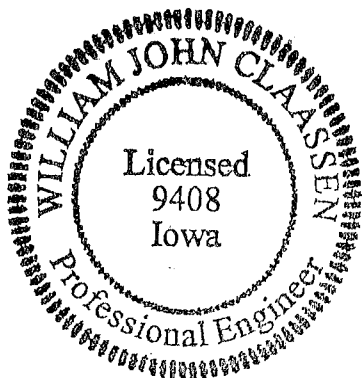


**CONTRACT SPECIFICATIONS FOR
2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP
WATERLOO WATER WORKS
WATERLOO, IOWA**



I HEREBY CERTIFY THAT THIS PLAN AND SPECIFICATION WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

4/20/2023

WILLIAM J. CLAASSEN
P.E. NO. 9408

DATE

MY REGISTRATION RENEWAL DATE IS 12/31/23.

PAGES OR SHEETS COVERED BY THIS SEAL: ALL

**2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP
WATERLOO WATER WORKS
WATERLOO, IOWA**

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NOTICE OF PUBLIC HEARING AND NOTICE TO BIDDERS

Notice is hereby given that the Board of Trustees of the Waterloo Water Works of the City of Waterloo, Iowa, will meet in the office of the General Manager, 325 Sycamore Street, Waterloo, Iowa, at 8:00 a.m., local time, May 17, 2023, at which time and place said Board will conduct a public hearing on the proposed adoption of Plans and Specifications and Form of Contract and estimate of cost for the 2023 Heartland Hills Area West Water Main Loop project, as described in detail in the Plans and Specifications prepared by Wayne Claassen Engineering and Surveying, Inc., now available for review and on file in the office of the General Manager of the Waterloo Water Works

At the aforesaid time and place, the Board will consider any objections which may be offered to said Plans and Specifications, Form of Contract and estimate of cost and to the making of said improvement. The public may file written objections thereto with the General Manager before said hearing, or appear and make objections thereto with the General Manager before said hearing, or appeal and make objection at said hearing. The extent of the work involved includes a directionally drilled 8-inch diameter PVC water main approximately 1,480 feet long in the City of Waterloo, Iowa in public road right of way from the West end of Sager Ave. to approximately 340 feet East of Progress Ave., plus approximately 1,450 feet of conventionally laid 8-inch dia. PVC water main in the City of Cedar Falls, in a private easement in unplatted property west of Heartland Hills Second Addition from the West end of Matthew Dr. to the West end of Jill Dr. to the West end of Mark Dr. to the West end of Jodi Dr. to the West end of Sager Ave. plus water services and appurtenances to replace existing water mains and to construct new water mains.

The Contractor shall commence construction within ten (10) calendar days of the issuance of a Notice to Proceed by the Engineer. The Contractor shall be substantially complete with the Project with fully functioning water mains by August 1, 2023 and shall be entirely complete with all aspects of the project including all seeding and restoration by September 1, 2023.

Proposals for said improvement shall be filed in the aforesaid office before 10:00 a.m. on May 9, 2023. The sealed proposals will be thereafter publicly opened and will be immediately read and recorded. All proposals shall be made on official Proposal Forms furnished by the Board of Trustees of the Waterloo Water Works, Waterloo, Iowa, and must be enclosed in a separate sealed envelope and plainly identified as a bid for the aforesaid project, and addressed to the Waterloo Water Works Board of Trustees, Waterloo, Iowa. Each proposal shall be accompanied in a separate envelope by either cash, a certified check drawn on a solvent state, or national bank; or a bid bond, in the form set out in the Specifications, executed by a corporation authorized to contract as a surety in the State of Iowa in the amount equal to five percent (5%) of the amount of the proposal, made payable to the of the Treasurer of the Waterloo Water Works Board of Trustees of Waterloo, Iowa. The bid deposit may be forfeited to the Board of Trustees as liquidated damages in the event the successful Bidder fails to enter into a contract and maintenance of said improvements as required by law within 10 days after the acceptance of the proposal. No Bidder may withdraw a proposal within 30 days after the date set for opening bids.

The successful Bidder shall be required to furnish corporate surety bonds in an amount equal to 100% of its contract price, said bonds to be issued by a responsible surety approved by the Board of Trustees, and shall guarantee the faithful performance of the contract and the terms and conditions therein contained, and shall guarantee the prompt payment of all materials and labor and protect and save harmless the Board of Trustees from claims and damages of any kind caused by the operation of the contractor and shall also guarantee the maintenance of the improvements in good repair for a period of two (2) years from and after the completion and acceptance by the Board of Trustees.

The contractor will be paid against bi-monthly estimates in cash on the basis of ninety-five percent (95%) of the work as same is completed and materials delivered and work approved. Final payment will be made thirty-one (31) days after completion of the work and acceptance by the Board. Before final payment is made, vouchers showing that all subcontractors and workmen and all persons furnishing materials have been fully paid for such materials and labor will be required unless the Waterloo Water Works is satisfied that material, men and laborers have been paid.

Plans and Specifications governing the construction of the proposed improvements have been prepared by Wayne Claassen Engineering and Surveying, Inc., which plans and specifications and also the prior proceedings of the Board referring to and defining said proposed improvements are hereby made a part of this notice, and the proposed contract by reference shall be executed in compliance therewith.

The contract documents are now available at the Waterloo Water Works office of the General Manager at the aforesaid address.

Plans and Specifications are obtainable by a qualified bidder from the Engineer upon payment of \$25.00 (\$35.00, if mailed) (\$45.00, if over-nighted). \$25.00 of the payment is refundable. The prime contractor, subcontractors, or suppliers working on the project shall retain their own set of plans and specifications for use on the project.

The prime contractor will be supplied with the needed number of reduced sets of plans and specifications at no additional cost. Full-sized sets of plans will be available at \$30.00 per set or individual full-sized sheets at \$0.75 per sheet.

Time is an essential element of this contract. It is important that the work be diligently pursued to completion. If the work is not completed within the specified contract period, plus authorized extensions, the contractor shall pay to the Waterloo Water Works Liquidated Damages in the amount of five hundred dollars (\$500.00) per day, for each day, as further described herein, in excess of the authorized time.

Before the work is commenced on this contract, a conference shall be held for the purpose of discussing the contract. The conference shall be attended by Waterloo Water Works officials, the prime contractor, and all subcontractors, if any.

The Contractor shall pay all sales taxes for all materials that become an integral part of the completed project. All Contractors and Subcontractors shall file reports of sales or use taxes paid, as further described in the Supplemental General Specifications. Sales tax exemption forms will not be provided to the Contractor.

Consideration will be given to the lowest responsible bidder submitting a sealed proposal, provided, however, that the Board reserves the right to reject any and all bids. In evaluating and awarding the contract, the Board will give consideration and weight to the bid which offers the best basis of construction, quality, probable service life and availability of relocation parts for equipment utilized and shall give due consideration to past experience with the bidder. If a bidder has shown substandard performance on previous Waterloo Water Works projects or projects of similar scope for other entities that has resulted in substandard performance, higher project administration costs or higher project oversight costs for the Waterloo Water Works or for the owners of projects of similar scope contracted by the bidder for other entities, the bid of the bidder may be rejected by the Waterloo Water Works.

BOARD OF WATER WORKS TRUSTEES
CITY OF WATERLOO, IOWA

By _____
Chad Coon,
General Manager

INSTRUCTIONS TO BIDDERS

1. EXPLANATIONS TO BIDDERS

Any explanation desired by a bidder regarding the meaning or interpretation of the Notice to Bidders, Plans, Specifications, etc., must be requested in writing and with sufficient time allowed for a reply to reach bidders before submission of their bids. Any interpretation made will be in the form of an amendment of the Notice to Bidders, Plans, Specifications, etc., and will be furnished to all prospective bidders. Its receipt by the bidder must be acknowledged in the space provided on the Proposal Form or by letter or telegram received before the time set for opening of bids. Oral explanations or instructions given before the award of the contract will not be binding.

2. EXAMINATION OF PROPOSED WORK

Bidders should visit the site and take such other steps as may be reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Failure to do so will not relieve bidders from responsibility for estimating properly the difficulty or cost of successfully performing the work. The owner will assume no responsibility for any understanding or representation concerning conditions made by any of its officers or agents prior to the execution of the contract, unless included in the Notice to Bidders, the Specifications or related documents.

3. PREPARATION OF BIDS

- a. Bids shall be submitted on the forms furnished, or copies thereof, and must be manually signed. If erasures or other changes appear on the forms, each erasure or change must be initialed by the person signing the bid.

The bidder has the option to submit a computer-generated spreadsheet in lieu of the portion of the Form of Bid or Proposal, which includes the Bid Item Number, Description, Unit, Estimated Quantity, Unit Bid Price, Total Bid Price, and Total Bid. The computer-generated spreadsheet shall include all of the information listed in that portion of the Form of Bid or Proposal as well as bear the signature of the Prime Contractor submitting the bid. For the bidders who submit a computer-generated spreadsheet, the TOTAL BID (with alternates, if applicable) shall also be indicated in the space(s) provided on the Form of Bid or Proposal.

- b. The Bid Form may provide for submission of a price or prices for one or more items, which may be lump sum bids, alternate prices, schedule items resulting in a bid on a unit of construction or a combination thereof, etc. When the Bid Form explicitly requires that the bidder bid on all items, failure to do so will disqualify the bid. When submission of a price on all items is not required, bidders should insert the words "no bid" in the space provided for any item on

- which no price is submitted.
- c. Unless called for, alternate bids will not be considered.
 - d. Modifications of bids already submitted will be considered if received at the office designated in the Notice to Bidders by the time set for closing of bids. Telegraphic modifications will be considered, but should not reveal the amount of the original or revised bid.
 - e. In preparing his bid, the bidder shall specify the price, written legibly in ink or with the typewriter, at which he proposes to do each item of work. The unit price shall be stated in figures in the blank space provided (i.e., \$7.14). In items where unit price is required, the total amount of each item shall be computed at the unit prices bid for the quantities given on the Bid Form and stated in figures in the blank space provided.

If the bidder chooses to submit the unit prices, total bid price, and total bid on a computer-generated spreadsheet, all numbers shall be easily legible.

- f. Any changes or alterations made in the Bid Form, or any addition thereto, may cause the rejection of the bid. No bid will be considered which contains a clause in which the contractor reserves the right to accept or reject a contract awarded him by the Waterloo Water Works Board of Trustees. Bids in which the unit prices are obviously unbalanced may be rejected.

4. SUBMISSION OF BIDS

- a. A bid must be sealed in a separate envelope and marked to indicate its contents and be accompanied by the bid security in a separate envelope. If forwarded by mail, the two envelopes shall be placed in a third and mailed to the General Manager. All bids must be filed with the General Manager of the Waterloo Water Works at his office at 325 Sycamore St., Waterloo, Iowa, before the time specified for closing bids.
- b. Bids received prior to the advertised hour of opening will be securely kept sealed. The officer whose duty it is to open them will decide when the specified time has arrived, and no bid received thereafter will be considered; except that when a bid arrives by mail after the time fixed for opening, but before the reading of all other bids is completed, and it is shown to the satisfaction of the Waterloo Water Works, that the non-arrival on time was due solely to delay in the mails for which the bidder was not responsible, such bid will be received and considered.
- c. Bidders are cautioned that, while telegraphic modifications of bids may be received as provided above, such modifications, if not explicit and if in any sense subject to misinterpretation, shall made the bid so modified or amended, subject to rejection.

5. **LATE BIDS AND MODIFICATIONS OR WITHDRAWALS**

Bids and modifications or withdrawals thereof received at the office designated in the Notice to Bidders after the exact time set for closing of bids will not be considered. However, a modification which is received from an otherwise successful bidder, and which makes the terms of the bid more favorable to the Waterloo Water Works, will be considered at any time it is received and may therefore be accepted. Bids may be withdrawn by written or telegraphic request received from bidders prior to the time set for closing of bids.

6. **PUBLIC OPENING OF BIDS**

Bids will be publicly opened at that time and place set for opening in the Notice to Bidders. Their content will be made public for the information of bidders and others interested who may be present either in person or by representative.

7. **BID SECURITY REQUIRED**

All bids must be accompanied in a separate envelope by a certified or cashier's check drawn on an Iowa bank, or a bank chartered under the laws of the United States, a certified share draft drawn on a credit union in Iowa or chartered under the laws of the United States, or bid bond (on the form furnished by the Waterloo Water Works) payable to the Treasurer of the Waterloo Water Works Board of Trustees of Waterloo, Iowa, in the sum of not less than five percent (5%) of the bid submitted, which certified check, certified share draft or bid bond will be held as security that the Bidder will enter into a Contract for the construction of the work and will furnish the required bonds, and in case the successful Bidder shall fail or refuse to enter into the Contract and furnish the required bond, his bid security may be retained by said Board of Trustees as agreed upon liquidated damages. If bid bond is used, it must be signed by both the bidder and the surety or surety's agent. Signature of surety's agent must be supported by accompanying Power of Attorney.

8. **STATEMENT OF BIDDER'S QUALIFICATIONS**

Each bidder shall, upon request of the Waterloo Water Works, submit on the form furnished for that purpose (a copy of which is included in the contract documents), a statement of bidder's qualifications, his experience record in constructing the type of improvements embraced, and his organization and equipment available for the work contemplated; and, when specifically requested, a detailed financial statement. The Waterloo Water Works, shall have the right to take such steps as it deems necessary to determine the ability of the bidder to perform his obligations under the contract, and the bidder shall furnish the Waterloo Water Works, all such information and data for this purpose as it may request. The right is reserved to reject any bid where an investigation of the available evidence or information does not satisfy the Waterloo Water Works, that the bidder is qualified to carry out properly the terms of the contract.

9. **AWARD OF CONTRACT**

- a. Owner reserves the right to reject any and all Bids, to waive any and all informalities and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming, nonresponsive or conditional Bids. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- b. In evaluating Bids, Owner shall consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and alternates and unit prices if requested in the Bid forms. It is Owner's intent to accept alternates (if any are accepted) in the order in which they are listed in the Bid form but owner may accept them in any order or combination.
- c. Owner may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identity of Subcontractors and other persons and organizations must be submitted. Operating costs, maintenance considerations, performance data, and guarantees of materials and equipment may be also be considered by Owner.
- d. Owner may conduct such investigations as they deem necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of the Bidders, proposed Subcontractors and other persons and organizations to do the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.
- e. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.
- f. If the contract is to be awarded, it will be awarded to the lowest Bidder who evaluation by Owner indicates to Owner that the award will be in the best interest of the Project.

10. **EXECUTION OF AGREEMENT, BOND AND CERTIFICATE OF INSURANCE**

- a. Subsequent to the award and within ten (10) days after the prescribed forms are presented for signature, the successful bidder shall execute and deliver to the Waterloo Water Works, an agreement in the form included in the contract documents in such number of copies as the Waterloo Water Works may require.

Having satisfied all conditions of award as set forth elsewhere in these documents, the successful bidder shall, within the period specified in paragraph "a" above, furnish a surety bond in a penal sum not less than the amount of the contract as awarded, as security for the faithful

performance of the contract and terms and conditions therein contained and shall guarantee the prompt payment of all persons, firms, or corporations to whom the contractor may become legally indebted for labor, materials, tools, equipment, or services of any nature including utility and transportation services, employed or used by him in performing the work. The bond shall protect and save harmless the Waterloo Water Works from claims and damages of any kind caused by the operations of the contractor and shall also guarantee the maintenance of the contract improvements for the period stated in the Notice of Hearing from and after completion of said improvements and their acceptance by the Waterloo Water Works. Such bond shall be in the same form as that included in the contract documents and shall bear the same date as, or a date subsequent to that of the agreement. The current Power of Attorney for the person who signs for any surety company shall be attached to such bond.

- b. The successful bidder shall, within the period specified in paragraph "a" above, furnish a certificate of insurance for approval in an amount equal to at least \$1,000,000 property damages and \$1,000,000 bodily injury, and shall indemnify and save harmless the Waterloo Water Works from claims and damages of any kind caused by the operation of the Contractor and shall also guarantee the maintenance of the improvements in good repair for a period of two (2) years from and after the completion and acceptance by the Board of Trustees. The certificate of insurance shall be furnished in such number of copies as the Waterloo Water Works may require. The Waterloo Water Works and Board of Trustees shall be named as an "Additional Insured." The contractor shall similarly submit his subcontractor's certificates of insurance in the amounts for approval before each commences work. The contractor shall carry or require that there be Workmen's Compensation Insurance for all his employees and those of his subcontractor engaged in work at the site, in accordance with State Workmen's Compensation Laws.
- c. The failure of the successful bidder to execute such agreement and to supply the required bond or bonds within ten (10) days after the prescribed forms are presented for signature, or within such extended period as the Waterloo Water Works may grant, based upon reasons determined sufficient by the Waterloo Water Works may either award the contract to the next lowest bidder or re-advertise for bids, and may charge against the bidder the difference between the amount of the bid and amount for which a contract for the work is subsequently executed, irrespective of whether the amount thus due exceeds the amount of the bid guaranty. If a more favorable bid is received by re-advertising, the defaulting bidder shall have no claim against the Waterloo Water Works for a refund.

FORM OF BID OR PROPOSAL

2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP WATERLOO WATER WORKS, WATERLOO, IA

General Manager and Board of Trustees
Waterloo Water Works
Waterloo, Iowa

1. The undersigned, being a Corporation existing under the laws of the State of _____, a Partnership consisting of the following partners: _____, having familiarized (himself) (themselves) (itself) with the existing conditions on the project area affecting the cost of the work, and with all the contract documents listed in the Table of Contents and Addenda (if any), as prepared by Wayne Claassen Engineering and Surveying, Inc. are now on file in the office of the General Manager of the Waterloo Water Works, Waterloo, Iowa, hereby proposes to furnish all supervision, technical personnel, labor, materials, machinery, tools, appurtenances, equipment, and services, including utility and transportation services required to construct and complete this 2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP project, all in accordance with the above-listed documents and for the unit prices for work in place for the following items and quantities:

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL PRICE
001.	Mobilization, Clearing and Grubbing	L.S.	L.S.	_____	_____
002.	Seed, Fertilize, and Mulch by Hydroseeding (IDOT Stabilizing Mix)	AC.	1.8	_____	_____
003.	9" Dia., Straw Filled Wattles	L.F.	400	_____	_____
004.	Traffic Control	L.S.	L.S.	_____	_____
005.	Maintenance Bond, 2-Year	L.S.	L.S.	_____	_____
006.	Clearing and Grubbing	L.S.	L.S.	_____	_____

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL PRICE
401.	Water Main, C900/RJ Restrained Joint DR18 PVC, 8-Inch Dia.	L.F.	1432	_____	_____
402.	Water Main, Casing, C900/RJ Restrained Joint DR18 PVC, 12-Inch Dia.	L.F.	680	_____	_____
403.	Water Main, Sager Ave. HDD, C900/RJ Restrained Joint DR18 PVC, 8-Inch Dia.	L.S.	1	_____	_____
404.	Casing End Seals	EA.	6	_____	_____
405.	Connection of New 8" Dia. Water Main To Existing 6" Dia. Water Main	EA	1	_____	_____
406.	Connection of New 8" Dia. Water Main To Existing 8" Dia. Water Main	EA	1	_____	_____
407.	Tee 8" Dia. X 6" Dia., D.I.P. Complete With Thrust Restraint	EA	5	_____	_____
408.	Tee 8" Dia. X 8" Dia., D.I.P. Complete With Thrust Restraint	EA	3	_____	_____
409.	Bend, 90°, 8" Dia., Ductile Iron, Complete With Thrust Restraint	EA	2	_____	_____
410.	Bend, 45°, 8" Dia., Ductile Iron, Complete With Thrust Restraint	EA	5	_____	_____
411.	Bend, 22.5°, 8" Dia., Ductile Iron, Complete With Thrust Restraint	EA	2	_____	_____
412.	Endcap, 8" Dia., Ductile Iron, Complete With Thrust Restraint	EA	1	_____	_____
413.	Endcap, 6" Dia., Ductile Iron, Complete With Thrust Restraint	EA	4	_____	_____

414.	Reducer, 8" Dia. x 6" Dia., Ductile Iron, Complete With Thrust Restraint	EA	2	_____	_____
415.	New Fire Hydrant Assembly, M.J., 6.5' Bury, Complete	EA	2	_____	_____
416.	Remove and Salvage Existing Fire Hydrant Assembly, Complete	EA	2	_____	_____
417.	Install Temporary Hydrant, Complete	EA	2	_____	_____
418.	Gate Valve, AVT EZ Insertion, 8" Dia., M.J., with Valve Box and Mechanical Thrust Restraint	EA	1	_____	_____
419.	Gate Valve, 8" Dia., M.J., with Valve Box And Mechanical Thrust Restraint	EA	13	_____	_____
420.	Gate Valve, 6" Dia., M.J., with Valve Box And Mechanical Thrust Restraint	EA	5	_____	_____
421.	Water Service Connection to New Main, 1" Dia., Complete	EA	8	_____	_____
422.	Water Service Connection to Existing ¾" Dia. Water Service Line, Complete	EA	7	_____	_____
423.	Water Service, ¾" Dia. By Open-Cut Excavation	L.F.	224	_____	_____
424.	Water Service, 1" Dia. By Directional Drilling	L.F.	477	_____	_____
425.	Fill Existing 8" Dia. Water Main With Cellular Concrete	L.F.	927	_____	_____
426.	Fill Existing 6" Dia. Water Main With Cellular Concrete	L.F.	1,095	_____	_____
501.	Remove/Replace Existing Composite Street Paving	S.Y.	70	_____	_____
502.	Remove/Replace Existing Portland Cement Concrete Street Pavement	S.Y.	140	_____	_____

503.	Remove/Replace Existing Portland Cement Concrete Sidewalk	S.Y.	22	_____	_____
504.	Remove/Replace Existing Portland Cement Concrete Driveway	S.Y.	40	_____	_____
505.	Class A Roadstone for Driveways	TON	10	_____	_____
601.	Remove/Salvage Existing Vinyl Fencing	L.F.	110	_____	_____
602.	Remove/Salvage Existing Wood Fencing	L.F.	10	_____	_____

TOTAL BID _____

2. It is understood that the quantities set forth are approximate only and subject to variation and that the unit bid price for the work done shall govern in the actual payment to Contractor.
3. In submitting this bid, the bidder understands that the right is reserved by the Waterloo Water Works to reject any or all bids. If written notice of the acceptance of this bid is mailed, telegraphed, or delivered to the undersigned within thirty (30) days after the opening thereof, or at any time thereafter before this bid is withdrawn, the undersigned agrees to execute and deliver an agreement in the prescribed form and furnish the required bond and certificate of the insurance within ten (10) days after the agreement is presented to him for signature, and start work within ten (10) days after "Notice to Proceed" is issued.
4. Security in the sum of _____ Dollars (\$ _____) in the form of _____, is submitted herewith in accordance with the INSTRUCTIONS TO BIDDERS.
5. The bidder is prepared to submit a financial and experience statement upon request.
6. The bidder has received the following Addendum or Addenda:

Addendum No. _____	Date _____
_____	_____
_____	_____
7. The bidder has filled in all blanks on this proposal.
8. The bidder has attached all applicable forms.

