shall be furnished in 4", 6", 8", 10", 12" sizes in Class 235 (DR18), furnished in standard lengths of 20 feet with standard blue color is BLUE

6.0 Workmanship

6.1 Pipe and couplings shall be homogeneous throughout and free from voids, cracks, inclusions and other defects and shall be as uniform as commercially practicable in color, density and other physical characteristics.

7.0 Marking

7.1 Pipe joints and couplings (as applicable) are legibly and permanently marked in ink with critical information including nominal size, material type, dimension ratio, pressure class, applicable standards, manufacturer's name or trademark, production record code, seal (mark) of testing agency verifying the suitability of the pipe material for potable water service (where applicable) and seal (mark) of the certifying agencies that have tested and approved the pipe for use in fire protection systems.

8.0 Installation

8.1 Installation shall be made in accordance with AWWA C605 "Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings Water" for all the procedural requirements including but not limited to proper handling and storage, installation, tapping and testing.

9.0 Approved Manufacturers

Certain Teed or approved equal.

3.0 EXECUTION

3.01 ASPHALTIC CONCRETE PRODUCTION

3.01.1 PRODUCE ASPHALTIC CONCRETE in accordance with Section 501 AND 503 of the Standard Specifications for the State of Nebraska Department of Roads.

3.02 PREPARATIONS OF EXISTING SURFACES

3.02.1 Existing asphalt shall be machine broomed. All loose material, dirt, and debris shall be removed. If mud is observed on the roadway, it must be fully removed.

3.02.2 THE EDGE OF EXISTING ASPHALT PAVING shall be cut back to a straight edge before laying any fresh asphalt.

3.03 TRANSPORTING

3.04.1 ASPHALTIC CONCRETE shall be compacted and finished in accordance with Section 500 of the Standard Specifications for the State of Nebraska Department of Roads.

3.04.2 A TACK COAT shall be applied to the edge of the existing pavement before laying any fresh asphalt.

3.05 QUALITY CONTROL

3.05.1 TESTING LABORATORY SERVICES shall be provided by the Contractor or producer for control and acceptance testing functions during periods of mix production, sampling, and testing, and whenever materials subject to the provisions of these Specifications are being supplied or tested. The laboratory shall provide adequate equipment, space, and utilities as required for the performance of the specified tests. Tests necessary to determine conformance with requirements specified shall be performed at the Contractor's expense. Tests shall be as follows:

.1 Extraction, Gradation, Marshall specimens and Air Voids (set of two includes unit weight, flow, voids and stability) every 300 tons or one per project of less than 300 tons on each type of mix used.

.2 Cores including length, specific gravity and percent compaction every 300 tons or two per project on each type of mix. Contractor shall patch the cored places at his expense.

3.05.2 SURFACE TESTS for conformity with the specified crown and grade shall be made by the Contractor immediately after initial compression. Correct any variation by the removal or addition of material and by continuous rolling.

.1 Finished Surface shall not vary more than ¼ inch (6.35 mm) for the surface course when tested with a 16-foot (4.8 m) straightedge applied parallel with, or at right angles to, the centerline.

.2 After the Completion of Final Rolling, again test the smoothness of the course, immediately correct humps or depressions exceeding the specified tolerances by removing the defective work and replacing with new material, as directed by the Engineer. This shall be done at the Contractor's expense.

.3 Finished Surfaces of Bituminous Courses shall not vary from the gradeline, elevations, and cross sections shown on the Contract Drawings by more than ½ inch (12.70 mm). The Contractor shall correct pavement areas varying in excess of this amount by removing and replacing the defective work. Skin patching will not be

permitted.

3.06 PROTECTION

3.06.1 PROTECT ADJACENT STRUCTURES from being splattered or marred at all times. In the event that they are splattered or marred, remove the asphaltic material, repair damage, and leave the appurtenances in a condition as good as, or better than, the original.

3.07 TEMPORARY MARKINGS

.1 Paint and application shall be made in accordance with NDOR specifications Section 423 and provide paint as listed on the NDOR approved materials list.

SECTION 02820

SEEDING

1.0 GENERAL

1.01 THIS WORK shall consist of furnishing and placing seed, fertilizer and mulch in accordance with these specifications at locations shown in the plans or designated by the Engineer.