9. The Owner reserves the right to select alternates, delete line items, and/or to reduce quantities prior to the award of a contract due to budgetary limitations.

(Name of Bidder)

(Date)

BY: _____ Title _____

Official Address: (Including Zip Code):

I.R.S. No. _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____

as Principal, and _____ as Surety are held and

firmly bound unto the Board of Trustees of the Waterloo Water Works, Waterloo, Iowa, hereinafter called

OWNER." In the penal sum

_____ Dollars (\$_____)

lawful money of the United States, for the payment of which sum will and truly be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents. The condition of this obligation is such that whereas the Principal has submitted the accompanying bid dated the _____ day of

_____, 2022, for 2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP.

NOW, THEREFORE,

(a) If said Bid shall be rejected, or in the alternate,

(b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the form specified and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid,

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

By virtue of statutory authority, the full amount of this bid bond shall be forfeited to the Owner in liquidation of damages sustained in the event that the Principal fails to execute the contract and provide the bond as provided in the specifications or by law.

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

IN WITNESS WHEREOF, the Principal and the Surety, have hereunto set their hands and seals, and such of them as are corporations, have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers this _____ day of _____, A.D. 2023.

Principal (Seal)

By _____
(Title)

Witness

Surety (Seal)

Witness

By _____
Attorney-in-fact

STATEMENT OF BIDDER'S QUALIFICATIONS

(To be submitted by the Bidder only upon the specific request of the Waterloo Water Works.)

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

1. Name of bidder.
2. Permanent main office address.
3. When organized.
4. If a corporation, when incorporated.
5. How many years have you been engaged in the contracting business under your present firm or trade name?
6. Contracts on hand: (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion.)
7. General character of work performed by your company.
8. Have you ever failed to complete any work awarded to you? If so, where and why?
9. Have you ever defaulted on a contract? If so, where and why?
10. List the more important projects recently completed by your company, stating the approximate cost for each, and the month and year completed.
11. List your major equipment available for this contract.
12. Experience in construction work similar in importance to this project.
13. Background and experience of the principal members of your organization, including the officers.
14. Credit available: \$ _____.
15. Give bank reference: _____.

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

17. The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Waterloo Water Works in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated at _____, this _____ day of _____, 2023.

(Name of Bidder)

By: _____

Title: _____

State of _____)
County of _____) ss:

_____, being duly sworn deposes and says that he is

_____ of _____
(Name of Organization)

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

Subscribed and sworn to before me this ____ day of _____, 2023.

Notary Public

My commission expires _____, _____.

TECHNICAL SPECIFICATIONS

Section 02670 Installation of Water Main by Horizontal Directional Drilling (HDD)

Division 3 - Trench, Backfill, and Trenchless

Section 3010 - Trench and Backfill

Section 3020 – Trenchless Construction

Division 5 - Water Mains and Appurtenances

Section 5010 - Pipe and Fittings

Section 5020 - Valves, Hydrants, and Appurtenances

Section 5030 - Testing and Disinfection

Division 9 - Site Work and Landscaping

Section 9010 - Seeding

Section 9040 – Erosion and Sediment Control

Note: If there are conflicts between the Technical Specifications, General Special Provisions, Special Provisions, General Specifications, Supplemental General Specifications and Construction Plan Bid Reference Notes, the more stringent requirement, as determined by the Engineer, shall be required.

SECTION 02670

INSTALLATION OF WATER MAIN BY HORIZONTAL DIRECTIONAL DRILLING (HDD)

PART ONE – GENERAL

1.1 DESCRIPTION

- A. Work included: Furnish all labor, materials, tools and equipment necessary for installation of Polyvinyl Chloride Restrained Joint (PVC/RJIB) water main pipe using current horizontal directional drilling technology in accordance with the Drawings and as specified herein.
- B. General: This specification defines the approved method and material for the installation of water main utilizing horizontal directional drilling technology.
- C. Definition: Horizontal directional drilling (HDD) involves utilization of an electronically tracked bore-head to guide the borehole to a pre-designed configuration. The HDD process begins with boring a small, horizontal pilot hole with a continuous string of steel drill rod. When the bore-head and rod emerge on the opposite end of the crossing, a back reamer is attached to the drill rod string and pulled back through the pilot hole. The reamer serves to enlarge the pilot hole to allow the pipe to be pulled through from the opposite end of the borehole. It is a requirement of this Project to utilize a back reamer of adequate diameter prior to pulling the new pipe to be pulled through the hole with minimized pulling force. The size of the drilling equipment and required support equipment shall be determined by the CONTRACTOR based on the diameter and length of pipe to be installed.

1.2 QUALITY ASSURANCE

- A. Qualification of manufactures: Products used in this Work shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of quality production acceptable to the OWNER.
- B. Contractor Certification: CONTRACTOR shall be certified by the particular horizontal directional drilling manufacturer that CONTRACTOR is a fully trained user of the drilling equipment.
- C. Qualifications of Personnel: Polyvinyl Chloride Restrained Joint (PVC/RJIB) pipe jointing shall be performed by personnel trained in the use of Polyvinyl Chloride Restrained Joint (PVC/RJIB) pipe and the recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the

Polyvinyl Chloride Restrained Joint (PVC/RJIB) pipe. Training shall be performed by a qualified representative.

1.3 SUBMITTALS

- A. General: All submittals shall be made in accordance with these Specifications. CONTRACTOR shall furnish engineering data covering design and installation. Submittal shall be made in a timely manner so that the project schedule can be met.
- B. Shop drawings: As a minimum, the following data and shop drawing information shall be submitted to the ENGINEER for review and approval:
1. Before beginning work, CONTRACTOR shall submit to the ENGINEER for approval, the Vendor's shop drawings, catalog data and specific manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings, which are damaged.
 2. A certificate of "Compliance with Specification" shall be furnished for all materials supplied.
 3. CONTRACTOR shall submit certification of workmen training for all personnel involved in installation of pipe.
 4. CONTRACTOR shall submit a work plan to the ENGINEER for acceptance. Work plan shall address preparation steps required for pre-installation.
 5. CONTRACTOR shall submit information to the ENGINEER for approval of the procedure and the steps to be followed for installation of the HDPE pipe utilizing horizontal directional drilling technology, even if the process is named in the specification. Any proposed changes in installation procedures shall require submittal of revised procedures for acceptance by the ENGINEER.
 6. CONTRACTOR shall submit to the ENGINEER for approval, full details about component materials and their properties, except those protected by trade secrets which may harm their claim to the product.

1.4 RESPONSIBILITY FOR MATERIALS

- A. Material furnished by CONTRACTOR: CONTRACTOR shall be responsible for furnishing all materials and shall replace at his own expense all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include furnishing of all materials and labor required for

the replacement of installed material discovered defective prior to the final acceptance of the work.

1.5 PRODUCT HANDLING

A. Handling of materials:

1. All materials furnished by the CONTRACTOR shall be delivered and distributed by the CONTRACTOR.
2. Pipe, fittings, etc., shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.
3. Pipe shall be so handled that no damage shall occur. If any part of the pipe is damaged, CONTRACTOR shall replace damaged material at his expense in a manner satisfactory to ENGINEER.

B. Storage of Materials: CONTRACTOR shall be responsible for safe storage of material furnished by or to him, and accepted by him, and intended for the Work, until it has been incorporated in completed Project. Interiors of all pipe, fittings and other accessories shall be kept free from dirt and foreign matter at all times.

1.6 WARRANTY

- ### A.
- All equipment and materials supplied under this Section shall be warranted to be free from defects in materials and workmanship for a minimum of two (2) years following acceptance by the OWNER.

PART TWO – PRODUCTS

2.1 MATERIALS

- ### A.
- Polyvinyl Chloride Restrained Joint (PVC/RJIB) pipe shall meet the requirements of AWWA C-900 and NSF 14 and as noted in the Construction Plans and with the maximum DR noted in the Construction Plans. Pipe shall be suitable for potable water.
- ### B.
- All pipe shall be made by the same manufacturer and shall be made of virgin material. No rework except that obtained from manufacturer's own production of the same formulation shall be used.
- ### C.
- The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

- D. Dimension Ratios: The minimum wall thickness of the PVC/RJIB pipe shall be determined by the CONTRACTOR but the DR shall not be greater than DR18 when measured in accordance with ASTM D-2122. The CONTRACTOR shall determine the minimum pipe thickness (maximum DR) with the following design criteria and shall submit his calculations to the Engineer for review.

1. THICKNESS DESIGN

- a. The following design criteria shall be used in calculating pipe thickness for PVC/RJIB:

- | | |
|---|--|
| 1) Working Pressure | 100 PSI |
| 2) Test Pressure | 150 PSI |
| 3) Surge Pressure | 200 PSI |
| 4) Dead Load | Earth cover as shown on Drawings, but not less than 15 feet |
| 5) Buckling Design | Considering dead load, internal vacuum, H-20 Wheel Loading and a hydrostatic load over top of pipe to grade. |
| 6) Max. Allowable Deflection | 3% |
| 7) Horizontal Deflection
Radius Curvature | 90% of Actual Design Radius |
| 8) Downhole Friction Factor | 1.0 |
| 9) Factor of Safety for
Drilling Fluid Density | 1.5 |

- b. The stresses in the pipe shall be calculated for the pre-installation, installation, and post installation loading conditions. Thickness shall be selected so that stresses do not exceed the following under any of the loading conditions.

- | | |
|---|----------------------------|
| 1) All conditions except
internal surge pressure | 50% of minimum yield point |
| 2) Internal surge pressure | |

condition

75% of minimum yield point

- c. The CONTRACTOR shall increase the minimum "in-service" thickness as necessary to support the expected stresses and loadings which are expected to be encountered during the installation of the HDD pipeline. The final selected thickness shall be supported by calculations as required herein. No additional cost shall be considered by the ENGINEER for pipe thickness greater than the specified minimum "in-service" thickness.
2. Installation Method: PVC/RJIB pipe shall be joined at the drilling machine prior to pull back.
3. Pipe Locator Wire: To facilitate future locating of water pipe two (2) #12 AWG EHS reinforced copper tracer wires by Copperhead or approved equal shall be installed with the pipe and in contact with all fittings and valves as per Plan details. Said tracer wire shall be installed without splices through all HDDs.

2.2 EQUIPMENT

A. Directional Drilling Machine:

1. Directional drilling equipment shall be self-powered and self-contained. Equipment shall be designed and manufactured with an electronically tracked bore-head so as to guide the borehole to a desired configuration, both horizontally and vertically.
2. Directional drilling equipment shall generate sufficient torque and thrust/pullback force to drill a pilot hole, enlarge the pilot hole by back reaming and pull the pipeline back through the enlarged hole.
3. CONTRACTOR shall comply with manufacturers specifications as to the machine size requirement for a given diameter and length of pipe, as well as parameters of the required size machine for percentage of upsize allowed.

B. Vacuum Excavation Unit:

1. Directional drilling operations shall be assisted by use of an adequately sized vacuum excavation system mounted on either a trailer or truck body.
2. Vacuum excavation system shall provide sufficient storage tank capacity and power pack to efficiently remove drilling fluid from the insertion pit during horizontal directional drilling operations.

3. Vacuum excavation system shall be equipped with a high-pressure water system designed to assist with "pothole" excavation operations.

C. Drilling Fluid Management System:

1. Directional drilling operations shall be assisted by use of a truck mounted drilling fluid mixing system.
2. Fluid management system shall include mixing tanks to allow for flexibility in mixing, transferring and delivering drilling fluid.
3. Fluid management system shall have the capability to transfer between tanks while providing drilling fluid to the directional drilling machine.

2.3 SHIPPING & HANDLING

- A. PVC/RJIB pipe materials shall be protected from kinking and gouging during shipping, handling, and storage.

2.4 MATERIAL TESTING

- A. Tests for compliance with this specification shall be made as specific herein and in accordance with the applicable ASTM Specification. A certificate with this specification shall be furnished, upon request, by the manufacturer for all material furnished under this specification. Pipe may be rejected if not meeting any requirements of this specification.

PART THREE – EXECUTION

3.1 HORIZONTAL DIRECTIONAL DRILLING OPERATION AND PIPE INSTALLATION

A. Access to the project site:

1. Access to the site of the project under construction shall be by existing road rights-of-way and adjoining public property. Access through private property will not be permitted without the explicit written permission of the property owner.

B. Pre-Installation Preparations: CONTRACTOR's work plan shall address the following minimum preparations/steps, unless approved otherwise by the ENGINEER.

1. **SAFETY:** The CONTRACTOR shall carry out operations under this section in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space. It shall be the CONTRACTOR's responsibility to

INSTALLATION OF WATER MAIN BY HORIZONTAL DIRECTIONAL DRILLING (HDD)

comply with OSHA Standards and Regulations pertaining to all aspects of the work.

C. Installation Procedures – General: All approved installation instructions and procedures submitted shall be carefully followed during installation. ENGINEER shall provide all grade profiles and field stakeout required for pipe centerline grade and offsets. Any proposed changes in installation procedures shall require submittal of revised procedures and acceptance by the ENGINEER.

1. Equipment used to perform the work shall be located as far away from buildings as possible. Provide enclosed, insulated power packs for all mechanical equipment to reduce machine noise, as required to meet local requirements.
2. CONTRACTOR shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect the pipe from damage during installation. Lubrication shall be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit.

D. Pipe Joining of PVC/RJIB Pipe:

1. PVC/RJIB pipe shall be assembled and joined at the site to provide a leak proof joint. Threaded or solvent-cement joints and connections shall not be permitted. All equipment and procedures used shall be used in strict compliance with the pipe manufacturer's recommendations.
2. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the ENGINEER and/or his representative shall be discarded and not used.

E. Connection of PVC/RJIB to Fittings: PVC/RJIB pipe shall be joined to ductile iron pipe and fittings in strict compliance with manufacturer's recommendations.

1. PVC/RJIB pipe shall be joined directly to ductile iron pipe and fittings by the use of Mega-lug joint restraints, or approved equal, in strict compliance with the manufacturer's recommendations. Stainless steel insert pipe stiffeners shall be used with all such connections.

3.2 HYDROSTATIC TESTS FOR LEAKAGE

A. General:

1. All new water mains shall be tested, after backfilling to a hydrostatic pressure of not less than 100 psi above design water pressure for the system or 150 psi, whichever is greater. Allowable leakage shall be calculated by the following formula and is shown in columnar form in Table 6:

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where:

L = allowable leakage in gallons per hour

S = length of pipe tested in feet

D = nominal diameter of pipe in inches

P = average test pressure during leakage test in psi

TABLE 6

Allowable Leakage per 1,000 ft. (305 m) of Pipeline*--gph

Average Test Pressure (Bars) PSI	NOMINAL PIPE DIAMETER - Inches							
	3"	4"	6"	8"	10"	12"	14"	16"
200 (14)	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70
175 (12)	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59
150 (10)	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47
125 (9)	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34
100 (7)	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

- B. No water line shall be placed in service until the leakage is less than the allowable leakage as indicated above. Testing of water mains shall only be done after installation of all valves, taps and service laterals are complete. All portions of the water system, including hydrants and service lines, shall be subject to hydrostatic pressure during the leakage test. Testing of water mains shall be observed and documented by the Inspector/Engineer.
- C. All high points and service lines in portion of system under test shall be vented and all air expelled from system prior to beginning test. All fittings and hydrants shall be properly braced or blocked before applying pressure. Where concrete thrust blocks are used, they shall have attained their final set prior to testing.
- D. After section of system under test has reached required pressure as stated above, said pressure shall be maintained for two (2) hours. At conclusion of pressure test, volume of makeup water required to refill pipeline shall be determined by

measurement with displacement meter or by pumping from a vessel of known volume.

- E. All joints or fittings at which leakage occurs shall be reworked to insure tightness. All visible leaks shall be repaired regardless of amount of leakage. If measured amount of leakage exceeds values for the appropriate size as found in AWWA Specification C600, Hydrostatic Testing (Table 6), pipeline shall be repaired and retested until leakage is within limit set by the referenced specification. Methods of repair prior to retesting will be done with ENGINEER'S approval and inspection. Repairs of new construction will be by adjustment or replacement of material only. The use of repair clamps or bell clamps will not be acceptable.

3.3 DISINFECTION OF WATER MAINS

- A. General: After testing and before final inspection of the completed systems, water mains and service laterals shall be flushed and disinfected in accordance with AWWA Specification C651 latest revision. Flushing shall be accomplished at a flow velocity of not less than 2.5 feet per second.

B. Disinfection Procedures:

1. Disinfection as described in AWWA C651 – "Placing of calcium hypochlorite tablets" shall be used. Five gram (5g) calcium hypochlorite tablets with 3.25 gram available chlorine per tablet shall be attached at the inside tip of the pipe by an adhesive such as Permatex No. 2 or equal. The following number of tablets for the given pipe size shall be used for an initial dose of twenty-five (25 mg/l (ppm) chlorine:

<u>Pipe Diameter</u>	<u>Number Tablets Per 18-20 Ft. Pipe Section</u>
6"	1
8"	2
10"	3
12"	4

Or the number of tablets equal to $0.0012d^2L$ rounded to the next higher integer, where d is the inside diameter, in inches, and L is the length of the pipe section, in feet. Use of the continuous feed or slug method of disinfecting may only be used to re-chlorinate a water pipe after the initial disinfection.

2. Disinfection solution shall remain in pipe for not less than twenty-four (24) hours, after which time a chlorine residual of 10 ppm at all parts of line shall be required.

3. At least two consecutive satisfactory bacteriological samples from the distribution system 24 hours apart and for each 1200 feet of water main must be obtained and approved before system can be placed in service. CONTRACTOR shall pay all costs associated with disinfection and testing of installed facilities and any additional bacteriological samples required after first set.

3.4 CARE AND RESTORATION OF PROPERTY

- A. All heavy equipment shall be operated with care to prevent damage to existing road surfacing.
- B. The CONTRACTOR shall not use or operate tractors, bulldozers, or other power-operated equipment the treads or wheels of which are so shaped as to cut or otherwise damage existing road surfaces.
- C. All surfaces which have been damaged by the CONTRACTOR'S operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration.
- D. Restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

3.5 PROTECTION OF EXISTING STRUCTURES, PRIVATE PROPERTY, AND RIGHTS-OF-WAY

- A. All existing pipes, poles, wires, fences, curbing, property-line markers, and other structures which, in the opinion of ENGINEER must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from injury by CONTRACTOR, and in case of injury, CONTRACTOR shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the owners do not wish to make the repairs themselves, all damage shall be repaired by CONTRACTOR, or, if not promptly done by him, ENGINEER may have the repairs made at expense of CONTRACTOR.
- B. The CONTRACTOR shall consult the ENGINEER or his representatives prior to removing or disturbing any tree, shrub, bush, fence, or improvement that may be encountered in the path of the water main. Immediately upon completion of water main, the CONTRACTOR shall replace the sod, lawns, bushes, shrubs, or whatever else may have been removed, disturbed or altered during the progress of the work.

3.6 PAYMENT

- A. The installed pipe shall be paid the lump sum price bid for each directional drill and shall include all materials, labor and equipment necessary to complete each HDD.

- B. All costs for testing the pipe after installation shall be considered incidental to the cost of the project.
- C. The CONTRACTOR shall not be paid or reimbursed for unsuccessful HDD attempts. Such unsuccessful attempts shall be abandoned in place and filled with an approved grout mixture in a manner that is pre-approved by the IOWA DEPARTMENT OF TRANSPORTATION and the ENGINEER.

TRENCH EXCAVATION AND BACKFILL**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Trench Excavation for Pipe Systems
- B. Trench Foundation Stabilization
- C. Pipe Bedding and Backfill

1.02 DESCRIPTION OF WORK

- A. Excavate trench for pipe installation.
- B. Stabilize trench and install pipe bedding materials.
- C. Place backfill material in trench.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Gradation reports for bedding materials.
- B. Results of required testing.
- C. Dewatering plan.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT

A. General: The following items are incidental to the underground utility being installed and will not be paid for separately:

1. Standard trench excavation.
2. Removal and disposal of unsuitable backfill material encountered during standard trench excavation.
3. Removal of abandoned private utilities encountered during trench excavation.
4. Furnishing and placing granular bedding material.
5. Placing and compacting backfill material.
6. Dewatering including, but not limited to, all equipment such as generators, pumps, rock for sump pits, discharge piping, and any extra excavation needed to facilitate dewatering according to stormwater regulations, as applicable.
7. Sheeting, shoring, and bracing.
8. Adjusting the moisture content of excavated backfill material to the range specified for placement and compaction.
9. Temporary support for existing water, sewer, gas, telephone, electric, and other utilities or services that cross the trench.

B. Rock Excavation:

1. **Measurement:** Measurement will be by cubic yards of rock removed.
2. **Payment:** Payment will be at the unit price per cubic yard for the quantity of rock removed.
3. **Includes:** Unit price includes, but is not limited to, furnishing the equipment and labor to break up, remove, and properly dispose of rock encountered in the trench.

C. Trench Foundation:

1. **Measurement:** Measurement will be in tons for the quantity of stabilization material required to replace material removed by over-excavation. Measurement will be based on the scale tickets for the material delivered and incorporated into the project. Trench foundation required to correct unauthorized over-excavation will not be measured.
2. **Payment:** Payment will be at the unit price per ton for the quantity of stabilization material furnished and placed.
3. **Includes:** Unit price includes, but is not limited to, removal and disposal of over-excavated material required to stabilize trench foundation; and furnishing, hauling, and placing stabilization material.

1.08 MEASUREMENT AND PAYMENT (Continued)**D. Replacement of Unsuitable Backfill Material:**

1. **Measurement:** Measurement will be in cubic yards for the quantity of backfill material required to replace unsuitable backfill material removed during standard trench excavation. Measurement will be based on compacted material in place.
2. **Payment:** Payment will be at the unit price per cubic yard for the quantity of backfill material furnished.
3. **Includes:** Unit price includes, but is not limited to, furnishing, hauling, and placing backfill material.

E. Special Pipe Embedment or Encasement:

1. **Measurement:** Measurement will be by the linear foot along the centerline of pipe for each type of special embedment or encasement.
2. **Payment:** Payment will be at the unit price per linear foot for each type of special pipe embedment or encasement.
3. **Includes:** Unit price includes, but is not limited to, furnishing and placing all required special pipe embedment or encasement materials.

F. Trench Compaction Testing: If the contract documents specify that the Contractor is responsible for trench compaction testing, measurement and payment will be as follows.

1. **Measurement:** Lump sum item; no measurement will be made.
2. **Payment:** Payment will be at the lump sum price for trench compaction testing.
3. **Includes:** Lump sum price includes, but is not limited to, all payments associated with retesting resulting from failure of initial tests.

PART 2 - PRODUCTS**2.01 MATERIALS EXCAVATED FROM A TRENCH**

- A. Standard Trench Excavation:** All materials encountered during trench excavation, except rock and over-excavation.
- 1. Suitable Backfill Material:** Class II, Class III, Class IVA, or Class IVB as defined in Section 3010, 2.02.
 - 2. Unsuitable Backfill Material:** Includes, but is not limited to, the following materials:
 - a. Soils not classified as suitable backfill material, as defined in Section 3010, 2.02.
 - b. Individual stones or concrete chunks larger than 6 inches and averaging more than one per each cubic foot of soil.
 - c. Frozen materials.
 - d. Stumps, logs, branches, and brush.
 - e. Trash, metal, or construction waste.
 - f. Soil in clumps or clods larger than 6 inches, and without sufficient fine materials to fill voids during placement.
 - g. Environmentally contaminated soils.
 - h. Materials removed as rock excavation or over-excavation.
 - 3. Topsoil:** Class V material. Comply with Section 3010, 2.03.
- B. Rock Excavation:** Boulders or sedimentary deposits that cannot be removed in trenches without continuous use of pneumatic tools or blasting.
- C. Over-excavation:** Excavation of unsuitable or unstable material in trenches below the pipe zone, comply with Figure 3010.101.

2.02 BEDDING MATERIAL**A. Class I Material:**

1. Crushed stone complying with the following gradation:

Sieve	Percent Passing
1 1/2"	100
1"	95 to 100
1/2"	25 to 60
No. 4	0 to 10
No. 8	0 to 5

2. The Engineer may allow the use of gravel or authorize a change in gradation subject to materials available locally at the time of construction.
3. The Engineer may authorize the use of crushed PCC for pipe sizes up to 12 inches.
4. Use aggregates having a percentage of wear, Grading A or B, not exceeding 50%, determined according to AASHTO T 96.

2.03 BACKFILL MATERIAL

- A. Class II Material:** Manufactured and non-manufactured open-graded (clean) or dense-graded (clean) processed aggregate, clean sand, or coarse-grained natural soils (clean) with little or no fines. Class II materials are further described in Table 3010.01.

Table 3010.01: Class II Materials

Type	Soil Group Symbol ASTM D 2487	Description	Percentage Passing Sieve Sizes		
			1 1/2 in.	No. 4	No. 200
Coarse-Grained Soils, clean	GW	Well-graded gravels and gravel-sand mixtures; little or no fines.	100%	< 50% of "Coarse Fraction"	< 5%
	GP	Poorly-graded gravels and gravel-sand mixtures; little or no fines.			
	SW	Well-graded sands and gravelly sands; little or no fines.		> 50% of "Coarse Fraction"	
	SP	Poorly-graded sands and gravelly sands; little or no fines.			
Coarse-Grained Soils, borderline clean to with fines	e.g. GW-GC, SP-SM	Sands and gravels that are borderline between clean and with fines.	100%	Varies	5% to 12%

B. Class III Material:

1. Natural coarse-grained soils with fines. Class III materials are further described in Table 3010.02.
2. Do not use where water condition in trench may cause instability.

Table 3010.02: Class III Material

Table	Soil Group Symbol ASTM D 2487	Description
Coarse-Grained Soils, with fines	GM	Silty gravels, gravel-sand-silt mixtures.
	GC	Clayey gravels, gravel-sand-clay mixtures.
	SM	Silty sands, sand-silt mixtures.
	SC	Clayey sands, sand-clay mixtures.

C. Class IVA Material:

1. Natural fine-grained inorganic soils. Class IVA materials are further described in Table 3010.03.
2. The Engineer will determine if material is not suitable for use as backfill material under deep fills, surface applied wheel loads, heavy vibratory compactors, tampers, or other conditions.
3. Do not use where water conditions in trench may cause instability.
4. Material is suitable for use in dry trench conditions only.

2.03 BACKFILL MATERIAL (Continued)**Table 3010.03: Class IVA Material**

Type	Soil Group Symbol ASTM D 2487	Description
Fine-Grained Soils (inorganic)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity.
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clay, lean clay.

D. Class IVB Material:

1. Natural fine-grained inorganic (high elastic silts and plastic clays - fat clay) with a liquid limit greater than 50%. Class IVA materials are further described in Table 3010.04.
2. When approved by the Engineer, material may be used as final trench backfill in a dry trench.
3. Do not use in the pipe embedment zone.

Table 3010.04: Class IVB Material

Type	Soil Group Symbol ASTM D 2487	Description
Fine-Grained Soils (inorganic)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
	CH	Inorganic clays of high plasticity, fat clays.

2.04 TOPSOIL**A. Class V Material:**

1. Organic soils. Class V materials are further described in Table 3010.05.
2. Use only as topsoil outside of the pavement, unless otherwise specified or allowed by the Engineer.
3. Do not use in the pipe embedment zone.

Table 3010.05: Class V Material

Type	Soil Group Symbol ASTM D 2487	Description
Organic Soils (unsuitable for backfill)	OL	Organic silts and organic silty clays of low plasticity.
	OH	Organic clays of medium to high plasticity, organic silts.
Highly Organic (unsuitable for backfill)	PT	Peat and other high organic soils.

2.05 STABILIZATION (FOUNDATION) MATERIALS

- A. Clean 2 1/2 inch crushed stone with the following gradation:

Table 3010.06: Stabilization Materials

Sieve	Percent Passing
2 1/2"	100
2"	90 to 100
1 1/2"	35 to 70
1"	0 to 20
1/2"	0 to 5

- B. If specified, meet Iowa DOT Section 4128 for Gradation No. 13a screened over a 1 inch screen or the Engineer may authorize a change in gradation depending on materials available locally at time of construction.
- C. Crushed concrete may be used, if approved by the Engineer, if it is within $\pm 5\%$ of the gradation for each size of material.

2.06 SPECIAL PIPE EMBEDMENT AND ENCASEMENT MATERIAL

- A. **Concrete Cradle, Arch, or Encasement:** Use Iowa DOT Class C concrete.

- B. **Flowable Mortar:** Comply with Iowa DOT Article 2506.02.

C. **CLSM:**

1. Approximate quantities per cubic yard:
 - a. Cement: 50 pounds
 - b. Fly ash: 250 pounds
 - c. Fine aggregate: 2,910 pounds
 - d. Water: 60 gallons
2. A compressive strength of at least 50 psi compressive strength at 28 calendar days can be expected.
3. Comply with material requirements of Iowa DOT Article 2506.02.

D. **Foamed Cellular Concrete:**

1. If specified or approved by the Engineer, foamed cellular concrete may be substituted for flowable mortar.
2. Comply with Iowa DOT Article 2506.02.
3. Submit mix design to the Engineer. Include base cement slurry mix per cubic yard, expansion factor from the foaming agent, and wet density.

PART 3 - EXECUTION**3.01 TRENCH EXCAVATION**

- A. Notify the Engineer prior to the start of excavation activities.
- B. Remove topsoil to a minimum depth of 12 inches and stockpile.
- C. Excavate trench to required elevations and dimensions. Comply with Figure 3010.101.
 - 1. Protect existing facilities, trees, and shrubs during trench excavation.
 - 2. Place excavated material away from trench.
 - 3. Grade spoil piles to drain. Do not allow spoil piles to obstruct drainage.
- D. Unsuitable Backfill Material:
 - 1. If unsuitable backfill material is encountered, notify the Engineer.
 - 2. Remove rock, rubbish, boulders, debris, and other unsuitable backfill materials at least 6 inches below and on each side of the pipe.
 - 3. Keep unsuitable backfill material separated from suitable backfill material and topsoil.
 - 4. Restore trench to design dimensions using bedding or stabilization material.

3.02 ROCK OR UNSTABLE SOILS IN TRENCH BOTTOM

- A. Notify the Engineer prior to over-excavation.
- B. The Engineer will determine the need for over-excavation and trench foundation stabilization prior to installation of pipes and structures.
- C. Comply with Figure 3010.101 for over-excavation of rock and wet or soft foundations.

3.03 TRENCH PROTECTION

- A. Install adequate trench protection (sheeting, shoring, and bracing) to prevent ground movement or damage to adjacent structures, pipelines, and utilities.
- B. Move trench boxes carefully to avoid disturbing pipe, bedding, or trench wall.

3.04 DEWATERING

- A. Maintain water levels below the bottom of trench excavation.
- B. Perform the dewatering operation according to the dewatering plan approved by the Engineer. The dewatering plan may be modified to meet actual field conditions, with approval of the Engineer.
- C. Ensure operation of the dewatering system does not damage adjoining structures and facilities. Cease dewatering operations and notify the Engineer if damage is observed.
- D. Discharged Water:
 - 1. Do not discharge water into sanitary sewers.
 - 2. Discharging water into storm sewers requires Engineer's approval.

3.04 DEWATERING (Continued)

3. Obtain permission of adjacent property owner prior to discharging water onto their property.
4. Maintain and control water discharge as necessary to prevent a safety hazard for vehicular and pedestrian traffic.
5. Direct water discharge away from electrical facilities or equipment.
6. Use dewatering equipment that will minimize disturbance from noise and fumes.
7. Protect discharge points from erosion. Provide sediment control for sediment contaminated water discharged directly from trench.

3.05 PIPE BEDDING AND BACKFILL

A. General: Comply with Figures 3010.101, 3010.102, 3010.103, 3010.104, and 3010.105, as appropriate.

1. Bedding and backfill used for pipe installation will depend on:
 - a. Type of installation (water main, sanitary sewer gravity main, sanitary sewer force main, or storm sewer).
 - b. Pipe material.
 - c. Depth of bury.
 - d. Pipe diameter.
2. After pipe installation, place remaining bedding material and immediately place backfill in trench.
3. Adjust the moisture content of excessively wet, but otherwise suitable, backfill material by spreading, turning, aerating, and otherwise working material as necessary to achieve required moisture range.
4. Adjust the moisture content of excessively dry, but otherwise suitable, backfill material by adding water, then turning, mixing, and otherwise blending the water uniformly throughout the material until the required moisture range is achieved.
5. Hydraulic compaction (flooding with water) is not allowed unless authorized by the Engineer.
6. Special Pipe Embedment and Encasement Materials:
 - a. If specified, use concrete, flowable mortar, CLSM, or foamed cellular concrete as a substitute for pipe bedding, haunch support, or primary and secondary backfill.
 - b. Secure pipe against displacement or flotation prior to placing special pipe embedment and encasement material.
 - c. Place Class IV clay material for a waterstop and compacted to 90% of Standard Proctor Density. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content. If trench stabilization material is used, extend waterstop through stabilization material to the bottom of the trench.

B. Pipe Bedding:

- 1. Granular Material:**
 - a. Class I granular bedding material is required for all gravity mains. Use when specified for pressure pipes.
 - b. Comply with Figures 3010.101, 3010.102, 3010.103, 3010.104, and 3010.105.

3.05 PIPE BEDDING AND BACKFILL (Continued)

- c. Place bedding material in the bottom of the trench in lifts no greater than 6 inches thick. Consolidate and moderately compact bedding material.
- d. Shape bedding material to evenly support pipe at the proper line and grade, with full contact under the bottom of the pipe. Excavate for pipe bells.
- e. Install pipe and system components.
- f. Place, consolidate, and moderately compact additional bedding material adjacent to the pipe to a depth equal to $1/6$ the outside diameter of the pipe.

2. Suitable Backfill Material:

- a. Only use with pressure pipe. Comply with Figure 3010.104.
- b. Use suitable backfill material to shape trench bottom to evenly support pipe at the proper line and grade, with full contact under the bottom of the pipe. Excavate for pipe bells.

C. Haunch Support: Place from the top of the pipe bedding to the springline of the pipe.**1. Granular Material:**

- a. Place Class I material in lifts no greater than 6 inches thick.
- b. Consolidate and moderately compact by slicing with a shovel or using other approved techniques.

2. Suitable Backfill Material:

- a. Place in lifts no greater than 6 inches thick.
- b. For Class II backfill material, consolidate and moderately compact by slicing with a shovel or using other approved techniques.
- c. For Class III and Class IVA backfill materials, compact to at least 90% of Standard Proctor Density. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content.

D. Primary and Secondary Backfill:**1. General:**

- a. For primary backfill, place from the springline of the pipe to the top of the pipe.
- b. For secondary backfill, place from the top of the pipe to 1 foot above the top of the pipe.

2. Granular Material:

- a. Place in lifts no greater than 6 inches thick.
- b. Compact to at least 65% relative density.

3. Suitable Backfill Material:

- a. Place in lifts no greater than 6 inches thick.
- b. For Class II backfill material, compact to at least 65% relative density.
- c. For Class III and Class IVA backfill materials, compact to at least 95% of Standard Proctor Density. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content.

E. Final Trench Backfill:

- 1. Place suitable backfill material from 1 foot above the top of the pipe to the top of the trench.
 - a. Use no more than 8 inch thick lifts for backfill areas more than 3 feet below the bottom of pavement.
 - b. Use no more than 6 inch thick lifts for backfill areas less than or equal to 3 feet below the bottom of pavement.

3.05 PIPE BEDDING AND BACKFILL (Continued)

2. Place backfill material after recording locations of connections and appurtenances or at the Engineer's direction.
3. Class I and Class II Backfill Material:
 - a. Compact to at least 65% relative density within right-of-way.
 - b. Compact to at least 50% relative density outside right-of-way.
4. Class III and Class IVA Backfill Material:
 - a. Compact to at least 95% of Standard Proctor Density within right-of-way.
 - b. Compact to at least 90% of Standard Proctor Density outside right-of-way.
 - c. Obtain required compaction within a soil moisture range of optimum moisture to 4% above optimum moisture content.
5. In areas to remain unpaved, terminate backfill material 8 inches below finished grade. Use topsoil for the final 8 inches above trench backfill material.
6. Terminate backfill material at subgrade elevation in areas to be paved.

3.06 TRENCH COMPACTION TESTING

- A. General:** When trench compaction testing is specified in the contract documents as the Contractor's responsibility, provide testing of trench backfill material using the services of an independent testing laboratory approved by the Engineer.
- B. Soil Testing:**
1. **Cohesive Soils:**
 - a. Determine moisture-density relationships by ASTM D 698 (Standard Proctor). Perform at least one test for each type of cohesive soil used.
 - b. Determine in-place density and moisture content. Use ASTM D 1556 (sand-cone method) and ASTM D 2216 (laboratory moisture content), or use ASTM D 6938 (nuclear methods for density and moisture content).
 2. **Cohesionless Soils:**
 - a. Determine maximum and minimum index density and calculate relative density using ASTM D 4253 and ASTM D 4254.
 - b. For Class I granular bedding material, determine gradation according to ASTM C 136.
- C. Field Testing:**
1. **Testing Frequency and Locations:** Perform testing of the final trench backfill, beginning at a depth of 2 feet above the top of the pipe, as follows:
 - a. Coordinate the timing of testing with the Engineer.
 - b. The Engineer will determine the location of testing.
 - c. For each 2 vertical feet of consolidated fill, provide tests at a maximum horizontal spacing of 200 feet and at all street crossings.
 - d. Additional testing may be required by the Engineer in the event of non-compliance or if conditions change.
 - e. If necessary, excavate to the depth and size as required by the Engineer to allow compaction tests. Place backfill material and recompact.
 2. **Test Failure and Retesting:** Rework, recompact, and retest as necessary until specified compaction and moisture content is achieved in all areas of the trench. In the event of failed tests, the Engineer may require retesting as deemed necessary.

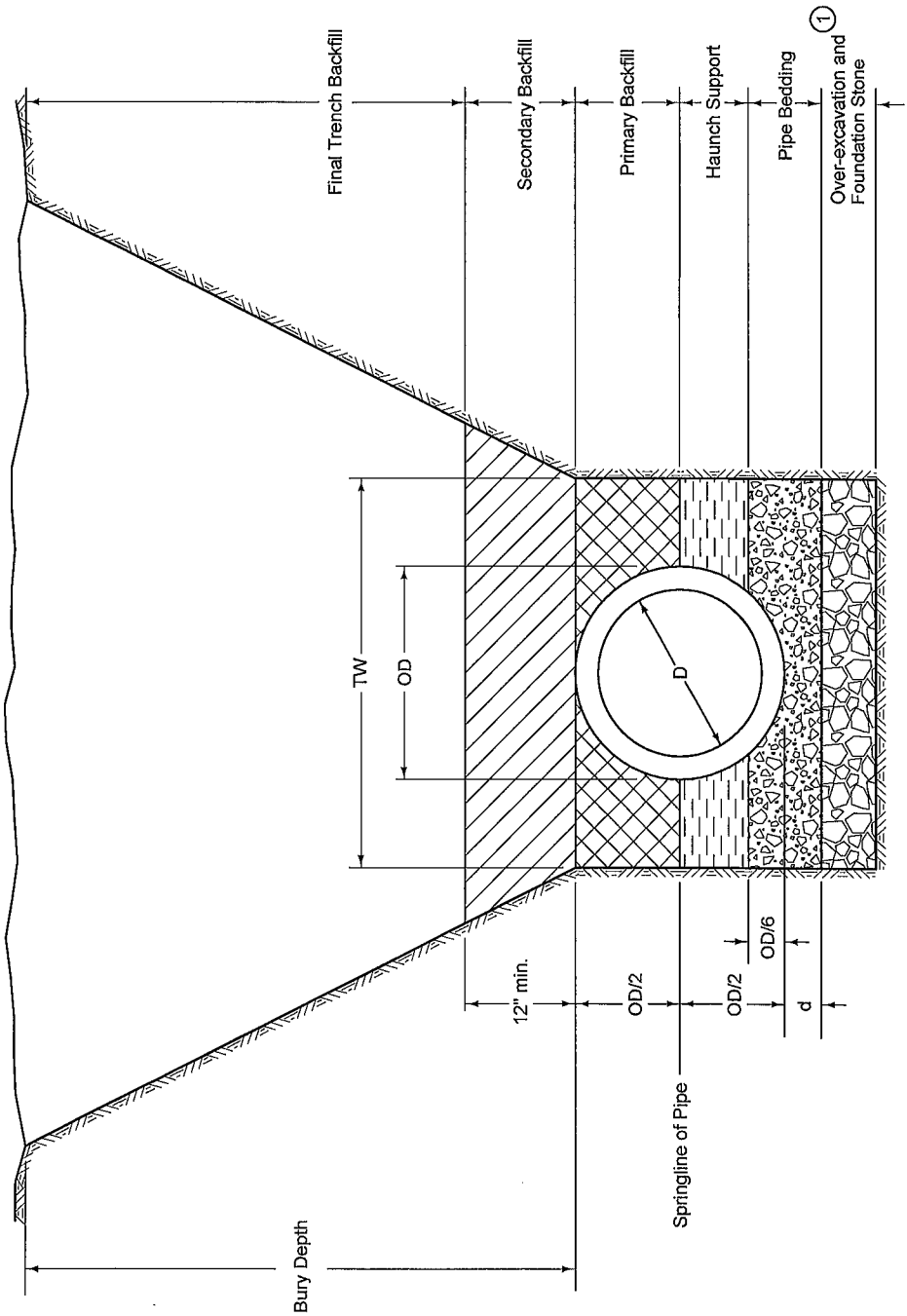
END OF SECTION



Refer to the contract documents for specific material and placement requirements.

- ① Required only when specified in the contract documents or when directed by the Engineer.

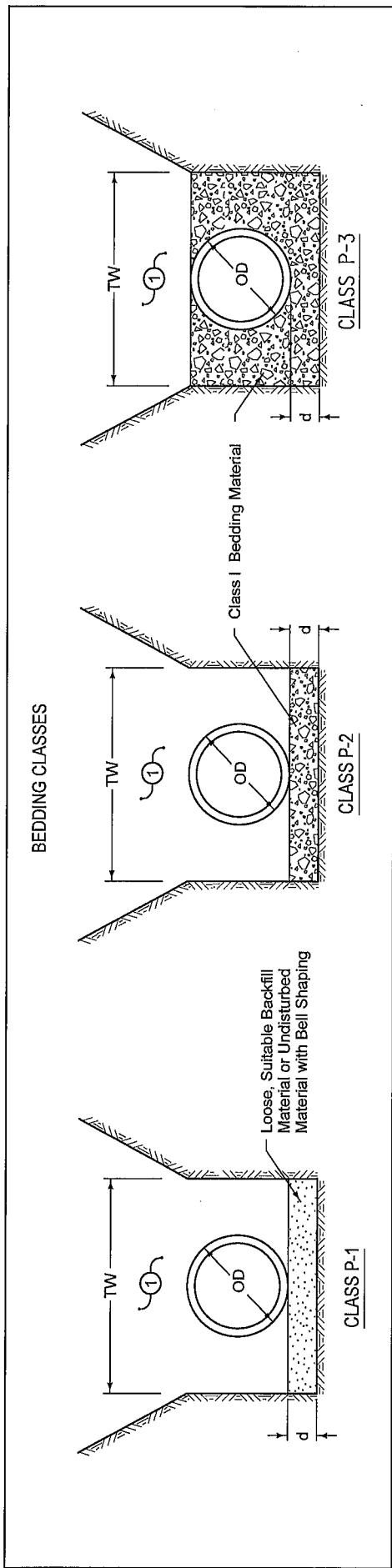
Key

- OD = Outside diameter of pipe
D = Inside diameter of pipe
TW = Trench width at top of pipe
d = Depth of bedding material below pipe



	SUDAS		REVISION	
			1	04-17-13
FIGURE 3010.101	STANDARD ROAD PLAN	SW-101		
		SHEET 1 of 1		
REVISIONS: Replaced Iowa DOT and SUDAS logos.				
Paul D. Wiegant Brian Smith				
SUDAS DIRECTOR DESIGN METHODS ENGINEER				
TRENCH BEDDING AND BACKFILL ZONES				

DO NOT USE ON PRIMARY ROADWAYS



① Place remainder of bedding and backfill material as specified in the contract documents.