1.02 RATE OF APPLICATION and seed mixtures shall be as shown in these special provisions.

2.0 PRODUCTS

2.01 ALL SEEDS shall comply with applicable State and Federal seed laws.

2.02 THE MINIMUM PERCENTAGE of purity for seed to be used shall be as specified in these special provisions.

2.03 KINDS OF SEEDS shall be equivalent to existing stand of alfalfa and the proportions for required mixtures shall be as specified in these special provisions. Seed shall be pre-mixed prior to delivery. The seed shall be bagged in known acreage lots.

2.04 SEED PROPOSED for use shall not be planted without the prior approval of the Engineer.

2.05 THE CONTRACTOR shall obtain from the seed dealer and furnish to the Engineer, an analysis of each type and lot of seed he proposes to use. The analysis shall provide complete information on the seed as required by State and Federal seed laws. The Engineer may approve use of the seed if the information on the analysis is satisfactory.

2.06 FERTILIZER shall be an approved commercial type, and shall be guaranteed to comply with the minimum requirements of these specifications.

2.07 MULCH if required shall be an approved native hay free from all noxious weeds and relatively free from all other weeds and applied as required in these special provisions.

3.0 CONSTRUCTION METHODS

3.01 THE CONTRACTOR shall notify the Engineer at least 48 hours in advance of the time he intends to begin work and shall not proceed with such work until permission to do so has been granted by the Engineer.

3.02 SEEDING OPERATIONS shall be performed between April 15 and May 15 in western and northern Nebraska, or in August in all locations. Plant to usually provide at least six weeks before first hard freeze, except by express permission of the Engineer. No work shall be performed during excessively windy weather or when the ground is frozen, wet or otherwise untillable.

3.03 NOT MORE THAN FIVE DAYS prior to the sowing of seed, the seedbed shall be prepared by loosening the soil to a depth of not less than two inches by discing, harrowing, raking or by other approved means. Several discings, harrowings, or similar means may be required to provide a satisfactory seedbed. Discing, harrowing and raking shall be longitudinal on all slopes.

3.04 EXISTING WEED STUBBLE and small weeds shall be cut and partially incorporated into the soil during the seedbed preparation work. All other growth of vegetation that will interfere with seeding operations shall be removed.

Extreme care shall be exercised to avoid injury to trees and shrubs that have been designated by the Engineer to be preserved.

3.05 FOR SEEDING, Alfalfa seeds must have close contact with soil particles and soil moisture to ensure rapid emergence. Leave just enough loose soil to cover seed after planting. On a properly prepared and firmed seedbed, contractor should sink in no more than 1/4 to 1/2 inch deep in fine textured soils and 3/4 inch deep in sandy soils .

Avoid rough, cloddy seedbeds because proper seeding depth and good seed-to-soil contact are difficult to control. Do not prepare a powdery-fine seedbed on fine textured, clayey soils as soil crusting may occur after it rains and hinder seedling emergence.

Excessive irrigation after planting also can cause crusting or promote seedling diseases. If irrigation water is to be used, fill the top 2 to 3 feet of the soil to field capacity before planting alfalfa. Pre-irrigation, if needed, is especially important with surface water systems. Construct furrows or corrugations prior to planting.

3.05.01 Approved mechanical power drawn drills. Broadcast and hydraulic seeders may **not** be used.

On firm, clean-tilled seedbeds, use a drill equipped with adequate depth control methods and packer wheels. This is usually the most reliable seeding method. Double seeding - seeding one-half of the seed while driving in one direction and the other half while driving at a right angle to the first pass - often results in more seedling ground cover and may improve success on erosive or potentially weedy sites. Double seeding also is more useful when drill row spacing is more than 7 inches.

When drills are used they shall be equipped with press wheels or drag chains. When broadcast type seeders or hydraulic seeders are used, the seed shall be harrowed with the exception of slopes too steep to operate equipment on as determined by the Engineer.

Mechanical power-drawn drills shall have depth bands set to maintain a planting depth of one-half inch to three-quarters of an inch.