Key

- OD = Outside diameter of pipe
- TW = Trench width at top of pipe:
Min. = OD+18 inches OR 1.25xOD+12 inches
(whichever is greater)
- d = Depth of bedding material below pipe:
Min. = OD/8 OR 4 inches
(whichever is greater)


ALLOWABLE BURY DEPTH

DUCTILE IRON, AWWA C151, CLASS 52

Pipe Diameter (inches)	Class P-1 Bedding	Class P-2 Bedding	Class P-3 Bedding
4	40'	40'	40'
6	40'	40'	40'
8	40'	40'	40'
10	36'	40'	40'
12	31'	40'	40'
14	26'	40'	40'
16	23'	37'	40'
18	20'	34'	40'
20	18'	32'	40'
24	16'	29'	38'
30	13'	23'	31'
36	13'	22'	30'
42	13'	21'	29'
48	13'	19'	27'
54	13'	19'	27'

PVC, AWWA C900, DR18

Pipe Diameter (inches)	Class P-1 Bedding	Class P-2 Bedding	Class P-3 Bedding
4	19'	23'	40'
6	19'	23'	40'
8	19'	23'	40'
10	19'	23'	40'
12	19'	23'	40'
14	19'	23'	40'
16	19'	23'	40'
18	19'	23'	40'
20	19'	23'	40'
24	19'	23'	40'

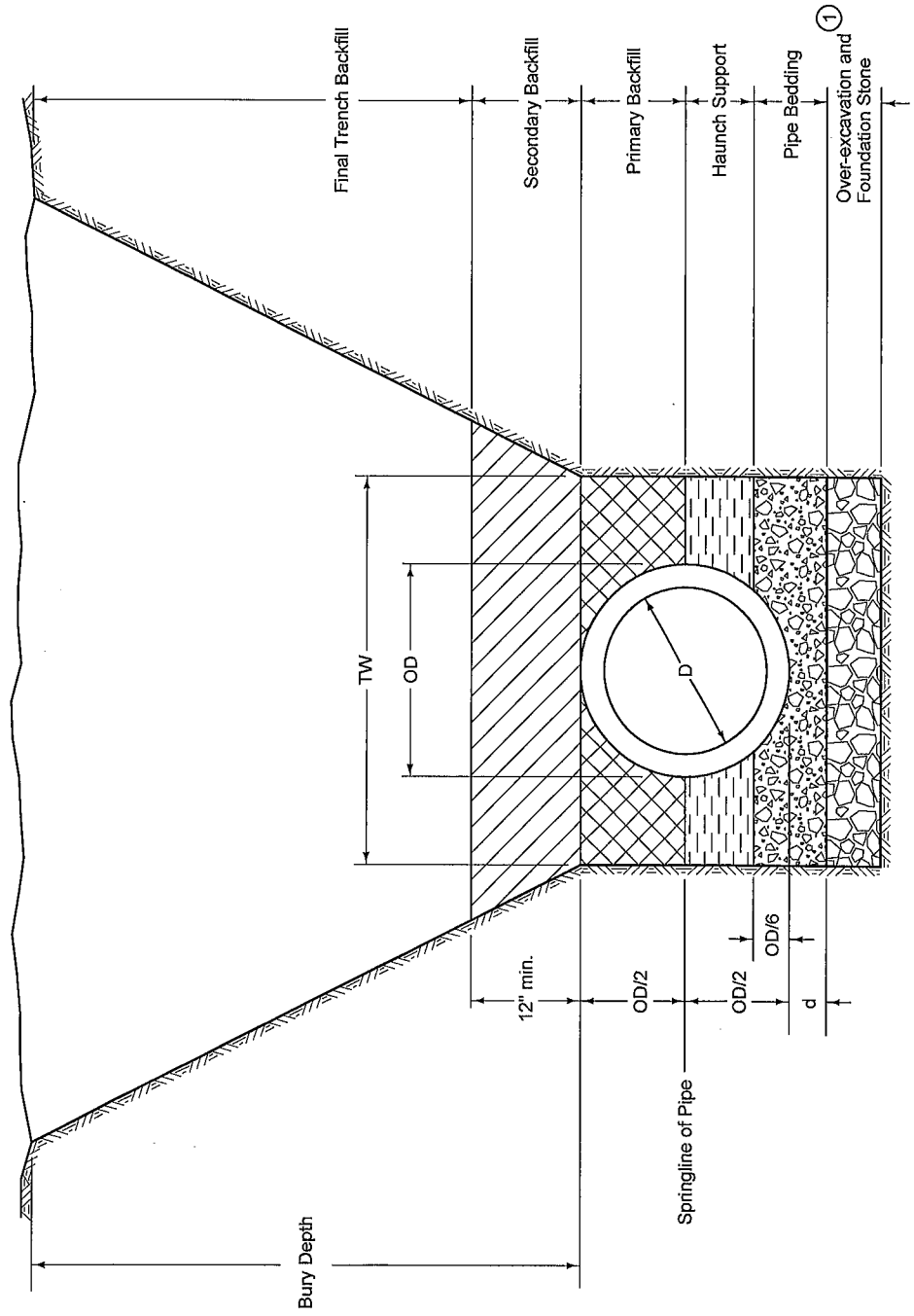
	REVISION	3	04-20-21
	SW-104		
FIGURE 3010.104	STANDARD ROAD PLAN		
REVISIONS: Address note DO NOT USE ON PRIMARY ROADWAYS.			
<i>Paul D. Wiegand</i>		<i>David Miller</i>	
SUDAS DIRECTOR		DESIGN METHODS ENGINEER	
PRESSURE PIPE TRENCH BEDDING			

Refer to the contract documents for specific material and placement requirements.

① Required only when specified in the contract documents or when directed by the Engineer.

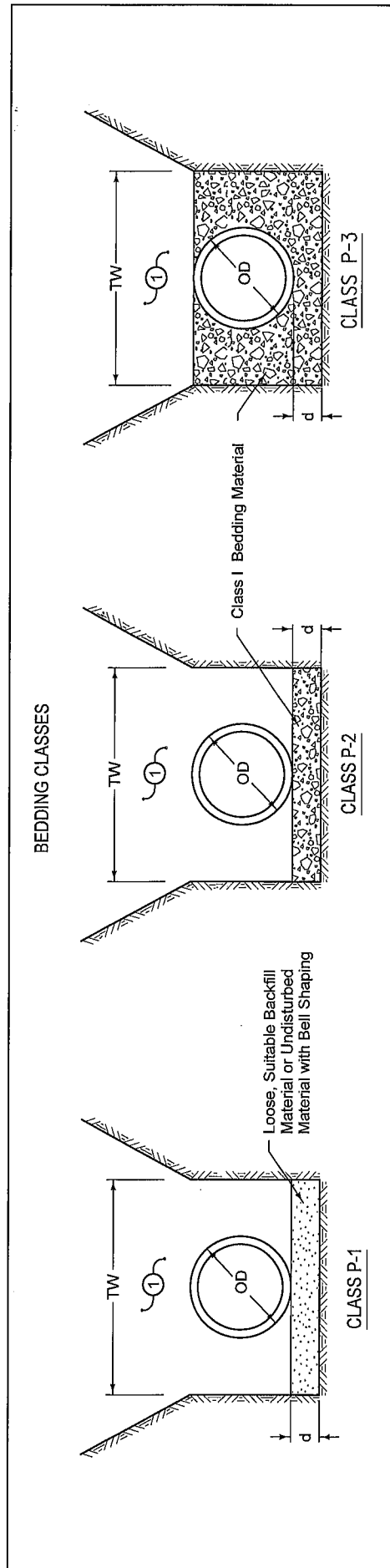
Key

- OD = Outside diameter of pipe
- D = Inside diameter of pipe
- TW = Trench width at top of pipe
- d = Depth of bedding material below pipe



SUDAS	IOWA DOT	REVISION
		1 04-17-18
FIGURE 3010.101	STANDARD ROAD PLAN	SHEET 1 OF 1
REVISIONS: Replaced Iowa DOT and SUDAS logos. <i>Rod DeWigand</i> Brian Smith SUDAS DIRECTOR DESIGN METHODS ENGINEER		
TRENCH BEDDING AND BACKFILL ZONES		

DO NOT USE ON PRIMARY ROADWAYS



- ① Place remainder of bedding and backfill material as specified in the contract documents.

Key

OD = Outside diameter of pipe
TW = Trench width at top of pipe:
Min. = OD+18 inches OR 1.25xOD+12 inches
(whichever is greater)
d = Depth of bedding material below pipe:
Min. = OD/8 OR 4 inches
(whichever is greater)

ALLOWABLE BURY DEPTH

DUCTILE IRON, AWWA C151, CLASS 52

Pipe Diameter (inches)	Class P-1 Bedding	Class P-2 Bedding	Class P-3 Bedding
4	40'	40'	40'
6	40'	40'	40'
8	40'	40'	40'
10	36'	40'	40'
12	31'	40'	40'
14	26'	40'	40'
16	23'	37'	40'
18	20'	34'	40'
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24	16'	29'	38'
30	13'	23'	31'
36	13'	22'	30'
42	13'	21'	29'
48	13'	19'	27'
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PVC, AWWA C900, DR18

Pipe Diameter (inches)	Class P-1 Bedding	Class P-2 Bedding	Class P-3 Bedding
4	19'	23'	40'
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12	19'	23'	40'
14	19'	23'	40'
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18	19'	23'	40'
20	19'	23'	40'
24	19'	23'	40'

	SUDAS	IOWA DOT
	REVISION 3 04-20-21	SW-104
FIGURE 3010.104		STANDARD ROAD PLAN
REVISIONS: Added note DO NOT USE ON PRIMARY ROADWAYS.		SHEET 1 of 1
<i>Paul D. Wiegand</i> SUDAS DIRECTOR		<i>Scott Miller</i> DESIGN METHODS ENGINEER
PRESSURE PIPE TRENCH BEDDING		

TRENCHLESS CONSTRUCTION (BORING, JACKING, AND TUNNELING)**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Trenchless Installation of Carrier Pipe with Casing Pipe
- B. Trenchless Installation of Carrier Pipe without Casing Pipe

1.02 DESCRIPTION OF WORK

- A. Excavate launching and receiving pits.
- B. Install casing or carrier pipe by trenchless methods.
- C. Install carrier pipe inside casing pipe (if required).
- D. Place backfill material in excavations.
- E. Surface restoration for areas removed to determine utility locations.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Proposed installation methods and equipment.
- B. Gradation reports for bedding materials if required.
- C. Shop drawings of casing spacers and proposed spacing.
- D. Dewatering plan (if required).

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT

All items of work contained in this section are incidental to the underground utility pipe being installed and will not be paid for separately.

PART 2 - PRODUCTS**2.01 CARRIER PIPE****A. Carrier Pipe Installed within Casing Pipe:**

1. **Sanitary Sewer Gravity Main:** Comply with Section 4010, 2.01.
2. **Sanitary Sewer Force Main:**
 - a. **Restrained Joint Ductile Iron Pipe:** Comply with Section 4010, 2.02.
 - b. **Restrained Joint PVC Pipe:** Comply with Section 4010, 2.02.
3. **Storm Sewer:** Comply with Section 4020, 2.01.
4. **Culverts:** Comply with Section 4030, 2.01.
5. **Water Main:**
 - a. **Restrained Joint Ductile Iron Pipe:** Comply with Section 5010, 2.01.
 - b. **Restrained Joint PVC Pipe:** Comply with Section 5010, 2.01.
 - c. **Fusible Pipe:** Comply with Section 5011, 2.01.

B. Carrier Pipe Installed without a Casing Pipe:

1. **Sanitary Sewer Gravity Main:**
 - a. **Reinforced Concrete Pipe:** Comply with Section 4010, 2.01.
 - b. **Vitrified Clay Pipe:** Comply with Section 4010, 2.01.
 - c. **Restrained Joint Ductile Iron Pipe:** Comply with Section 4010, 2.02.
 - d. **Restrained Joint PVC Pipe:** Comply with Section 4010, 2.02.
2. **Sanitary Sewer Force Main:**
 - a. **Restrained Joint Ductile Iron Pipe:** Comply with Section 4010, 2.02.
 - b. **Restrained Joint PVC Pipe:** Comply with Section 4010, 2.02.
3. **Storm Sewer and Culverts:**
 - a. **Reinforced Concrete Pipe:** Comply with Section 4020, 2.01.
 - b. **Reinforced Concrete Arch Pipe:** Comply with Section 4020, 2.01.
 - c. **Reinforced Concrete Elliptical Pipe:** Comply with Section 4020, 2.01.
 - d. **Reinforced Concrete Low Head Pressure Pipe:** Comply with Section 4020, 2.01.
4. **Water Main:**
 - a. **Restrained Joint Ductile Iron Pipe:** Comply with Section 5010, 2.01.
 - b. **Restrained Joint PVC Pipe:** Comply with Section 5010, 2.01.
 - c. **Fusible Pipe:** Comply with Section 5011, 2.01.

2.02 CASING PIPE

A. Pipe: Use only new, steel pipe meeting the requirements of ASTM A 139, Grade B; ASTM A 252, Grade 2; ASTM A 53, Grade B; or API 5L X Grade. Pipe may be welded or seamless. Wall thickness will be as specified in the contract documents.

B. Joints:

1. Comply with American Welding Society Code D1.1. Weld all joints with full penetrating weld. Welders must be qualified according to Iowa DOT Article 2408.03, B. Welds must comply with Iowa DOT Materials I.M. 558.
2. Upon approval of the Engineer, an interlocking casing pipe connection system may be used in lieu of field welding the sections of casing pipe.

2.02 CASING PIPE (Continued)

- C. Pipe Diameter:** Minimum inside diameter as specified in the contract documents. If diameter is not specified, use a minimum inside casing diameter of at least 4 inches greater than the largest outside diameter of the carrier pipe, including pipe bells.

2.03 CASING SPACERS

- A. Use manufactured casing spacers to position carrier pipe in casing. Do not use wood skids.
- B. Meet the following material requirements:
1. HDPE Band/Panel and Riser: ASTM D 638.
 2. Stainless Steel or Carbon Steel Band/Panel and Riser: Type 304 stainless steel according to ASTM A 240 or carbon steel according to ASTM A 36.
 - a. Liner: Elastomeric PVC per ASTM D 149.
 - b. Spacer Skid/Runner: Abrasion resistant polymer with a low coefficient of friction.
 - c. Fasteners: Type 304 (18-8) stainless steel per ASTM A 193.

2.04 BACKFILL FOR ABANDONED TUNNELS

- A. Use Iowa DOT Class C concrete, approximately 4 inch slump.
- B. Flowable mortar, foamed cellular concrete, or CLSM according to Section 3010, 2.06.

2.05 BACKFILL MATERIAL

- A. Excavated Materials:** Comply with Section 3010 for classification of excavated materials. Use only suitable material for backfill material.
- B. Special Fill Materials:** For use where specified in the contract documents.
1. **PCC:** Use Iowa DOT Class C concrete, approximately 4 inch slump.
 2. **Flowable Mortar:** Comply with Section 3010, 2.06.
 3. **CLSM:** Comply with Section 3010, 2.06.
 4. **Foamed Cellular Concrete:** Comply with Section 3010, 2.06.

2.06 CASING END SEAL

- A. Manufactured:** Minimum 1/8 inch thick manufactured synthetic rubber casing end seal with stainless steel bands and fasteners.
- B. PCC:** Comply with Section 6010. Do not use PCC casing end seals with flexible carrier pipes.

PART 3 - EXECUTION**3.01 EXCAVATION**

- A. Notify the Engineer prior to the start of excavation activities.
- B. Remove topsoil to a minimum depth of 12 inches and stockpile.
- C. Excavate the minimum size pits necessary to safely and properly perform the work.
 - 1. Protect existing facilities, trees, and shrubs during excavation.
 - 2. Place excavated material away from trench.
 - 3. Grade and shape spoil piles to drain and protect adjacent areas from runoff. Do not allow spoil piles to obstruct drainage. Stabilize stockpiles with seeding and provide sediment control around stockpiles.
- D. Remove rock, rubbish, debris, and other materials not suitable for use as backfill.

3.02 SHEETING, SHORING, AND BRACING

Comply with Section 3010, 3.03.

3.03 DEWATERING

Comply with Section 3010, 3.04.

3.04 TRENCHLESS INSTALLATION

- A. General:** Select a method of installation that is appropriate for the soil conditions anticipated and will 1) allow the pipe to be installed to the desired line and grade within the specified tolerances; 2) prevent heaving or settlement of the ground surface or damage to nearby facilities; and 3) prevent damage to the carrier pipe and any lining materials within the carrier pipe.

1. Installation Methods:

- a. Auger Boring:** A method that utilizes a rotating cutting head to form the bore hole and a series of rotating augers inside a casing pipe to remove the spoil.
- b. Directional Drilling:** A method for installing pipe from a surface-launched drilling rig. A pilot bore is formed and then enlarged by back reaming and removing the spoil material. The pipe is then pulled in place.
- c. Open-ended Pipe Ramming:** A method that involves driving a steel casing pipe with a percussive hammer. The front end of the casing pipe is open-ended. Spoils are removed from the pipe.
- d. Pipe Jacking:** A method in which pipe is pushed into the ground with hydraulic jacks while soil is simultaneously excavated. Excavation is normally completed with a tunnel boring machine.
- e. Microtunneling:** A method of pipe jacking using a remote controlled tunnel boring machine.
- f. Utility Tunneling:** A method of forming large diameter tunnels. As excavation takes place at the front of the tunnel, a liner is constructed to temporarily support the tunnel. Upon completion of the tunnel, the pipe is pushed in place.
- g. Other:** Other methods may be allowed with the Engineer's approval.

3.04 TRENCHLESS INSTALLATION (Continued)**2. Line and Grade:**

- a. Install pipe at line and grade that will allow the carrier pipe to be installed at its true starting elevation and grade within the specified maximum alignment deviation of the pipe centerline.
- b. When no deviation tolerances are specified in the contract documents, apply the following maximum deviations to the carrier pipe.
 - 1) Gravity Pipe:
 - a) Horizontally: ± 1.0 foot per 100 feet;
 - b) Vertically: ± 0.2 feet up to 100 feet; an additional ± 0.1 foot per 100 feet thereafter. Backfall in pipe is not allowed.
 - 2) Pressurized Pipe:
 - a) Horizontally: ± 2.0 feet
 - b) Vertically: ± 1.0 foot. Maintain the minimum depth specified in the contract documents.
- c. Greater deviation or interference with other identified facilities may be cause for rejection.

3. Deviation from Line and Grade:

- a. Provided adequate clearance remains for proper installation of the carrier pipe, the Contractor will be allowed to correct deviations in grade of a casing pipe in order to achieve design grade of the carrier pipe by:
 - Pouring an invert in the casing pipe, or
 - Shimming the carrier pipe with casing spacers to a uniform grade.
- b. Installations deviating from the specified tolerances that cannot be adjusted to conform to the specified tolerances may be rejected by the Engineer. If non-conforming installation is not rejected, provide all additional fittings, manholes, or appurtenances needed to accommodate horizontal or vertical misalignment, at no additional cost to the Jurisdiction.
- c. Abandon rejected installation and place special fill materials, at no additional cost to the Jurisdiction. Replace abandoned installations, including all additional fittings, manholes, or appurtenances required to replace rejected installations.

B. Casing Pipe or Un-cased Carrier Pipe Installation:

1. Install pipe by approved methods.
2. Use a jacking collar, timbers, and other means as necessary to protect the driven end of the pipe from damage.
3. Do not exceed the compressive or tensile strength capacity of the pipe during pushing or pulling operations.
4. Fully support bore hole at all times to prevent collapse. Insert pipe as soil is removed, or support bore with drilling fluid.
5. Fully weld all casing pipe joints. Use an interlocking connection system when approved by the Engineer.
6. Fill space between the inside of the bore hole and the outside of the pipe with special fill material if the space is greater than 1 inch.

C. Carrier Pipe Installation through Casing:

1. Clean dirt and debris from the interior of the casing pipe after installation.

3.04 TRENCHLESS INSTALLATION (Continued)

2. Install casing spacers on carrier pipe sections as necessary to support the pipe barrel according to the pipe manufacturer's recommendations subject to the following minimum requirements:
 - a. Install a spacer within 1 foot of each side of the carrier pipe joint and at a maximum spacing of 6 feet.
 - b. Do not allow the pipe to be supported by joint bells.
 - c. Lubricate casing spacers with drilling mud or flax soap. Do not use petroleum-based lubricants or oils.
 3. Ensure that thrust loads will not damage carrier pipe joints. Provide thrust collars between joint shoulders of concrete pipe.
 4. Provide timbers for sufficient cushioning between the end of the pipe pushed and the jacking equipment to prevent damage to the pipe. Do not allow the steel jack face to thrust against the unprotected pipe end.
 5. Position jacks so the resulting force is applied evenly to the entire end of the pipe.
 6. Assemble pipe joints in the jacking pit before pushing the carrier pipe into the casing.
 7. Close the end of the casing pipe around the carrier pipe with a casing end seal.
- D. Annular Space Grouting:** If specified, fill the annular space between the carrier pipe and the casing pipe with flowable mortar, foamed cellular concrete, or CLSM according to Section 3010. Batching, mixing, and placing may be started when the temperature is 34°F and rising. Cease mixing and placing when temperature is 38° F or less and falling.
1. **Flowable Mortar and CLSM:** Fill voids by staged grouting. Construct bulkheads at each end of the pipe. Ensure all voids are filled with flowable mortar by providing 2 feet of head when filling.
 2. **Foamed Cellular Concrete:**
 - a. Construct bulkheads sufficient to withstand pressure of grouting operation at each end of the pipe.
 - b. Use sufficient grouting pressures to ensure all voids between the inner pipe and the casing pipe have been filled without collapsing or deforming the inner pipe by more than 5% of the diameter. Multiple grout lifts may be necessary. Follow manufacturer's recommendations.
 - c. Check wet density at the beginning of the placement and a minimum of every 2 hours thereafter. Provide test results to the Engineer.
 - d. If grout holes are utilized, insert cylindrical wood plugs or other approved plugs until grout has set. Fill holes with concrete after plugs have been removed.

3.05 PIT RESTORATION

- A. Remove installation equipment and unused materials from the launching and receiving pits.
- B. When the carrier pipe extends beyond the limits of trenchless installation and into the bore pit, place bedding and backfill material according to Section 3010, 3.05.
- C. Place suitable backfill material in the pit. Apply the testing requirements of Section 3010, 3.06.
- D. Restore the site to original condition or better.

3.06 UTILITY LOCATING SITE RESTORATION

Restore areas removed as a means to locate underground utilities according to Section 7040, 3.01, G for paved areas and Section 9010 for non-paved areas, unless otherwise directed by the Jurisdiction.