3.06 FERTILIZER shall be applied as per Nebraska Cooperative Extension G02-1456-A, NebGuide – Seeding Alfalfa.

3.07 CAMPANION CROP if required it shall be applied as per Nebraska Cooperative Extension G02-1456-A, NebGuide – Seeding Alfalfa. Only use oats that are free of weed seed. Do not use wheat, rye, triticale, or barley.

3.08 SEED shall be applied to the entire area disturbed by grading or construction .

APPROVED VARIETIES INCLUDE:

Seed shall comply with the following requirements and shall be applied at the rate shown:

SEED MIXTURE

<u>Species</u>	<u>PLS/Acre*</u>
Oats	15.0 to 30.0 pounds
Alfalfa (Medicago sativa)	18 pounds (irrigated) PLS = 99% Germination = 90%
Alfalfa (Medicago sativa)	12 pounds (non-irrigated) PLS = 99% Germination = 90%

*PLS= Pure Live Seed and equals the percentage of purity multiplied by the percentage of germination. It is not the same as bulk seed. The pounds of bulk seed required will be greater than the pounds of pure live seed shown above.

The seed furnished may be sampled and analyzed by a representative of the Nebraska Department of Agriculture. If the seed tag analysis does not equal or exceed the sample analysis after application of the tolerances allowed by "The Rules for Testing Seeds - Association of Official Seed Analysts", a contract unit price adjustment may be made.

FERTILIZER

Rate of Application and type suited for soil type shall be applied as per Nebraska Cooperative Extension G02-1456-A, NebGuide – Seeding Alfalfa.

3.09 RE-SEEDING CONTRACTOR shall re-till and reseed as required by the Engineer for a period of one year following substantial completion.

3.09.01 When all work related to seeding, fertilizing, and/or mulching has been completed on an area, and is washed out or damaged, re-seed, fertilize, and/or mulch the area at the contract unit price(s) when so ordered by the Engineer.

3.09.02 When work related to seeding, fertilizing, and/or mulching has not been completed in an area, and is washed out or damaged, re-seed, fertilize, and/or mulch the area as necessary, at the Contractor's expense.

3.10 CLEANUP All work related to cleanup throughout the project and upon completion is the responsibility of the Contractor, at the Contractor's expense.

3.10.01 Remove all excess materials, debris, and equipment upon completion of work.

3.10.02 Clean all paved surfaces open for public use at the end of each day and prior to forecasted precipitation.

3.10.03 Repair any damage resulting

3.10 CONTRACTOR shall provide all water necessary to establish a cover suitable to the Owner.

SECTION 03310

CAST-IN-PLACE CONCRETE for PAVING

1.0 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

1.02 SUBMITTALS

1.02.1 CONCRETE MIX. Submit the following to the Engineer as shop drawings, in accord with the General Conditions and General Requirements, for each mix to be provided:

- Source of each aggregate
- Aggregate gradation
- Pounds of aggregate per cubic yard
- Pounds of water per pound of cement
- Slump in inches
- Percent air content
- Type and quantity of admixtures used
- Compressive strength

Make no alterations in materials without approval.

1.03 ENVIRONMENTAL REQUIREMENTS

1.03.1 COLD WEATHER REQUIREMENTS. Conform to ACI 306, Recommended Practice for Cold Water Concreting, or, more particularly, no concrete shall be placed after atmospheric temperature reaches 40°F when on a downward trend and under no circumstances in freezing temperature without the approval of the Engineer. In such cases, provisions shall be made for heating the aggregate, water, and placed concrete to the satisfaction of the Engineer.

1.03.2 HOT WEATHER REQUIREMENTS. Conform to ACI 305, Recommended Practice for Hot Weather Concreting.

1.04 STORAGE OF CEMENT AND AGGREGATES

1.04.1 STORE CEMENT in a manner to prevent the absorption of moisture. The use of tarpaulins for the protection of cement will not be permitted. Cement which has been reclaimed or lumpy will be rejected.

1.04.2 STORE DIFFERENT SIZE AGGREGATES separately with adequate provisions to exclude the entrance of foreign materials.

2.0 PRODUCTS

2.01 MATERIALS

2.01.1 PORTLAND CEMENT shall meet the requirements of ASTM C 150, Type II. Only one brand or type of cement shall be used concurrently in the work. Portland cement having false set shall not be used. Cement which has a temperature of over 180°F shall not be used. Cement which is placed in storage or is received on the Project at temperatures of over 200°F shall not be used until acceptable test results are obtained for samples taken from the cement after the temperature of the cement represented has decreased to 180°F. Portland cement for use in concrete shall not contain more than 0.75 percent equivalent alkali.

2.01.2 NORMAL WEIGHT AGGREGATES shall meet the requirements of ASTM C 33 and the requirements of Section 600 of the Nebraska Department of Roads Standard Specifications for Highway Construction.

- .1 Sand Gravel Aggregate not Applicable - this project.
- .2 Nebraska 47-B Concrete aggregate shall be a mixture of sand, gravel, and limestone rock composed of clean, hard, durable, and uncoated particles, free from injurious quantities of soft or flaky particles, particles with concretionary coatings, alkali, organic matter, paper, wood, or other deleterious material.

<u>Sieve</u>	<u>Course Aggregate Gradation</u>	
	<u>Percent Retained</u>	
	<u>Minimum</u>	<u>Maximum</u>
1 inch	0	8
3/4 inch	10	34
3/8 inch	55	85
No. 4	88	100
No. 20	94	100

	<u>Fine Aggregate Gradation</u>	
	<u>Sieve</u>	<u>Percent Retained</u>
	<u>Minimum</u>	<u>Maximum</u>
No. 4	3	23
No. 10	30	50
No. 30	60	84
No. 200	97	100

The Engineer may consider the behavior of concrete in which the aggregate from a particular source has been used. Observations of the behavior may include the service record of both concrete pavement and concrete structures as well as the results of laboratory tests. If the evidence mentioned above, and the results of laboratory tests, indicated that an aggregate from the particular source contains reactive constituents which cause a cement aggregate reaction, the aggregate shall be rejected for use in concrete. If, in the judgment of the Engineer, the aggregate can be used in concrete with a Portland cement having an alkali content not exceeding 0.6 percent without causing a cement-aggregate reaction, the Engineer may permit its use. Aggregate produced by pumping from different pits in the Platte River Valley shall be considered to be from the same source.

2.01.3 AIR-ENTRAINING ADMIXTURES shall be a type approved by the Engineer, and shall conform to the requirements of AASHTO Standard Specifications for Air-Entraining Admixtures for Concrete, Designation M154.

2.01.4 CURING AND SEALING COMPOUNDS shall be acrylic base compounds, and shall be one of the following types and manufacture:

Surfaseal	L & M Construction Chemicals, Inc.
Acryseal	Protex Industries, Inc.
Kure-N-Seal	Sonneborn Division of Contech, Inc.
CS-309	W.R. Meadows, Inc.
Acrylic Curing Compound	Nebraska Builders Products

2.02 CONCRETE MIXES

2.02.1 MIX CONCRETE to provide a compressive strength of not less than 2,500 psi in seven days and 3,500 psi in 28 days. The concrete shall be furnished having a maximum slump of 4 inches and minimum slump of 1 1/2 inches.

2.02.2 PROPORTION OF MATERIALS to be used in the sand-gravel concrete mix shall be as follows unless changed by the Engineer when necessary to obtain the specified strength and/or the desired density, durability, uniformity, and workability:

- .1 Table of Proportions. Concrete composed of cement, water, and sand-gravel aggregate shall contain 425 pounds minimum, 455 pounds maximum total aggregate per sack of cement, except for air-entrained concrete, in which 405 pounds minimum and 435 pounds maximum total aggregate shall be used. Air-entrained concrete shall have an air content of six to nine percent by volume of the wet concrete as determined by ASTM Test C138-44. Cement factor per yard of concrete, 6.8 sacks.
- .2 Nebraska 47-B Concrete table of proportions. Concrete composed of cement, water, sand-gravel aggregate, and limestone rock shall contain 510 minimum, 555 pounds maximum total aggregate per sack of cement for air-entrained concrete. Air-entrained concrete shall have an air content of 5 to 7.5 percent by volume of the wet concrete as determined by ASTM Test C138-44. Cement factor per yard of concrete, 6 sacks.