END OF SECTION

PIPE AND FITTINGS**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Pipe
- B. Fittings
- C. Special Fittings
- D. Pipeline Accessories

1.02 DESCRIPTION OF WORK

Construct water mains and building service pipes.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Submit product information sheet for joint restraint system to be used.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Remove pipe and fittings contaminated with mud and surface water from the site; do not use in construction unless thoroughly cleaned, inspected, and approved by the Engineer.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT**A. Water Main:****1. Trenched:**

- a. **Measurement:** Each type and size of pipe installed in an open trench will be measured in linear feet along the centerline of the pipe, including the length through the fittings.
- b. **Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- c. **Includes:** Unit price includes, but is not limited to, trench excavation; dewatering; furnishing and installing pipe; furnishing, placing, and compacting bedding and backfill material; tracer system; testing; disinfection; and polyethylene wrap for ductile iron pipe and for fittings.

1.08 MEASUREMENT AND PAYMENT (Continued)**2. Trenchless:**

- a. **Measurement:** Each type and size of pipe installed by trenchless methods will be measured in linear feet along the centerline of the pipe.
- b. **Payment:** Payment will be made at the unit price per linear foot for each type and size of pipe.
- c. **Includes:** Unit price includes, but is not limited to, furnishing and installing pipe; trenchless installation materials and equipment; pit excavation; dewatering; placing and compacting backfill material; tracer system; testing; and disinfection.

B. Water Main with Casing Pipe:**1. Trenched:**

- a. **Measurement:** Each type and size of pipe with a casing pipe installed in an open trench, will be measured in linear feet along the centerline of the casing pipe from end of casing to end of casing.
- b. **Payment:** Payment will be made at the unit price per linear foot for each type and size of carrier pipe.
- c. **Includes:** Unit price includes, but is not limited to, furnishing and installing both carrier pipe and casing pipe; trench excavation; dewatering; furnishing and installing pipe; furnishing, placing, and compacting bedding and backfill material; casing spacers; furnishing and installing annular space fill material; tracer system; testing; and disinfection.

2. Trenchless:

- a. **Measurement:** Each type and size of pipe installed by trenchless methods with a casing pipe will be measured in linear feet along the centerline of the casing pipe.
- b. **Payment:** Payment will be made at the unit price per linear foot for each type and size of carrier pipe.
- c. **Includes:** Unit price includes, but is not limited to, furnishing and installing both carrier pipe and casing pipe; trenchless installation materials and equipment; pit excavation; dewatering; placing and compacting backfill material; casing spacers; furnishing and installing annular space fill material; tracer system; testing; and disinfection.

C. Fittings: One of the following methods will be specified for measurement and payment of water main fittings.**1. Fittings by Count:**

- a. **Measurement:** Each type and size of fitting installed as specified in the contract documents or as required for proper installation of the water main will be counted.
- b. **Payment:** Payment will be made at the unit price for each type and size of fitting.
- c. **Includes:** Unit price includes, but is not limited to, restrained joints and thrust blocks.

2. Fittings by Weight:

- a. **Measurement:** Each type and size of fitting installed as specified in the contract documents or as required for proper installation of the water main will be counted. Determine the total weight of fittings counted, in pounds, based on the standard fitting weights published in AWWA C153 for ductile iron compact fittings.
- b. **Payment:** Payment will be made at the unit price per pound for each type and size of fitting.
- c. **Includes:** Unit price includes, but is not limited to, restrained joints and thrust blocks.

1.08 MEASUREMENT AND PAYMENT (Continued)**D. Water Service Stubs by Each:**

1. **Measurement:** Each type and size of water service stub from the water main to the stop box will be counted.
2. **Payment:** Payment will be made at the unit price for each type and size of water service stub.
3. **Includes:** Unit price includes, but is not limited to, water service corporation; service pipe; curb stop; stop box; trench excavation; dewatering; furnishing and installing pipe; furnishing, placing, and compacting bedding and backfill material; and installation of tracer wire system for non-metallic service pipe.

E. Water Service Stubs by Length:

1. **Water Service Pipe:**
 - a. **Measurement:** Each type and size of water service pipe will be measured in linear feet along the centerline of the pipe.
 - b. **Payment:** Payment will be made at the unit price per linear foot of each type and size of water service pipe.
 - c. **Includes:** Unit price includes, but is not limited to, trench excavation; dewatering; furnishing and installing pipe; furnishing, placing, and compacting bedding and backfill material; and installation of tracer wire system for non-metallic service pipe.
2. **Water Service Corporation:**
 - a. **Measurement:** Each type and size of water service corporation will be counted.
 - b. **Payment:** Payment will be made at the unit price for each type and size of water service corporation.
 - c. **Includes:** Unit price includes, but is not limited to, trench excavation (if necessary); furnishing and installing the water service corporation; and furnishing, placing, and compacting bedding and backfill material.
3. **Water Service Curb Stop and Box:**
 - a. **Measurement:** Each type and size of water service curb stop and box will be counted.
 - b. **Payment:** Payment will be made at the unit price for each type and size of water service curb stop and box.
 - c. **Includes:** Unit price includes, but is not limited to trench excavation (if necessary); furnishing and installing the curb stop and box; and furnishing, placing, and compacting bedding and backfill material.

F. Water Main Abandonment, Cap:

1. **Measurement:** Each size and location of water main to be abandoned will be counted.
2. **Payment:** Payment will be made at the unit price for each size and location of water main abandoned.
3. **Includes:** Unit price includes, but is not limited to, trench excavation (if necessary); closing valves; removing valve boxes; installing thrust blocks; cutting pipe; installing MJ caps; and furnishing, placing, and compacting backfill material.

1.08 MEASUREMENT AND PAYMENT (Continued)**G. Water Main Abandonment, Fill and Plug:**

1. **Measurement:** Each size and location of water main to be abandoned by filling and plugging will be measured in linear feet.
2. **Payment:** Payment will be made at the unit price per linear foot of water main filled and plugged.
3. **Includes:** Unit price includes, but is not limited to, trench excavation (if necessary); closing valves; removing valve boxes; installing thrust blocks; cutting and removing the specified section of pipe; furnishing and pumping flowable material to fill the pipe to be abandoned; installing MJ caps; and furnishing, placing, and compacting backfill material.

H. Water Main Removal:

1. **Measurement:** Each size and location of water main to be removed will be measured in linear feet from end to end.
2. **Payment:** Payment will be made at the unit price per linear foot for each pipe removed.
3. **Includes:** Unit price includes, but is not limited to, trench excavation (if necessary); closing valves; installing thrust blocks; cutting pipe; installing MJ caps; removal and disposal of all valves and pipe specified for removal; furnishing, placing, and compacting backfill material.

PART 2 - PRODUCTS**2.01 WATER MAIN**

A. Polyvinyl Chloride (PVC) Pipe: Comply with AWWA C900 with ductile iron pipe equivalent outside diameters.

1. Minimum Wall Thickness:

- a. **4 inch through 24 inch sizes:** DR 18.
- b. **Sizes over 24 inch:** As specified in the contract documents.

2. Joint Type: Use push-on joint type, except as otherwise specified in the contract documents or as authorized by the Engineer.

- a. **Push-on:** According to AWWA C900.
- b. **Integral Restrained Joint:** AWWA C900 pipe with restraining system manufactured integrally into pipe end.
- c. **Mechanical Restrained Joint:** Ductile iron mechanical device designed for joint restraint of AWWA C900 pipe complying with the requirements of ASTM F 1674.

3. Markings on Pipe:

- a. Name of manufacturer.
- b. Size and class.
- c. Spigot insertion depth gauge.
- d. National Sanitation Foundation (NSF) seal.

B. Ductile Iron Pipe (DIP):

1. Minimum Thickness Class:

- a. **4 inch through 24 inch sizes:** Special thickness Class 52 according to AWWA C151.
- b. **Sizes over 24 inches:** As specified in the contract documents.

2. Cement-mortar Lined: According to AWWA C104 with seal coat.

3. External Coating: Seal coat according to AWWA C151.

4. Joint Type: Use push-on type, unless otherwise specified in the contract documents or as authorized by the Engineer.

- a. **Push-on:** According to AWWA C111.
- b. **Mechanical:** According to AWWA C111.
- c. **Restrained, Buried:** Pipe manufacturer's standard field removable system.
- d. **Restrained, in Structures:** Restraining gland, flanged or grooved/shouldered.
- e. **Flanged:** According to AWWA C111.
- f. **Grooved/Shouldered:** According to AWWA C606.
- g. **Gaskets:** According to AWWA C111.

5. Markings on Pipe:

- a. Name of manufacturer.
- b. Size and class.
- c. Spigot insertion depth gauge.

2.02 BOLTS FOR WATER MAIN AND FITTINGS

Use corrosion resistant bolts.

A. Tee-bolts and Hexagonal Nuts for Mechanical Joints:

1. High-strength, low-alloy steel manufactured according to AWWA C111.
2. Provide ceramic-filled, baked-on, fluorocarbon resin coating for bolts and nuts.
3. Include factory-applied lubricant that produces low coefficient of friction for ease of installation.

B. Other Bolts and Nuts:

1. Stainless steel.
2. Ductile iron.
3. Zinc, zinc chromate, or cadmium plated.

2.03 FITTINGS**A. For DIP and PVC Pipe:** Comply with AWWA C110 (ductile iron or gray iron) or AWWA C153 (ductile iron).**1. Joint Type:**

- a. For pipe sizes 16 inches and less, use mechanical joint complying with AWWA C111.
- b. For pipe sizes greater than 16 inches, use restrained mechanical joint system. Provide follower gland using breakaway torque bolts to engage thrust restraint.
 - 1) Minimum pressure rating same as connecting pipe. For fittings between dissimilar pipes, the minimum pressure rating is the lesser of the two pipes.
 - 2) Suitable for buried service.
 - 3) Joint restraint system to be field installable, field removable, and re-installable.
- c. Use of alternate restraint systems must be approved by the Engineer.

2. Lined: Cement mortar lined according to AWWA C104 with seal coat or protective fusion bonded coatings per AWWA C116.**3. Wall Thickness:** Comply with AWWA C153.**4. Gaskets:** Comply with AWWA C111.**B. Flange Adapter:**

1. **Body:** Ductile iron complying with ASTM A 536.
2. **End Rings (Follower Rings):** Ductile iron complying with ASTM A 536.
3. **Gaskets:** New rubber compounded for water service and resistant to permanent set.
4. **Bolts and Nuts:** High strength, low alloy corrosion resistant steel or carbon steel bolts complying with ASTM A 307.

2.03 FITTINGS (Continued)**C. Pipe Coupling:**

1. **Center Sleeve (Center Ring):** Steel pipe or tubing complying with ASTM A 53 or ASTM A 512, or formed carbon steel with a minimum yield of 30,000 psi.
2. **End Ring (Follower Ring):** Ductile iron complying with ASTM A 536, or steel meeting or exceeding the requirements of ASTM A 576, grade 1010-1020.
3. **Gaskets:** New rubber compounded for water service and resistant to permanent set.
4. **Bolts and Nuts:** High strength, low alloy corrosion resistant steel.

2.04 CONCRETE THRUST BLOCKS

- A. Use Iowa DOT Class C concrete.
- B. Comply with the contract documents for dimensions and installation of thrust blocks. Comply with Figure 5010.101.
- C. Use for all pipe sizes 16 inches in diameter or smaller or when specified.

2.05 PIPELINE ACCESSORIES**A. Polyethylene Wrap:**

1. Comply with AWWA C105.
2. Provide tubes or sheets with 8 mil minimum thickness.

B. Tracer System: Comply with Figure 5010.102.**1. Tracer Wire:****a. Open Cut:****1) Solid Single Copper Conductor:**

- a) **Size:** #12 AWG
 - b) **Insulation Material:** Linear low-density polyethylene (LLDPE) insulation suitable for direct burial applications
 - c) **Insulation Thickness:** 0.030 inches, minimum
 - d) **Tensile Strength:** 150 pounds, minimum
 - e) **Operating Voltage:** Rated for 30 volts
- 2) Bimetallic Copper Clad Steel Conductor:**
- a) **Size:** #14 AWG
 - b) **Rating:** Direct burial
 - c) **Operating Voltage:** Rated for 30 volts
 - d) **Conductivity:** 21%
 - e) **Copper Cladding:** 3% of conductor diameter, minimum
 - f) **Insulation Material:** High density, high molecular weight polyethylene
 - g) **Insulation Thickness:** 0.030 inches, minimum
 - h) **Tensile Strength:** 175 pounds, minimum

b. Directional Drilling/Boring:**1) Bimetallic Copper Clad Steel Conductor:**

- a) **Size:** #12 AWG
- b) **Rating:** Direct burial
- c) **Operating Voltage:** Rated for 30 volts
- d) **Conductivity:** 21%

2.05 PIPELINE ACCESSORIES (Continued)

- e) **Copper Cladding:** 3% of conductor diameter, minimum
 - f) **Insulation Material:** High density, high molecular weight polyethylene
 - g) **Insulation Thickness:** 0.045 inches, minimum
 - h) **Tensile Strength:** 1,100 pounds, minimum
- 2. **Ground Rod:** 3/8 inch diameter, 60 inch steel rod uniformly coated with metallically bonded electrolytic copper.
 - 3. **Ground-rod Clamp:** High-strength, corrosion-resistant copper alloy.
 - 4. **Splice Kit:** Inline resin splice kit with split bolt (1 kV and 5 kV) for use with single conductor and unshielded cable splices in direct bury and submersible applications.
 - 5. **Tracer Wire Station:** Comply with the contract documents.

2.06 SPECIAL GASKETS

- A. For soils contaminated with gasoline, use neoprene or nitrile gaskets.
- B. For soils contaminated with volatile organic compounds, use nitrile or fluorocarbon gaskets.
- C. For other soil contaminants, contact the Engineer for the required gasket.

2.07 WATER SERVICE PIPE AND APPURTENANCES

- A. **Controlling Standards:** Local plumbing and fire codes.
- B. **Materials** (as allowed by Jurisdiction or specified in contract documents):
 - 1. **Copper Pipe:**
 - a. Comply with ASTM B 88.
 - b. Wall Thickness: Type K.
 - 2. **DIP:** As specified in Section 5010, 2.01. Polyethylene wrap is required.
 - 3. **PVC Pipe:** ASTM D 1785, Schedule 80 or ASTM D 2241, SDR 21. Provide solvent weld joints for all pipes.
 - 4. **Brass Pipe:** Red, seamless, according to ASTM B 43.
 - 5. **Polyethylene Pipe:** Class 200, according to AWWA C901.
- C. **Corporations, Stops, and Stop Boxes:** Contact the Jurisdiction for requirements.

2.08 NON-SHRINK GROUT

Comply with Iowa DOT Materials I.M. 491.13.

2.09 CASING PIPE

Comply with Section 3020.

PART 3 - EXECUTION**3.01 PIPE INSTALLATION****A. General:**

1. Do not use deformed, defective, gouged, or otherwise damaged pipes or fittings.
2. Keep trench free of water. Clean pipe interior prior to placement in the trench.
3. Install pipe with fittings and valves to the lines and grades specified in the contract documents.
4. Clean joint surfaces thoroughly and apply lubricant approved for use with potable water and recommended by the manufacturer.
5. Push pipe joint to the indication line on the spigot end of the pipe before making any joint deflections.
6. Limit joint deflections to one degree less than pipe manufacturer's recommended maximum limit.
7. Tighten bolts in a joint evenly around the pipe.
8. Install concrete thrust blocks on all fittings 16 inches in diameter or smaller (comply with Figure 5010.101). For fittings larger than 16 inches, install restrained joints, and when specified in the contract documents, also install concrete thrust blocks.
9. Keep exposed pipe ends closed with rodent-proof end gates at all times when pipe installation is not occurring.
10. Close the ends of the installed pipe with watertight plugs during nights and non-working days.
11. Do not allow any water from the new pipeline to enter the existing distribution system piping until testing and disinfection are successfully completed.

B. Trenched:

1. Excavate trench and place pipe bedding and backfill material as specified in Section 3010.
2. Provide uniform bearing along the full length of the pipe barrel. Provide bell holes.

C. Trenchless: Comply with Section 3020.**3.02 ADDITIONAL REQUIREMENTS FOR DIP INSTALLATION**

- A. Utilize full-length gauged pipe for field cuts. Alternatively, use a MJ gland or other approved method to field-gauge pipe selected for cutting to verify the outside diameter is within allowable tolerances.
- B. Cut the pipe perpendicular to the pipe barrel. Do not damage the cement lining. Bevel cut, file, or grind the ends for push-on joints according to the manufacturer's recommendations.
- C. Encase all pipe, valves, and fittings with polyethylene wrap according to Section 5010, 3.05.
- D. Install pipe according to AWWA C600, except as modified herein.

3.03 ADDITIONAL REQUIREMENTS FOR PVC PIPE INSTALLATION

- A. Cut the pipe perpendicular to the pipe barrel. Deburr and bevel cut spigot end of the pipe barrel to match factory bevel. Re-mark the insertion line.
- B. When connecting to shallow-depth bells, such as on some cast iron fittings or valves, cut the spigot end square to remove factory bevel. Deburr the end and form a partial bevel on the end.
- C. Install pipe according to AWWA C605, except as modified herein.

3.04 POLYETHYLENE ENCASEMENT INSTALLATION

- A. Apply polyethylene encasement to buried ductile iron pipe and to buried fittings, fire hydrants, and appurtenances. The polyethylene encasement is used to prevent contact between the pipe and the bedding material, but need not be airtight or watertight.
- B. Install polyethylene encasement according to AWWA C105, using tubes or flat sheets, and pipe manufacturer's recommendations.
- C. Do not expose the polyethylene encasement to sunlight for long periods before installation.
- D. Remove all lumps of clay, mud, cinders, etc. on the pipe surface before encasing the pipe. Take care to prevent soil or bedding material from becoming trapped between the pipe and polyethylene.
- E. Lift polyethylene-encased pipe with a fabric-type sling or padded cable.
- F. Secure and repair encasement material using polyethylene tape, or replace as necessary.

3.05 TRACER SYSTEM INSTALLATION

- A. Install with all buried water main piping. Comply with Figure 5010.102 for tracer wire installation.
- B. Begin and terminate the system at all connections to existing mains.
- C. Install wire continuously along the lower quadrant of the pipe. Do not install wire along the bottom of the pipe. Attach wire to the pipe at the midpoint of each pipe length; use 2 inch wide, 10 mil thickness polyethylene pressure sensitive tape.
- D. Install splices only as authorized by the Engineer. Allow the Engineer to inspect all below-grade splices of tracer wire prior to placing the backfill material.
- E. Install ground rods adjacent to connections to existing piping and at locations specified in the contract documents or as directed by the Engineer.
- F. Bring two wires to the surface at each fire hydrant location and terminate with a tracer wire station (comply with Figure 5010.102).
- G. Final inspection of the tracer system will be conducted at the completion of the project and prior to acceptance by the owner. Verify the electrical continuity of the system. Repair discontinuities.

3.06 CONFLICTS**A. Horizontal Separation of Gravity Sewers from Water Mains:****1. Sanitary and Combined Sewers:**

- a. Separate gravity sanitary and combined sewer mains from water mains by a horizontal distance of at least 10 feet unless:
 - 1) The top of a sewer main is at least 18 inches below the bottom of the water main, and
 - 2) The sewer is placed in a separate trench or in the same trench on a bench of undisturbed earth at a minimum horizontal separation of 3 feet from the water main.
- b. Maintain the maximum feasible separation distance in all cases. When it is impossible to obtain the required horizontal clearance of 3 feet and a vertical clearance of 18 inches between sewers and water mains, provide a linear separation of at least 2 feet and one of the following:
 - 1) Construct sanitary and combined sewers of water main materials meeting the requirements of Section 5010, 2.01.
 - 2) Enclose the water main in a watertight casing pipe with an evenly spaced annular gap and watertight end seals.

2. Storm Sewers: Separate storm sewers and water mains by at least 10 feet measured edge-to-edge unless it is impossible to do so. When impossible to maintain a 10 feet horizontal separation, maintain a minimum separation of 3 feet and utilize one of the following within 10 feet measured edge-to-edge:

- a. Construct the water main of ductile iron pipe with gaskets impermeable to hydrocarbons.
- b. Enclose the water main in a watertight casing pipe with evenly spaced annular gap and watertight end seals.
- c. Construct storm sewer pipe of water main materials.
- d. Construct storm sewers of reinforced concrete pipe with gaskets manufactured according to ASTM C 443.

B. Horizontal Separation of Water Mains from Sanitary and Combined Sewer Manholes:

Ensure water pipes do not pass through or come in contact with any part of a sanitary or combined sewer manhole. Maintain a minimum horizontal separation of 3 feet.

C. Horizontal Separation of Sewer Force Mains from Water Mains: Separate sewer force mains and water mains by a horizontal distance of at least 10 feet unless:

1. The force main is constructed of water main materials meeting a minimum pressure rating of 150 psi and the requirements of Section 5010, 2.01 and
2. The sewer force main is laid at least 4 linear feet from the water main.

D. Vertical Separation of Sewers and Water Main Crossovers:**1. Sanitary and Combined Sewers:**

- a. Vertically separate sanitary and combined sewers crossing under water mains by at least 18 inches when measured from the top of the sewer to the bottom of the water main. If physical conditions prohibit the separation, do not place the sewer closer than 6 inches below a water main or 18 inches above a water main. Maintain the maximum feasible separation distance in all cases. Ensure the sewer and water pipes are adequately supported and have watertight joints. Use a low permeability soil for backfill material within 10 feet of the point of crossing.

3.06 CONFLICTS (Continued)

- b. Where the sanitary sewer crosses over or less than 18 inches below a water main, utilize one of the following within 10 feet measured edge-to-edge horizontally, centered on the crossing:
 - 1) Construct sanitary and combined sewers of water main material meeting the requirements of Section 5010, 2.01.
 - 2) Enclose the water main in a watertight casing pipe with an evenly spaced annular gap and watertight end seals.

2. Storm Sewers:

- a. Vertically separate storm sewers from water mains by at least 18 inches measured between the outside edges of the water main and the storm sewer. Maintain the maximum feasible separation distance in all cases. Ensure the sewer and water pipes are adequately supported. Use a low permeability soil for backfill material within 10 feet of the point of crossing.
- b. When impossible to maintain an 18 inch vertical separation when the water main crosses over the storm sewer, maintain a minimum vertical separation of 6 inches and utilize one of the following within 10 feet measured edge-to-edge centered on the crossing:
 - 1) Construct the water main of ductile iron pipe with gaskets impermeable to hydrocarbons.
 - 2) Enclose the water main in a watertight casing pipe with evenly spaced annular gap and watertight end seals.
 - 3) Construct storm sewer pipe of water main materials.
 - 4) Construct storm sewers of reinforced concrete pipe with gaskets manufactured according to ASTM C 443.