2.02.3 WATER FOR CONCRETE shall be free from objectionable quantities of oil, acid, alkali, salt, organic matter, or other deleterious materials, and shall not be used until the source of supply has been approved. If, at any time, the water from an approved source becomes of unsatisfactory quality or insufficient quantity, the Contractor will be required to provide satisfactory water from another source.

2.02.4 WATER CONTENT in any mix shall include the amount of moisture or water carried on the surface of the aggregate. The amount of water to be used shall be the minimum amount required to produce a plastic mixture of the strength specified and of the design, density, durability, uniformity, and workability. The maximum water-cement ratio shall be 0.50.

2.03 CONCRETE PRODUCTION

2.03.1 PRODUCE AND DELIVER READY-MIXED CONCRETE in accordance with Sections 1002.04 through 1002.07 of the Nebraska Department of Roads Standard Specifications for Highway Construction, except as amended herein.

2.04 REINFORCING STEEL

2.04.1 REINFORCING STEEL shall be Grade 60, minimum.

3.0 EXECUTION

3.01 PREPARATION

3.01.1 CLEAN EQUIPMENT for mixing and transporting concrete. Forms shall be thoroughly wetted (except in freezing weather) or oiled. Clean reinforcement of ice, dirt, rust, scale, or other coatings. Remove debris, water, and ice from the place of deposit of concrete. Remove laitance and other unsound material from hardened concrete before additional concrete is added.

3.03 CONVEYING AND PLACING

3.02.1 CONVEY CONCRETE FROM TRUCKS as rapidly as possible to the place of final deposit by methods that will prevent separation or loss of materials.

3.02.2 CHUTING, PUMPING, AND PNEUMATIC CONVEYING EQUIPMENT shall be of such size and design to ensure a practically continuous flow of concrete at the delivery end without separation of materials.

3.02.3 PUMP CONCRETE to conform with the report recommendations of ACI Committee 304, Placing Concrete by Pumping Methods.

3.02.4 DEPOSIT CONCRETE as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Place concrete at a rate so that concrete is plastic and flows readily into the spaces between the bars. Concrete contaminated by foreign material shall not be used unless approved by the Engineer. When placing is once started, it shall be carried on as a continuous operation until placement of the panel or section is completed, and shall be placed before its initial set has occurred.

3.02.5 CONSTRUCT HEADERS to the dimensions shown on the Drawings wherever the end of pavement joints an unimproved road or street and wherever shown. Concrete shall be of the same class as used in construction of the pavement.

3.03 CONSOLIDATION

3.03.1 CONSOLIDATE CONCRETE in accordance with ACI 309.

3.04 FINISHING

3.04.1 FLATWORK

- .1 Belt Finish paving to a true plane within ¼ inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

3.04.2 NO EXCESS WATER shall be present when any finishing is being accomplished, and no water shall be added after the concrete is mixed and placed. Excessive form marks on exposed concrete surfaces shall be rubbed down with carborundum stones to the satisfaction of the Engineer.

3.05.1 TESTS. Unless otherwise noted on the Drawings or directed by the Engineer, a test set shall be made in

accord with the following schedule:

<u>Total Cubic Yards of Concrete Placed in Day's Run</u>	<u>Minimum Number of Tests (three cylinders each)</u>
0 - 100	One per day
100 - 1,000	One for each 100
1,000 - 2,000	One for each 200

3.05.2 EACH TEST SET shall include the following:

- .1 Three Compression Test Specimens made, tested, and evaluated in accord with ACI 301
- .2 Slump Test made in accord with ASTM C 143
- .3 Test For Entrained Air Content in accord with ASTM C 231 or ASTM C 173

3.06 SPECIAL CONSIDERATIONS

3.06.1 IN NO PLACE shall concrete be allowed to set more than 30 minutes until another batch is applied and properly vibrated.

3.06.2 WETTING OF SUBGRADE shall be done prior to the placing of concrete by sprinkling with water.

3.06.3 STOPPAGES. IN the event that concrete pouring is unavoidably stopped, due to breakdown of equipment or otherwise, for more than 30 minutes, the Contractor shall use a construction joint as directed by the Engineer.