3.07 TRANSITIONS IN PIPING SYSTEMS

Where the specified material of a piping system entering or exiting a structure changes, make the change at the outside of the structure wall, beyond any wall pipe or wall fitting required, unless otherwise specified.

3.08 STRUCTURE PENETRATIONS**A. Wall Pipes:**

- 1. Install where pipes penetrate and terminate at a wall or floor surface of a concrete structure, or where the pipe protrudes through the concrete wall or floor and the protrusion is otherwise unsupported.
- 2. Provide a waterstop flange near the center of the embedment length. The waterstop is to be cast integrally with the wall pipe, or fully welded to it around the pipe circumference.

B. Wall Sleeves:

- 1. Install where a pipe passes through a structure wall.
- 2. Sleeves in concrete walls are to be supplied with a waterstop collar, fully welded, and cast-in-place in the concrete.

3.09 WATER SERVICE STUB

- A. Install water service pipe, corporations, stops, and stop boxes according to local Jurisdiction requirements.
- B. Install 1 inch and smaller corporation valves tapped at 45 degrees above horizontal at a minimum distance of 18 inches from pipe bell or other corporation. Install 1 1/2 inch and 2 inch corporation valves tapped horizontal a minimum distance of 24 inches from pipe bell or other corporation.
- C. Construct trench and place backfill material according to Section 3010.

3.10 WATER MAIN ABANDONMENT

Verify with the Engineer that all services are no longer using the main to be abandoned.

A. For Each Pipe to be Abandoned by Capping:

- 1. Close valves and remove valve boxes as specified in the contract documents.
- 2. Construct thrust blocks on each end of the active pipes according to Figure 5010.101.
- 3. Cut pipe to be abandoned a minimum of 5 feet from the closed valve on each end of the active pipes, leaving a minimum of 12 inches of pipe exposed beyond the thrust block.
- 4. Remove a minimum of 3 feet of the pipe to be abandoned.
- 5. Install a MJ cap using a retaining gland according to Figure 5010.101 on the end of each pipe to be abandoned and each active pipe.

B. For Each Pipe to be Abandoned by Filling:

- 1. Close valves and remove valve boxes as specified in the contract documents.
- 2. Construct thrust blocks on each end of the active pipes according to Figure 5010.101.
- 3. Cut pipe to be abandoned a minimum of 5 feet from the closed valve on each end of the active pipes, leaving a minimum of 12 inches of pipe exposed beyond the thrust block.
- 4. Remove a minimum of 3 feet of the pipe to be abandoned.
- 5. Install a MJ cap using a retaining gland according to Figure 5010.101 on each pipe to be abandoned and each active pipe.
- 6. Fill the pipe to be abandoned by pumping with flowable mortar, foamed cellular concrete, or CLSM complying with Section 3010.

3.11 WATER MAIN REMOVAL

Verify with the Engineer that all services are no longer using the main and have been disconnected from the main to be removed.

- A. Close valves as specified in the contract documents.
- B. Construct thrust block on each end of the active pipes according to Figure 5010.101.
- C. Cut pipe to be removed a minimum of 5 feet from the closed valve on each end of the active pipes leaving a minimum of 12 inches of pipe exposed beyond the thrust block.

3.11 WATER MAIN REMOVAL (Continued)

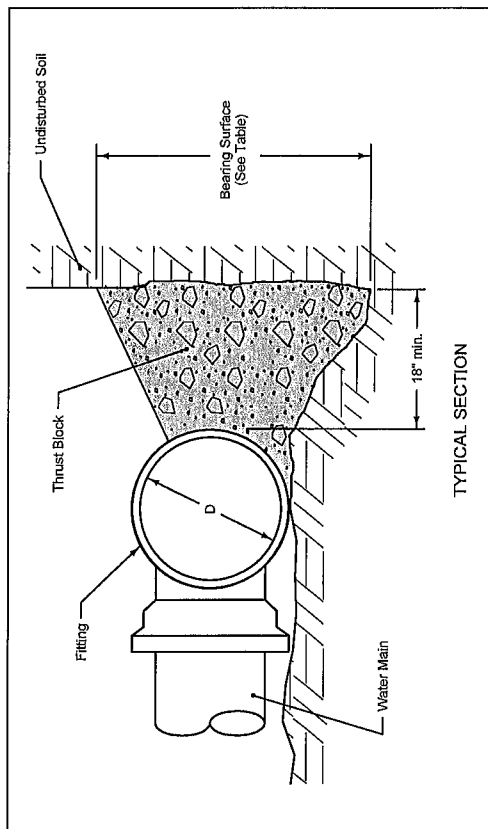
- D. Install a MJ cap using a retaining gland according to Figure 5010.101 at the end of each active pipe.
- E. Remove and dispose of water main pipe. Furnish, place, and compact backfill material.

3.12 TESTING AND DISINFECTION

Test and disinfect according to Section 5030.

END OF SECTION

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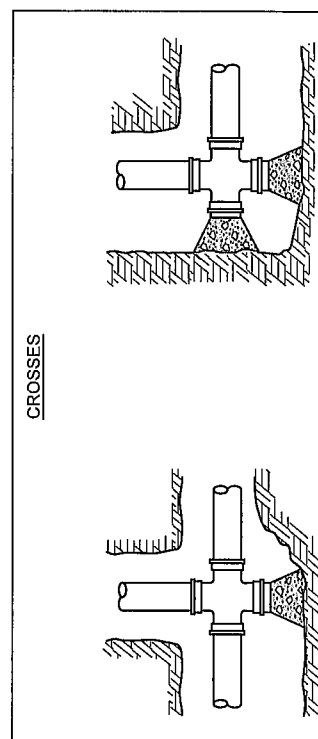
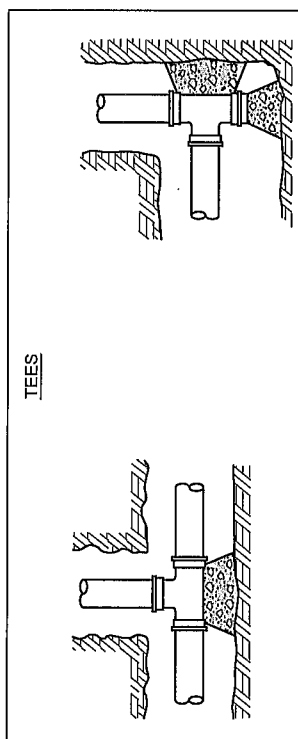
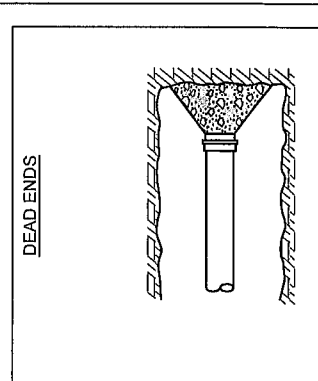
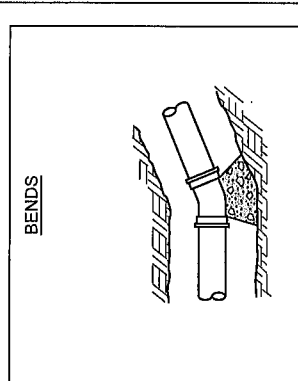
Extend thrust blocks to undisturbed soil. Excavation into trench wall may be necessary.

Form vertical surfaces of poured concrete thrust blocks except on bearing surface.

Encase all fittings in polyethylene wrap. Do not allow concrete to directly contact joints or fitting bolts.

Diameter of Pipe, D (inches)	MINIMUM BEARING SURFACE (sf)					Tees and Dead Ends
	Bends					
	11 1/4°	22 1/2°	45°	90°		
4	1	1	2	4	3	
6	1	2	4	8	6	
8	2	4	7	14	10	
10	3	6	11	21	15	
12	4	8	16	29	21	
14	5	11	21	39	28	
16	7	14	27	50	36	
18	9	17	34	63	45	
20	11	21	42	78	55	
24	15	31	60	111	78	
30	24	47	92	171	120	
36	34	67	132	244	173	

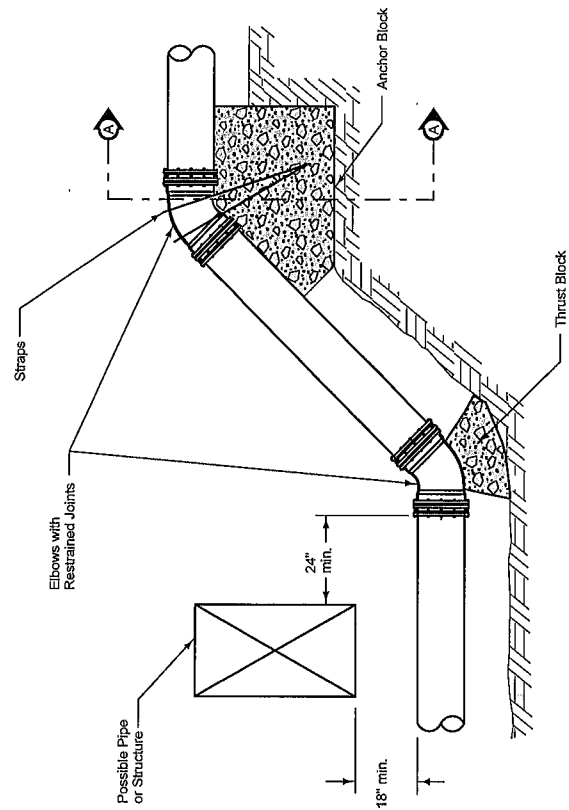
Minimum surface area based on water pressure of 150 psi and allowable soil pressure of 1,000 psf.



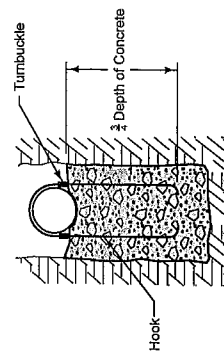
TYPICAL PLAN

SUDAS	IOWADOT	REVISION
		1 10-18-16
FIGURE 5010.101	STANDARD ROAD PLAN	WM-101
SHEET 1 of 2		
REVISIONS: Replaced Iowa DOT and SUDAS logos with new logos.		
R. D. Wiegand SUDAS DIRECTOR Brian Smith DESIGN METHODS ENGINEER		
THRUST BLOCKS		

CHANGES IN PIPE DEPTH



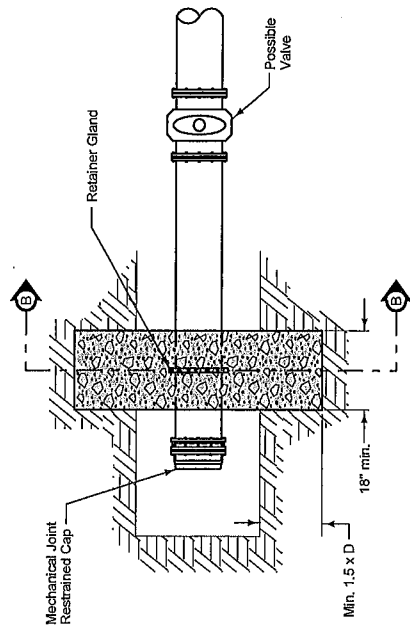
ELEVATION



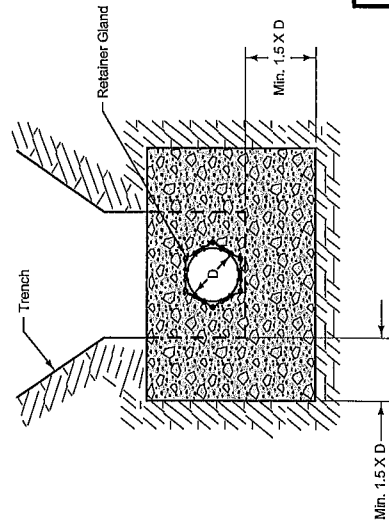
SECTION A-A

DEAD ENDS (ALTERNATE METHOD)


Use only when allowed by the Engineer, or when specified in the contract documents.



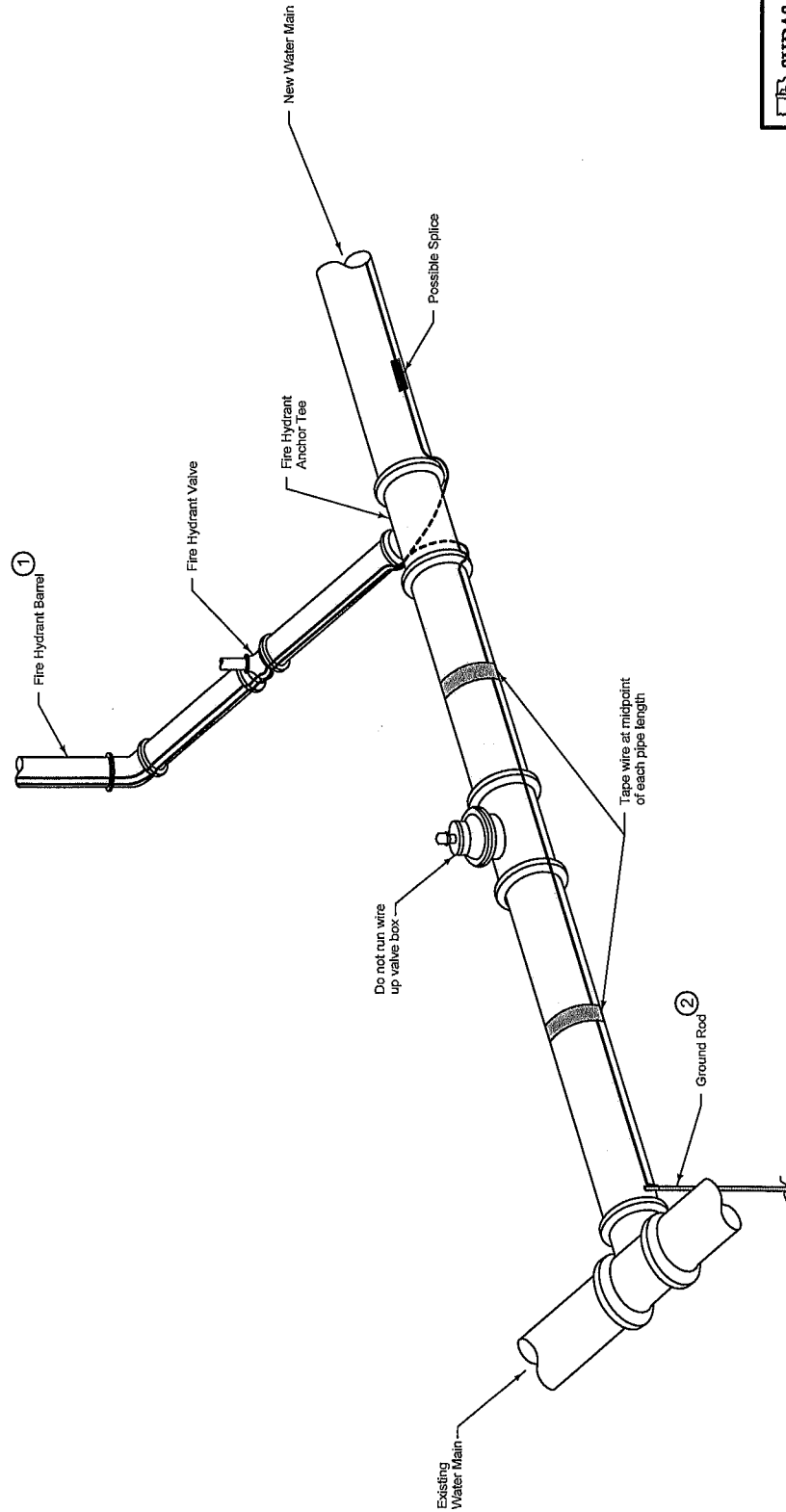
PLAN





SECTION B-B

	SUDAS	IOWADOT	REVISION	
			1	10-18-16
FIGURE 5010.101	STANDARD ROAD PLAN	WM-101		SHEET 2 of 2
REVISIONS: Replaced Iowa DOT and SUDAS logos with new logos.				
Paul D. Wiegand		Brian Smith		
SUDAS DIRECTOR		DESIGN METHODS ENGINEER		
THRUST BLOCKS				

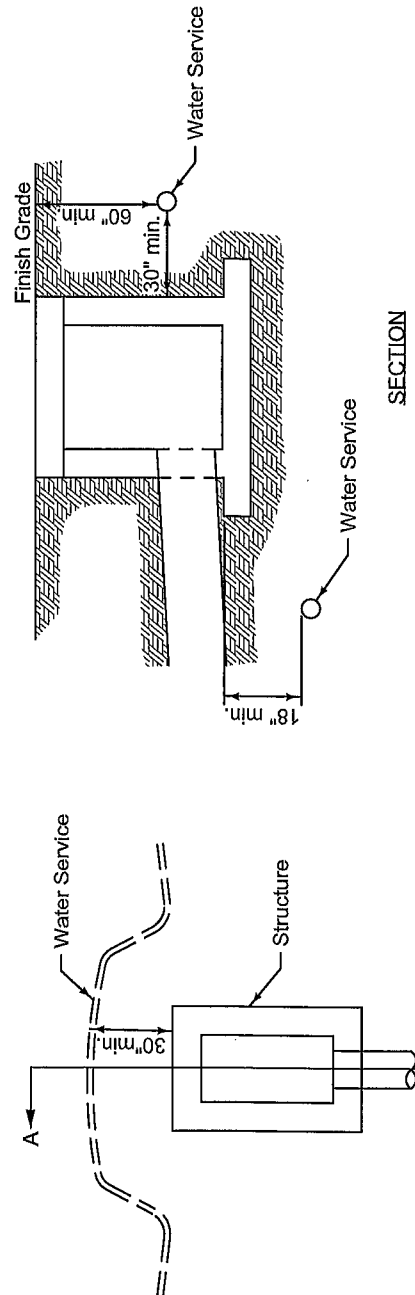
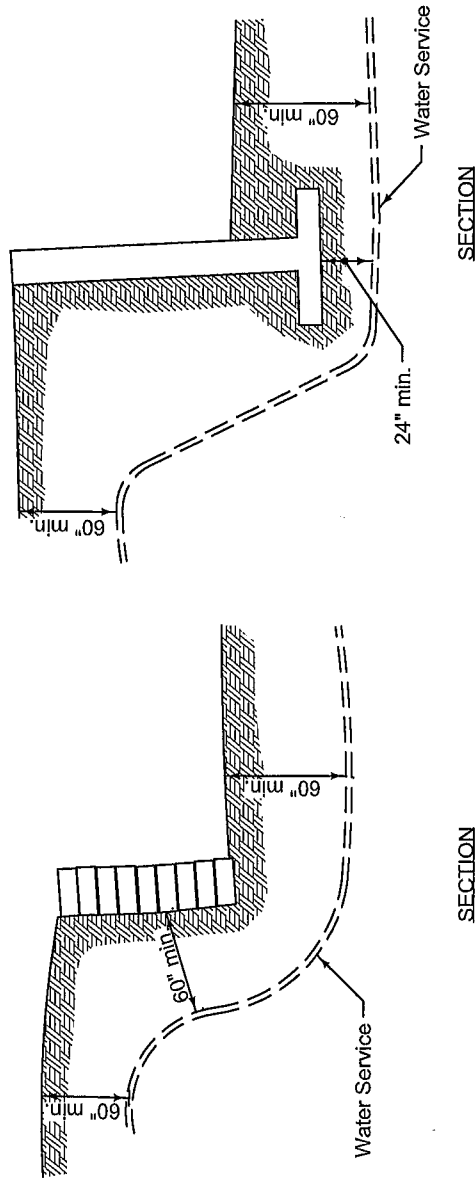
- ① Extend tracer wire up fire hydrant barrel to internal terminals of tracer wire station and back down. Refer to WM-201 for details of fire hydrant assembly.
- ② Clamp tracer wire to ground rod at system termination points.

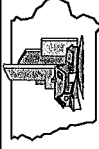


TYPICAL INSTALLATION

	SUDAS		WM-102	REVISION	1	10-18-16
	FIGURE 5010.102			STANDARD ROAD PLAN		
REVISIONS: Replaced Iowa DOT and SUDAS logos with new logos.						
<div>Rose D. Wiegand SUDAS DIRECTOR</div> <div>Brian Smith DESIGN METHODS ENGINEER</div>						
TRACER SYSTEM						

This figure details minimum required clearances between structure and water service lines. Adjust location of water services as directed by the Engineer to maintain the clearances shown.



	REVISION	10-21-14
	1	
SUDAS 5010.901		SHEET 1 of 1
SUDAS Standard Specifications		
MINIMUM CLEARANCE BETWEEN WATER SERVICE AND STRUCTURE		

TESTING AND DISINFECTION**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Pressure and Leak Testing of Water System
- B. Disinfection of Potable Water Systems

1.02 DESCRIPTION OF WORK

Test and disinfect water mains, valves, fire hydrants, and appurtenances.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Notify the Engineer two working days in advance of testing or disinfection operations to coordinate the operations.
- B. The Engineer or his/her representative is required to be in attendance during testing or disinfection.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT

Testing and disinfection of water systems is incidental to the construction of pipe and fittings.

PART 2 - PRODUCTS

2.01 DISINFECTION AGENT - CHLORINE

- A. Liquid Chlorine complying with AWWA B300 and AWWA B301.
- B. Sodium Hypochlorite complying with AWWA B300.
- C. Calcium Hypochlorite complying with AWWA B300.
- D. All disinfecting agents to be NSF 60 certified. Supply and store in the original container.

PART 3 - EXECUTION**3.01 GENERAL**

Perform operations according to AWWA C651 in the sequence below. Successfully complete each operation specified in subsections 3.02 through 3.08 below before continuing to the next operation. The Jurisdiction will provide reasonable quantities of water for flushing and testing.

3.02 SEQUENCE OF TESTING AND DISINFECTION

A. Continuous-Feed or Slug Method (After Water Main Installation): The sequence of testing and disinfection may be modified with approval of the Engineer.

1. Perform initial flush.
2. Perform disinfection.
3. Flush after disinfection.
4. Perform pressure and leak testing.

B. Tablet Method (Concurrent with Water Main Installation): Use this method only if approved by the Engineer. Modify the procedure for flushing, disinfection, and pressure and leak testing as needed if tablet method is used.

1. Perform disinfection.
2. Flush after disinfection.
3. Perform pressure and leak testing.

3.03 INITIAL FLUSHING**A. Flushing:**

1. Coordinate flushing with the Jurisdiction.
2. Flush pipe prior to disinfection using potable water.
3. Measure flushing velocity.
4. Obtain a minimum flushing velocity of 3 feet per second in the pipe to be disinfected.

B. Minimum Flushing Rate: According to AWWA C651, Table 3, based on 40 psi residual pressure (see table below).

Table 5030.01: Minimum Flushing Rate

Pipe Diameter (inches)	Flow Rate for Flushing (gpm)	Number of Taps ²			Number of 2 1/2" Fire Hydrant Outlets ¹
		1"	1 1/2"	2"	
4	120	1	-	-	1
6	260	-	1	-	1
8	470	-	2	-	1
10	730	-	3	2	1
12	1,060	-	-	3	2
16	1,880	-	-	5	2

¹With a 40 psi pressure in the main with the fire hydrant flowing to atmosphere, a 2 1/2 inch fire hydrant outlet will discharge approximately 1,000 gpm; and a 4 1/2 inch fire hydrant outlet will discharge approximately 2,500 gpm.

²Number of taps on pipe based on discharge through 5 feet of galvanized iron pipe with one 90° elbow.

3.03 INITIAL FLUSHING (Continued)

- C. Property Protection:** Protect public and private property from damage during flushing operations.

3.04 PRESSURE AND LEAK TESTING

- A. Remove debris from within the pipe. Clean and swab out pipe, if required.
- B. Secure unrestrained pipe ends against uncontrolled movement.
- C. Isolate new piping from the existing water system.
- D. Fill and flush all new piping with potable water. Ensure all trapped air is removed.
- E. Pressurize the new pipe to the test pressure at the highest point in the isolated system. Do not pressurize to more than 5 psi over the test pressure at the highest point in the isolated system.
- F. Test and monitor the completed piping system at 1.5 times the system working pressure or 150 psi, whichever is greater, for 2 continuous hours.
- G. If at any time during the test the pressure drops to 5 psi below the test pressure, repressurize the pipe by pumping in potable water in sufficient quantity to bring the pressure back to the original test pressure.
- H. Accurately measure the amount of water required to repressurize the system to the test pressure.
- I. Maximum allowable leakage rate:

$$L = \frac{(S)(D)(P)^{0.5}}{148,000}$$

Where:

L = allowable leakage, in gallons per hour

S = length of pipe tested, in feet

D = nominal pipe diameter, in inches

P = average test pressure, in pounds per square inch

The following table assumes an average test pressure (P) of 150 psi and 1,000 feet of test section.

Table 5030.03: Maximum Allowable Leakage Rate

Pipe Diameter (inches)	Allowable Leakage Rate (gallons/hour/1,000 feet of pipe)
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99
14	1.16
16	1.32
18	1.49
20	1.66
24	1.99
30	2.48
36	2.98

3.04 PRESSURE AND LEAK TESTING (Continued)

- J. If the average measured leakage per hour exceeds the maximum allowable leakage rate, repair and retest the water main.
- K. If the measured pressure loss does not exceed 5 psi, the test will be considered acceptable.
- L. Repair all visible leaks regardless of the amount of leakage.

3.05 DISINFECTION**A. General:**

- 1. Disinfect according to AWWA C651. The tablet method contained in AWWA C651 is not to be used unless approved by the Engineer.
- 2. Keep piping to be chlorinated isolated from lines in service and from points of use.
- 3. Coordinate disinfection and testing with the Engineer.

B. Procedure:

- 1. Induce a flow of potable water through the pipe.
- 2. Introduce highly chlorinated water to the pipe at a point within 5 pipe diameters of the pipe's connection to an existing potable system, or within 5 pipe diameters of a closed end, if there is no connection to an existing system.
- 3. Introduce water containing a minimum of 25 mg/L free chlorine until the entire new pipe contains a minimum of 25 mg/L free chlorine.
- 4. Retain chlorinated water in the pipe for at least 24 hours and no more than 48 hours.

3.06 FINAL FLUSHING

- A. Flush pipe using potable water until chlorine residual equals that of the existing potable water system.
- B. Dispose of chlorinated water to prevent damage to the environment. Dechlorinate highly chlorinated water from testing before releasing into the ground or sewers. Obtain Jurisdiction approval prior to flushing activities.
 - 1. Check with the local sewer department for the conditions of disposal to the sanitary sewer.
 - 2. Chlorine residual of water being disposed will be neutralized by treating with one of the chemicals listed in the following table.

3.06 FINAL FLUSHING (Continued)**Table 5030.02: Amounts of Chemicals Required to Neutralize Various Residual Chlorine Concentrations in 100,000 Gallons of Water**

Residual Chlorine Concentration mg/L	Sulfur Dioxide (SO₂) lb	Sodium Bisulfite (NaHSO₃) lb	Sodium Sulfite (Na₂SO₃) lb	Sodium Thiosulfate (Na₂S₂O₃ + 5H₂O) lb	Ascorbic Acid (C₆O₈H₆) lb
1	0.8	1.2	1.4	1.2	2.1
2	1.7	2.5	2.9	2.4	4.2
10	8.3	12.5	14.6	12.0	20.9
50	41.7	62.6	73.0	60.0	104

3.07 BACTERIA SAMPLING

Test water mains according to AWWA C651, except as modified below:

- A. Collect samples every 1,200 feet of new water main plus one set from the end of the line and at least one from each branch greater than one pipe length. If trench water entered the new main during construction, or if excessive quantities of dirt and debris entered the main, reduce the sampling interval to every 200 feet of new main.
- B. Collect samples according to one of the following methods as directed by the Engineer:
 1. Collect an initial set of samples after flushing and then an additional set after a minimum of 24 hours without any water use. The engineer may reduce the sampling interval to 16 hours.
 2. Allow water to sit in the new main for a minimum of 16 hours after flushing without any water use. Collect an initial set of samples and allow the sampling ports to run for a minimum of 15 minutes. Collect a second set of samples from the sampling ports.

3.08 RE-DISINFECTION

If the initial disinfection fails to produce satisfactory bacteriological samples, flush the main again and reinitiate the sampling process. If check samples show the presence of coliform organisms, re-chlorinate the main prior to flushing and sampling until satisfactory results are obtained.

3.09 PUTTING WATER MAIN IN SERVICE

Put the completed water system in service only after both sets of bacterial samples have passed and obtaining permission from the Jurisdiction.

END OF SECTION

SEEDING**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Certification of Products
- B. Acceptance and Warranty
- C. Seed Types and Mixes
- D. Equipment
- E. Application of Seed

1.02 DESCRIPTION OF WORK

Includes the requirements for seedbed preparation; furnishing, applying, and covering the seed; and compaction of the seedbed.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Submit certification of products to the Engineer prior to seed placement:
 - 1. Seed: Submit a laboratory analysis for all seeds, specifying the purity and germination. Provide a lot number on all submittals and labeling. Ensure lot number is the same on all records pertaining to a particular seed. Provide 48 hours notice prior to mixing the seed and give the Engineer an opportunity to witness the seed mixing. Submit a mechanically printed seed tag from an Iowa Crop Improvement Association-approved seed conditioner or grower.
 - 2. Fertilizer: Submit certification of the fertilizer analysis with scale weight and statement of guaranteed analysis. Submit from a certified fertilizer dealer, a mechanically printed commercial fertilizer label, or bill of lading. Comply with the inspection and acceptance requirements of Iowa DOT Materials I.M. 469.03.
 - 3. Wood Cellulose Fiber Mulch: Submit certification of the degradable wood cellulose fiber mulch ingredients with applicable use and rate, and the water retention capacity by manufacturer or supplier.
 - 4. Wood Excelsior Mulch: Bale wood excelsior and determine the mass (weight). Use the mass of the material, furnished by the manufacturer, to determine the rate of application.
 - 5. Straw Mulch: Certify weight. Furnish a list of the number of bales and a corresponding ticket from an approved scale for the mulch material to be used on the project.
 - 6. Compost: Submit certification of composted organics analysis with U.S. Compost Council's Seal of Testing Assurance (STA), recommended rates of application, and manufacturer's estimated cubic yards per ton.
 - 7. Inoculant: Furnish information from inoculant packaging.
 - 8. Tackifier: Submit certification of the tackifier ingredients, recommended rates of application, and expiration date.
- B. Submit written instructions recommending procedures for maintenance of seeded areas.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Deliver packaged materials in original, unopened, and undamaged containers. Do not mix or blend materials except in the presence of the Engineer.
- B. Deliver, handle, and store all materials according to product recommendations, and protect from loss, damage, and deterioration.
- C. Materials not meeting these requirements will be rejected.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Coordinate the seeding schedule with all other work on the project. Notify the Engineer at least three calendar days prior to the start of seeding operations.
- B. After all land-disturbing activities are complete and the seedbed has been approved by the Engineer, perform seeding operations.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT**A. Conventional Seeding:****1. Seeding:**

- a. **Measurement:** Measurement will be in acres for each type of seed.
- b. **Payment:** Payment will be in unit price per acre for each type of seed.
- c. **Includes:** Unit price includes, but is not limited to, removal of rock and other debris from the area; repairing rills and washes; preparing the seedbed; furnishing and placing seed, including any treatment required; furnishing and placing fertilizer and mulch; and furnishing water and other care during the care period, unless these items are bid separately.

2. Fertilizing:

- a. **Measurement:** Measurement will be in acres of fertilizer.
- b. **Payment:** Payment will be at unit price per acre of fertilizer.
- c. **Includes:** Unit price includes, but is not limited to, furnishing, applying, and incorporating fertilizer to the area to be seeded.

3. Mulching:

- a. **Measurement:** Measurement will be in acres of mulch.
- b. **Payment:** Payment will be in unit price per acre of mulch.
- c. **Includes:** Unit price includes, but is not limited to, furnishing, applying, and incorporating mulch to the area to be seeded.

1.08 MEASUREMENT AND PAYMENT (Continued)**B. Seeding, Fertilizing, and Mulching for Hydraulic Seeding:**

1. **Measurement:** Measurement will be in acres for each type of seed.
2. **Payment:** Payment will be in unit price per acre for each type of seed.
3. **Includes:** Unit price includes, but is not limited to, removal of rock and other debris from the area; repairing rills and washes; preparing the seedbed; furnishing and placing seed, including any treatment required; furnishing and placing fertilizer and mulch; and furnishing water and other care during the care period, unless these items are bid separately.

C. Seeding, Fertilizing, and Mulching for Pneumatic Seeding:

1. **Measurement:** Measurement will be in acres for each type of seed.
2. **Payment:** Payment will be in unit price per acre for each type of seed.
3. **Includes:** Unit price includes, but is not limited to, removal of rock and other debris from the area; repairing rills and washes; preparing the seedbed; furnishing and placing seed, including any treatment required; furnishing and placing fertilizer and mulch; and furnishing water and other care during the care period, unless these items are bid separately.

D. Watering:

1. **Measurement:** Measurement will be by metering of water applied. If metering is not available, measurement will be by counting the loads from a transporting tank of known volume and gauging the contents of the transporting truck for partial loads.
2. **Payment:** Payment will be at the unit price per 1,000 gallons (MGAL) of water used.
3. **Includes:** Unit price includes, but is not limited to, water, pumps, meters, equipment, water tanker/container, transportation, hoses, and sprinklers.

E. Warranty:

1. **Measurement:** Lump sum item; no measurement will be made.
2. **Payment:** Payment will be at the lump sum price for the warranty.
3. **Includes:** Lump sum price includes, but is not limited to, all work required to correct any defects in the original placement of the seeding for the period of time designated.

PART 2 - PRODUCTS**2.01 SEED****A. General:**

1. Provide fresh, clean, new crop, certified seed complying with tolerance for germination and purity and free of poa annua, bent grass, and noxious weed seed. Furnish all seeds, including grass, legume, forbs, and cereal crop seeds, from an established seed dealer or certified seed grower. All materials and suppliers are to follow Iowa Seed Law and Iowa Department of Agriculture and Land Stewardship regulations, and be labeled accordingly.
 - a. Provide turfgrass with a certified "blue tag" or "gold tag."
 - b. Provide native grass and forbs that are source-identified as G0-Iowa certified "yellow tag," when available. If G0-Iowa certified "yellow tag" sourced seed is unavailable, or is only available from a single source, a substitution may be approved by the Engineer.
2. Mix seed to the specified proportions by weight. Use methods approved by the Engineer.

- B. Seed Quality:** Ensure the seed provided meets or exceeds the minimum requirements of purity and germination stated on an independent certificate of seed analysis document according to the Association of Official Seed Analysis (AOSA) rules. The seed certification tag and seed analysis document provided must be from the same lot number as shown on the seed tag. Ensure the date of test results is no greater than 9 months from the seed application date. Approval of all seed for use will be based on the accumulated total of Pure Live Seed (PLS) for each phase of work. PLS is obtained by multiplying purity times germination. PLS shall not be less than the accumulated total of the PLS specified.

If the seed does not comply with minimum requirements for purity and germination and such seed cannot be obtained, the Engineer may approve use of the seed on a basis of PLS or may authorize a suitable substitution for the seed specified.

C. Requirements on Containers:

1. **Seed:** Provide seed with a tag on each container. Ensure the seed analysis on the label is mechanically printed.
2. **Mulch:** When packaged, provide mulch in new labeled containers.
3. **Tackifier:** Provide tackifier packaged in new labeled containers.
4. **Inoculant:** Use inoculant that has a manufacturer's container, indicating the specific legume seed to be inoculated and the expiration date. All inoculant must meet requirements of the Iowa Seed Law. Follow precautions specified on the product label.
5. **Sticking Agent:** Use a commercial sticking agent recommended by the manufacturer of the inoculant. For quantities less than 50 pounds, the sticking agent need not be a commercial agent, but requires approval by the Engineer. Apply sticking agent separately prior to application of inoculant. Follow safety precautions specified on the product label.

2.01 SEED (Continued)**Table 9010.01: Domestic Grasses**

Common Name	Scientific Name	Purity (%)	Germination (%)
Bluegrass, Kentucky	<i>Poa pratensis</i>	85	80
Brome, smooth-LINCOLN	<i>Bromus inermis</i>	90	85
Fescue, creeping, red	<i>Festuca rubra</i>	98	85
Fescue, tall, FAWN	<i>Festuca arundinacea</i> -FAWN	98	85
Orchardgrass	<i>Dactylis glomerata</i>	90	90
Red top	<i>Agrostis alba</i>	92	85
Ryegrass, perennial	<i>Lolium perenne</i>	95	90
Wildrye, Canada	<i>Elymus Canadensis</i>	95	85
Wildrye, Russian	<i>Psathyrostachys junceus</i>	95	85

Table 9010.02: Legumes

Common Name	Scientific Name	Purity (%)	Germination (%)
Alfalfa, RANGER/VERNAL	<i>Medicago sativa</i>	99	90*
Alfalfa, travois	<i>Medicago</i> spp.	99	90*
Clover, Alsike	<i>Trifolium hybridum</i>	99	90*
Clover, red, medium	<i>Trifolium pratense</i>	99	90*
Clover, white	<i>Trifolium repens</i>	98	90*
Hairy vetch	<i>Vicia villosa</i>	96	85*
Lespedeza, Korean	<i>Lespedeza stipulacea</i>	98	80*

* Includes hard seed.

Table 9010.03: Stabilizing Crop

Common Name	Scientific Name	Purity (%)	Germination (%)
Oats	<i>Avena sativa</i>	97	90
Rye	<i>Secale cereale</i>	97	90
Sudangrass, PIPER	<i>Sorghum vulgare</i> var. sudanese	98	85

2.01 SEED (Continued)**Table 9010.04: Native Grasses**

Common Name	Scientific Name
Big bluestem*	<i>Andropogon gerardii</i>
Blue grama	<i>Bouteloua gracilis</i>
Blue-joint grass	<i>Calamagrostis Canadensis</i>
Bottlebrush sedge	<i>Carex hystericina</i>
Buffalograss*	<i>Buchloe dactyloides</i>
Common rush	<i>Juncus effusus</i>
Fowl bluegrass	<i>Poa palustris</i>
Fowl manna grass	<i>Glyceria striata</i>
Fox sedge	<i>Carex vulpinoidea</i>
Green bulrush	<i>Scirpus atrovirens</i>
Hairy wood chess	<i>Bromus purgans</i>
Indiangrass*	<i>Sorghastrum nutans</i>
Intermediate wheatgrass	<i>Agropyron intermedium</i>
Little bluestem*	<i>Andropogon scoparius</i>
Prairie dropseed	<i>Sporobolus heterolepis</i>
Reed manna grass	<i>Glyceria grandis</i>
Rice cutgrass	<i>Leersia oryzoides</i>
Rye grass, annual	<i>Lolium italicum</i>
Sand bluestem*	<i>Andropogon gerardii</i> , var. <i>paucipilus</i>
Sand dropseed	<i>Sporobolus cryptandrus</i>
Sand lovegrass	<i>Eragrostis trichodes</i>
Sideoats grama*	<i>Bouteloua curtipendula</i>
Slender wheatgrass	<i>Agropyron trachycaulum</i> , var. <i>unilaterale</i>
Spike rush	<i>Eleocharis palustris</i>
Softstem bulrush	<i>Schoenoplectus tabernaemontani</i>
Switchgrass*	<i>Panicum virgatum</i>
Tussock sedge	<i>Carex stricta</i>
Virginia wild-rye	<i>Elymus virginicus</i>
Weeping lovegrass	<i>Eragrostis curvula</i>
Western wheatgrass*	<i>Agropyron smithii</i>
Wool grass	<i>Scirpus cyperinus</i>

2.01 SEED (Continued)

Table 9010.05: Forbs

Common Name	Scientific Name
Black-eyed Susan	<i>Rudbeckia hirta</i>
Blue-flag iris	<i>Iris virginica-shrevii</i>
Boneset	<i>Eupatorium perfoliatum</i>
Canadian anemone	<i>Anemone canadensis</i>
Common mountainmint	<i>Pycnanthemum virginianum</i>
Common rush	<i>Juncus effusus</i>
Fowl manna grass	<i>Glyceria striata</i>
Golden Alexanders	<i>Zizia aurea</i>
Great blue lobelia	<i>Lobelia siphilitica</i>
Grey-headed coneflower	<i>Ratibida pinnata</i>
Heath aster	<i>Symphyotrichum ericoides</i>
Ironweed	<i>Veronia fasciculata</i>
Joe-pye weed	<i>Eupatorium maculatum</i>
Meadow blazingstar	<i>Liatris ligulistylis</i>
Milkweed, butterfly	<i>Asclepias tuberosa</i>
Milkweed, swamp	<i>Asclepias incarnata</i>
New England aster	<i>Symphyotrichum novae-angliae</i>
Ohio spiderwort	<i>Tradescantia ohimensis</i>
Oxeye sunflower	<i>Heliopsis helianthoides</i>
Pale purple coneflower	<i>Echinacea pallida</i>
Partridge pea	<i>Chamaecrista fasciculata</i>
Prairie blazing star	<i>Liatris pycnostachya</i>
Purple prairie clover	<i>Dalea purpurea</i>
Rattlesnake master	<i>Eryngium yuccifolium</i>
Reed manna grass	<i>Glyceria grandis</i>
Rice cutgrass	<i>Leersia oryzoides</i>
Showy goldenrod	<i>Solidago speciosa</i>
Showy tic-trefoil	<i>Desmodium canadense</i>
Stiff goldenrod	<i>Solidago rigida</i>
Swamp aster	<i>Aster puniceus</i>
White wild indigo	<i>Baptisia alba</i>
Wild bergamot	<i>Monarda fistulosa</i>

2.02 SEED MIXTURES AND SEEDING DATES

See the contract documents for the specified seed mixture. If a mixture is not specified, use the following. The Contractor may submit a modification of the mixture for the Engineer's consideration.

- A. Type 1 (Permanent Lawn Mixture):** Used for residential and commercial turf site, fertilized, and typically mowed. Use between March 1 and May 31 and between August 10 and September 30.

Table 9010.06: Type 1 Seed Mixture¹

Common Name	Application Rate lb/acre
Creeping red fescue	25
Turf-type perennial ryegrass ²	20
Turf-type perennial ryegrass ²	20
Kentucky bluegrass cultivar ³	65
Kentucky bluegrass cultivar ³	65
Kentucky bluegrass cultivar ³	65

¹ A commercial mixture may be used if it contains a high percentage of similar bluegrasses; it may or may not contain creeping red fescue.

² Choose two different cultivars of turf-type perennial ryegrass, at 20 lbs/acre each.

³ Choose three different cultivars of Kentucky bluegrass, at 65 lbs/acre each.

- B. Type 2 (Permanent Cool Season Mixture for Slopes and Ditches):** Not typically mowed. Reaches a maximum height of 2 to 3 feet, low fertility requirements, grows in the spring and fall, and can go dormant in the summer. Use between March 1 and May 31 and between August 10 and September 30.

Table 9010.07: Type 2 Seed Mixture

Common Name	Application Rate lb/acre
Tall fescue ¹	100
Kentucky bluegrass	20
Ryegrass, perennial ²	75

¹ Use endophyte free cultivars including Fawn, K-31, or a combination.

² Use cultivars including Linn, Amazon, Noriea, or Nui, or a combination.

- C. Type 3 (Permanent Warm-Season Slope and Ditch Mixture):** Not typically mowed. Reaches a height of 5 to 6 feet, stays green throughout summer, and responds well to being burned in spring; no fertilizer. Use between March 1 and June 30.

Table 9010.08: Type 3 Seed Mixture

Common Name	Application Rate lb/acre
Big bluestem*	3 PLS
Grain rye	40
Indiangrass*	4 PLS
Little bluestem*	3 PLS
Oats	16
Sideoats grama*	5 PLS
Switchgrass*	1 PLS

* Furnish seed certified as Source Identified Class (Yellow Tag) Source G0-Iowa.

2.02 SEED MIXTURES AND SEEDING DATES (Continued)

- D. Type 4 (Urban Temporary Erosion Control Mixture):** Short lived (6 to 8 months) mix for erosion control.

Table 9010.09: Type 4 Seed Mixture

Common Name	Application Rate lb/acre
<i>SPRING - March 1 - May 20</i>	
Annual ryegrass	40
Oats*	65
<i>SUMMER - May 21 - August 14</i>	
Annual ryegrass	50
Oats*	95
<i>FALL - August 15 - September 30</i>	
Annual Ryegrass	40
Grain rye	65

* Engineer may delete for previously established urban areas.

- E. Type 5 (Rural Temporary Erosion Control Mixture):** Short lived mix for erosion control.

Table 9010.10: Type 5 Seed Mixture

Common Name	Application lb/acre
<i>March 1 - October 31</i>	
Canada wildrye	5 PLS/acre
Grain rye	50
Oats	50
<i>November 1 - February 28 (or 29)</i>	
Canada wildrye	7 PLS/acre
Grain rye	62
Oats	62

Seed does not need to be certified Source Identified Class (Yellow Tag).

- F. Type 6 (Salt-resistant Mixture):** Use for grass medians and areas immediately back of curb on streets subject to regular salt applications for winter de-icing. Apply between March 1 and May 31 and between August 10 and September 30.

Table 9010.11: Type 6 Seed Mixture

Common Name	Application Rate lb/acre	Purity (%)	Germination (%)
Blue chip Kentucky bluegrass	37.5	90	85
Fults alkali grass	75	98	85
Hard fescue	50	95	85
Nubue Kentucky bluegrass	37.5	90	85
Sheeps fescue	50	90	85

2.02 SEED MIXTURES AND SEEDING DATES (Continued)

- G. Wetland Seeding:** Between April 1 and June 30, use the following seed mixture for wetland grass seeding areas.

Table 9010.12: Wetland Grass Seed Mixture

Common Name	Scientific Name	PLS** (per ac)
Arrowhead	<i>Sagittaria latifolia</i>	4 oz
Big bluestem*	<i>Andropogon gerardii</i>	1 lb
Bluejoint grass	<i>Calamagrostis</i>	1 oz
Blue vervain	<i>Verbena Hastata</i>	1 oz
Boneset	<i>Eupatorium perfoliatum</i>	1 oz
Broom sedge	<i>Carex scoparia</i>	2 oz
Dark green bulrush*	<i>Scirpus atrovirens</i>	1 oz
Fox sedge*	<i>Carex vulpinoidea</i>	4 oz
New England aster*	<i>Symphotrichum novae-angliae</i>	2 oz
Nodding bur marigold	<i>Bidens cernua</i>	8 oz
Porcupine sedge	<i>Carex hystericina</i>	8 oz
Prairie cordgrass	<i>Spartina pectinata</i>	1 lb
Rice cutgrass	<i>Leersia oryzoides</i>	4 oz
Sneezeweed	<i>Helenium autumnale</i>	2 oz
Softstem bulrush	<i>Schoenoplectus tabernaemontani</i>	8 oz
Spike rush	<i>Eleocharis palustris</i>	4 oz
Swamp milkweed*	<i>Asclepias incarnata</i>	1 lb
Switchgrass*	<i>Panicum virgatum</i>	8 oz
Tussock sedge	<i>Carex stricta</i>	2 oz
Virginia wild-rye*	<i>Elymus virginicus</i>	5 lbs
Water plantain	<i>Alisma plantago-aquatica</i>	4 oz

* Furnish seed certified as Source Identified Class (Yellow Tag) Source G0-Iowa.

** Seeding rates for wetland grasses are given as PLS. Either the germination test or Tetrazolium (TZ) test is acceptable to determine PLS for native species.

2.02 SEED MIXTURES AND SEEDING DATES (Continued)

H. Native Grass and Forbs (Wildflower) Seeding: Between April 1 and June 30, use the following seed mixture for areas designated for native grass and wildflower seeding.

Table 9010.13: Native Grass and Forbs (Wildflower) Seeding Mixture

Common Name	Scientific Name	Application Rate**
GRASSES		lb/acre
Big bluestem*	Andropogon gerardii	1.0
Canada wild rye	Elymus Canadensis	1.5
Indiangrass*	Sorghastrum nutans	1.0
Little bluestem*	Schizachyrium scorparium	2.0
Sideoats grama*	Boutelouea curtipendula	2.5
Switchgrass*	Panicum virgatum	0.5
FORBS (WILDFLOWERS)		oz/acre
Black-eyed Susan	Rudbeckia hirta	3.0
Butterfly milkweed	Asclepias tuberosa	4.0
Canadian anemone	Anemone canadensis	0.5
Common mountainmint	Pycnanthemum virginianum	0.25
Golden Alexanders	Zizia aurea	8.0
Grey-headed coneflower	Ratibida pinnata	2.75
Heath aster	Symphyotrichum ericoides	0.25
Ironweed	Veronia faxiculate	3.0
New England aster	Symphyotrichum novae-angliae	1.25
Ohio spiderwort	Tradescantia ohiensis	7.0
Oxeye sunflower	Heliopsis helianthoides	12.0
Pale purple coneflower	Echinacea pallida	15.0
Partridge pea	Chamaecrista fasciculate	32.0
Prairie blazing star	Liatris pycnostachya	4.5
Purple prairie clover	Dalea purpurea	2.5
Rattlesnake master	Eryngium yuccifolium	1.75
Showy goldenrod	Solidago speciosa	0.50
Stiff goldenrod	Solidago rigida	1.0
Swamp milkweed	Asclepias incarnata	4.0
White wild indigo	Baptisia alba	2.0
Wild bergamot	Monarda fistulosa	1.25
NURSE CROP		lb/acre
Oats (spring seeding - April 1 to June 30)		32
Winter wheat (dormant/frost seeding - November 1 to March 31)		25

* Furnish seed certified as Source Identified Class (Yellow Tag) Source G0-Iowa.

** Seeding rates for native grass and forb species are given as PLS. Either the germination test or Tetrazolium (TZ) test is acceptable to determine PLS for native species.

2.03 FERTILIZER

Use fertilizer of the grade, type, and form specified that complies with rules of the Iowa Department of Agriculture and Land Stewardship and the following requirements:

- A. Grade:** Identify the grade of fertilizer according to the percent nitrogen (N), percent of available phosphoric acid (P_2O_5), and percent water soluble potassium (K_2O), in that order, and base approval on that identification.

The Contractor may substitute other fertilizer containing analysis percentages different from those specified, provided that the minimum amounts of actual nitrogen, phosphate, and potash per acre are supplied, and that in no case does the total amount per acre of the three fertilizer elements be exceeded by 30% of the following minimum amounts.

- 1. For Conventional Seeding, Permanent:** Apply a 6-24-24 commercial fertilizer or the equivalent units of nitrogen, phosphate, and potash at the rate of 300 pounds per acre.
- 2. For Conventional Seeding, Temporary:** Apply commercial fertilizer to all seeded areas at the rate of 250 pounds per acre of 13-13-13 (or equivalent) for rural mixes and 300 pounds per acre of 6-24-24 (or equivalent) for urban mixes, unless otherwise specified in the contract documents.
- 3. For Hydraulic Seeding:** Apply fertilizer in combination with seeding by a hydraulic seeder and as specified in Iowa DOT Article 2601.03, B. Apply a commercial fertilizer or the equivalent units of nitrogen, phosphate, and potash at the rate specified for the type of seeding being applied.
- 4. For Pneumatic Seeding:** Based on the compost nutrient analysis, supply any additional commercial fertilizer necessary to meet the 13-13-13 units of nitrogen, phosphate, and potash at the rate of 450 pounds per acre as the compost is applied.

- B. Type:** Use fertilizer that can be uniformly distributed by the application equipment. Furnish fertilizer either as separate ingredients or in chemically-combined form.

2.04 STICKING AGENT

- A.** Use a sticking agent that is a commercial material recommended by the manufacturer to improve adhesion of inoculant to the seed. For small quantities less than 50 pounds, the sticking agent need not be a commercial agent, but it must be approved by the Engineer and must be applied separately, prior to application of inoculant.
- B.** Follow safety precautions specified on the product label. A sticking agent is not required if a liquid formulation of inoculant is used.

2.05 INOCULANT FOR LEGUMES

An inoculant is a culture of bacteria specifically formulated for each legume seed (alfalfa, clovers, lespedesa, and hairy vetch). Ensure the manufacturer's container indicates the specific legume seed to be inoculated and the expiration date. Use inoculant that meets the requirements of the Iowa Seed Law. Follow the safety precautions specified on the product label.

2.06 WATER

Use water that is free of any substance harmful to seed germination or plant growth.

2.07 MULCH**A. For Conventional Seeding:**

1. Material used as mulch may consist of the following:
 - a. Dry cereal straw (oats, wheat, barley, or rye)
 - b. Prairie hay
 - c. Wood excelsior composed of wood fibers, at least 8 inches long, based on an average of 100 fibers, and approximately 0.024 inch thick and 0.031 inch wide. The fibers must be cut from green wood and be reasonably free of seeds or other viable plant material.
2. Do not use other hay (bromegrass, timothy, orchard grass, alfalfa, or clover).
3. All material used as mulch must be free from all noxious weed, seed-bearing stalks, or roots and will be inspected and approved by the Engineer prior to its use.
4. The Contractor may use other materials, subject to the approval of the Engineer.

B. For Hydraulic Seeding:

1. Wood Cellulose:
 - a. Use material that is a natural or cooked cellulose fiber processed from whole wood chips, or a combination of up to 50% of cellulose fiber produced from whole wood chips, recycled fiber from sawdust, or recycled paper (by volume).
 - b. Product contains a colloidal polysaccharide tackifier adhered to the fiber to prevent separation during shipment and avoid chemical co-agglomeration during mixing.
 - c. Form a homogeneous slurry of material, tackifier, and water.
 - d. Use a slurry that can be applied with standard hydraulic mulching equipment.
 - e. Dye the slurry green to facilitate visual metering during application.
 - f. Do not use materials that have growth or germination-inhibiting factors or any toxic effect on plant or animal life when combined with seed or fertilizer.
2. Bonded Fiber Matrix (BFM):
 - a. Manufactured to be applied hydraulically.
 - b. Dyed to facilitate visual metering.
 - c. All components pre-packaged by manufacturer to ensure material performance and compliance. Field mixing of additives or any components will not be allowed.
 - d. Meet the following requirements:
 - 1) Contain non-toxic tackifiers that upon drying become insoluble and non-dispersible to eliminate direct raindrop impact on soil according to ASTM D 7101 and EPA 2021.0-1.
 - 2) Contain no germination or growth inhibiting factors and do not form a water-resistant crust that can inhibit plant growth.
 - 3) Hydraulic mulch that is completely photo-degradable or biodegradable.
 - 4) Have a rainfall event (R-factor) of $140 < R$ according to ASTM D 6459.
 - 5) Have a cover factor of $C \leq 0.03$ according to ASTM D 6459.
 - 6) Vegetation Establishment of 400% minimum according to ASTM D 7322.
 - 7) Water Holding Capacity 600% minimum according to ASTM D 7367.
3. Mechanically-Bonded Fiber Matrix (MBFM):
 - a. Manufactured to be applied hydraulically.
 - b. Dyed to facilitate visual metering.
 - c. All components pre-packaged by manufacturer to ensure material performance and compliance. Field mixing of additives or any components will not be allowed.

2.07 MULCH (Continued)

- d. Meet the following requirements:
- 1) Contain non-toxic tackifiers that upon drying become insoluble and non-dispersible to eliminate direct raindrop impact on soil according to ASTM D 7101 and EPA 2021.0-1.
 - 2) Contain no germination or growth inhibiting factors and do not form a water-resistant crust that can inhibit plant growth.
 - 3) Hydraulic mulch that is completely photo-degradable or biodegradable.
 - 4) Have a rainfall event (R-factor) of $162 < R$ according to ASTM D 6459.
 - 5) Have a cover factor of $C \leq 0.01$ according to ASTM D 6459.
 - 6) Vegetation establishment of 500% minimum according to ASTM D 7322.
 - 7) Water holding capacity of 700% minimum according to ASTM D 7367.

C. For Pneumatic Seeding: Use compost meeting the following requirements.

1. Derived from a well-decomposed source of organic matter.
2. Produced using an aerobic composting process, meeting Code of Federal Regulations (CFR) 503 for time, temperature, and heavy metal concentrations.
3. No visible admixture of refuse or other physical contaminants, nor any material toxic to plant growth.
4. Certified by the U.S. Composting Council's Seal of Testing Assurance (STA) program.
5. Conforms to chemical, physical, and biological parameters of AASHTO R 52, with the following additional requirements:
 - a. Follow U.S. Composting Council's TMECC guidelines for all testing.
 - b. Organic Matter Content: 30% minimum.
 - c. pH: between 6.0 and 8.0.
 - d. Maturity (growth screening): Minimum 90% emergence for all compost to be vegetated.
 - e. Particle Size:

Sieve Size	Percent Passing*
2"	100
1"	90-100
3/4"	65-100
3/8"	0-75

*6 inch maximum particle length.

PART 3 - EXECUTION**3.01 EQUIPMENT**

- A. Aerial Equipment:** When aerial application of seed and fertilizer is specified, use aerial equipment capable of providing a uniform distribution of seed and fertilizer on the specified area.
- B. Compost Blower:** A compost blower is pneumatic equipment to blow compost over the desired area. It may be equipped with a supplemental seed injection system. Use equipment with sufficient power to cover the required area without driving on the prepared seedbed.
- C. Cultipacker:** Use a pull-type cultipacker with individual rollers or wheels. Cultipackers with sprocket-type spacers between the wheels may be used. The cultipacker must produce a corrugated surface on the area being compacted. Operate the cultipacker separately from all other operations, and do not attach the cultipacker to the seeder or disk, unless combined cultipacker seeder is manufactured to operate as a unit. Make provisions for addition of weight.
- D. Disk:** When preparing a seedbed on ground having heavy vegetation, use a disk with cutaway blades. Make provisions for the addition of weight to obtain proper cutting depth.
- E. Drop Seeder:** Use one piece of equipment containing pulverizer rollers in front of the seed tubes, ground driven seed meters, maximum seed tube spacing of 3 inches delivering seed between the pulverizer rollers and packer wheels, and packer wheels that press and firmly pack seed into the soil.
- F. Endgate Cyclone Seeders:** Endgate cyclone seeders must be suitably mounted. Movement must be provided by mechanical means. The seed drops through an adjustable flow regulator onto a rotating, power driven, horizontal disk or fan.
- G. Expanded Mesh Roller:** Use equipment that is an open grid type or a cultipacker type, modified by covering with expanded metal mesh.
- H. Field Tiller:** Use equipment designed for the preparation of the seedbed to the degree specified.
- I. Gravity Seeders:** Gravity seeders must provide agitation of the seed, have an adjustable gate opening, and uniformly distribute seed on the prepared seedbed. Use a seed hopper equipped with baffle plates spaced no more than 2 feet apart. The baffle plates must extend from the agitator shaft to within approximately 2 inches of the top of the seed hopper. Wind guards are required to facilitate seeding when moderate wind conditions exist and when ordered by the Engineer. Place wind guards in front or in back (or both) of the seed outlet and extend them to near the ground line. This seeder may be used for application of fertilizer.
- J. Hand Cyclone Seeders:** Hand cyclone seeders are carried by the person dispensing seed. The seed drops through an adjustable flow regulator onto a rotating, hand driven, horizontal disk or fan.
- K. Hydraulic Seeder:** Use hydraulic seeding equipment with a pump rated at no less than 100 gallons per minute. Inoculant, seed, and fertilizer may be applied in a single operation. The equipment must have a suitable working pressure and a nozzle adapted to the type of work. Supply tanks must have a means of agitation. Calibrate tanks and provide them with a calibration stick or other approved device to indicate the volume used or remaining in the tank.
- L. Mowers:** Use mowers that are rotary, flail, disk, or sickle type. Do not use mowers that bunch or windrow the mowed material.

3.01 EQUIPMENT (Continued)

- M. Mulch Anchoring Equipment:** Use mulch anchoring equipment designed to anchor straw or hay mulch into soil by means of dull blades or disks. It should have flat blades or disks, may have cutaway edges and must be spaced at approximately 8 inch intervals. The mulch anchoring equipment must be pulled by mechanical means and weigh approximately 1,000 pounds. When directed by the Engineer, increase the weight by addition of ballast.
- N. Native Grass Seed Drill:** Use a native grass seed drill designed to provide uniform distribution of native grass and wildflower seeds. Provide separate seed boxes to apply both small seeds as well as fluffy bearded seeds. If a no-till attachment is specified, use an attachment of the same manufacturer as the drill.
- O. Pneumatic Seeder:** Use an air blown system with sufficient power and hose to reach 300 feet.
- P. Pulverizer:** Use equipment designed to break up compacted soil to prepare a seedbed.
- Q. Rotary Tiller:** Use equipment with rotary-type blades designed for the preparation of seedbed to the degree specified.
- R. Slit Seeder:** Use a gas, diesel or electric powered mechanical slit seeder that is capable of cutting vertical grooves a maximum of 1/4 inch deep into the soil with a maximum horizontal blade spacing of 3 inches, deposits metered seed directly after the formation of the vertical grooves, and contains packer wheels that press and firmly pack seed into the soil.
- S. Slope Harrow:** Use a slope harrow, consisting of a rolling weight attached by heavy chain to a tractor. The chain must be of suitable length, with picks attached, and a means of rotating the picks as the rolling weight is pulled in a direction parallel to the movement of the tractor.
- T. Spike Tooth Harrow:** Use equipment designed to provide adjustment of the spike teeth to level the ground, or to be used as specified by the Engineer.
- U. Straw Mulching Machine:** Use a machine to uniformly apply mulch material over the desired area without excessive pulverization. Excessive pulverization is the general absence of straw longer than 6 inches after distribution.

3.02 AREA OF SEEDING

Place seed only in the areas specified in the contract documents. Repair damaged areas that are disturbed outside the contract limits at the expense of the Contractor. Do not disturb areas having a satisfactory growth of desirable grasses or legumes.

3.03 FINISH GRADING AND TOPSOIL

See Section 2010 for finish grading and topsoil placement.

3.04 CONVENTIONAL SEEDING

- A. Order of Operations:** 1) fertilizing, 2) seedbed preparation, 3) seed preparation/application, and 4) mulching.
- B. Fertilizing:**
1. Apply fertilizer immediately prior to seedbed preparation. Incorporate the fertilizer into the top 2 to 3 inches of topsoil during the seedbed preparation. Equipment that results in ruts or excessive compaction will not be allowed.
 2. Do not apply fertilizer with native grass, wildflower, or wetland seeding.

3.04 CONVENTIONAL SEEDING (Continued)**C. Seedbed Preparation, Permanent:**

1. Limit preparation of seedbed to areas that will be seeded immediately upon completion.
2. Work areas accessible to field equipment to a depth of no less than 3 inches. Use mechanical rotary tillage equipment for the preparation of seedbed on earth shoulders, urban or raised medians, and rest areas. Prepare by hand areas inaccessible to field machinery, to a depth of no less than 2 inches. Use care that the entire width of the shoulder and areas around headwalls, wingwalls, flumes, and other structures are prepared in the manner specified. Where weed growth has developed extensively, they may be disked into the ground. If weed growth develops sufficiently to interfere with proper seedbed preparation, mow the weeds and remove them from the project at no additional cost to the Contracting Authority.

Use crawler type or dual-wheeled tractors for seedbed preparation. Operate equipment in a manner to minimize displacement of soil and disturbance of the design cross-section. Harrow ridging in excess of 4 inches due to operation of tillage equipment prior to rolling with the cultipacker. Roll the area with no less than one pass of the cultipacker prior to permanent seeding.

3. Shape and fine grade to remove rills or gullies, water pockets, undesirable vegetation, and irregularities to provide a smooth, firm, and even surface true to grade and cross-section. For Type 1 (lawn seeding), prepare to a fine texture and without soil lumps. Coordinate preparation of all ditches designated for special ditch control with the seedbed preparation. Till parallel to the contours.
4. Smooth the seedbed with a cultivator-type tillage tool having a rake bar or a rock rake. Pick up and remove all debris, such as rocks, stones, concrete larger than 2 inches (1/2 inch maximum for lawn seeding), or roots and other objectionable material that will interfere with the seeding operation. A spring tooth cultivator may be used in lieu of a rock picker. Remove the rock by hand after each use of the cultivator; repeat the process until the soil is relatively free of rock as determined by the Engineer.
5. Choose equipment to minimize soil compaction. Operate equipment in a manner to minimize displacement of soil and disturbance of the design cross-section. Roll the area with at least one pass of the cultipacker. Remove ruts that develop during the sequence of operations before subsequent operations are performed. This must be completed just prior to seeding and the work approved by the Engineer before the seeding application.

D. Seedbed Preparation, Temporary: Till the soil to a minimum depth of 5 inches with a disk, harrow, or field cultivator.

E. Seeding:**1. Seed Preparation:**

- a. Thoroughly mix all seed specified for the contract prior to placing the seed in the seed hopper. Provide 48 hours notice prior to mixing the seed, and give the Engineer an opportunity to witness the seed mixing. The mixing of a certified blue tag seed mix at an approved (by Iowa Crop Improvement Association) seed conditioner's facility need not be witnessed.
- b. Treat all legume seed with a commercial sticking agent to be applied prior to application of inoculant, or as a mixture when the sticking agent is compatible with other materials. A sticking agent is not required if a liquid formulation of inoculant is used. Use mechanical mixing equipment to apply sticking agent and inoculant on seed quantities over 50 pounds.

3.04 CONVENTIONAL SEEDING (Continued)

- c. Inoculate all legumes with a standard product humus culture before being mixed with other seeds for sowing.
- d. Inoculate all legumes with a standard culture at the rate specified by the manufacturer of the inoculant according to Iowa DOT Article 4169.04. Do not expose inoculated seed to direct sunlight for more than 30 minutes. Re-inoculate seed that is not sown within 8 hours after inoculation prior to use. Pre-inoculated seed with manufacturer's recommended protective coating may be used in lieu of seed with Contractor-applied inoculant.
- e. When the gravity or cyclone seeder is used for application of seed, inoculate legume seed according to the manufacturer's recommended procedures, before mixing with other grass seeds for sowing. Furnish and apply inoculant.

2. Seed Application, Permanent:

- a. Prior to seeding, the seedbed will be inspected and approved by the Engineer. Use methods and procedures consistent with equipment manufacturer's recommendations; however, do not operate ground-driven equipment at speeds greater than 10 mph.
- b. On all areas accessible to machinery, sow seed with a gravity seeder, endgate cyclone seeder, or seed drill.
- c. On areas inaccessible to field machinery, the use of hand-operated cyclone seeders will be allowed, but no other hand-seeding methods will be accepted.
- d. The application of grass and legume seed with hand seeders on early spring work must be performed as separate operations. No mixing of the two types of seed will be allowed.
- e. All seeded areas will have one pass with a roller or cultipacker to firm the soil.

3. Seed Application, Temporary:

- a. On areas accessible to field machinery, sow seed with an endgate cyclone seeder.
- b. On areas inaccessible to field machinery, the use of hand-operated cyclone seeders will be allowed, but no other hand-operated seeding methods will be accepted.
- c. Cover the seed and fertilizer by lightly tilling the seeded area with a disk, rigid harrow, spring tooth harrow, or field cultivator.

4. Seeding Outside of the Specified Seeding Dates: With the agreement of the Engineer and at the full responsibility of the Contractor, seeding operations for all seed types may be conducted outside the specified seeding dates. Should the seeded areas require reseeding, it must be done as specified and at no additional cost to the Contracting Authority.

- a. **Dormant Seeding:** When winter dormant seeding is allowed or specified by the Jurisdiction, complete it when air temperatures are consistently below 40°F and prior to December 25 of a given year. Dormant seeding is not allowed on snow.

- 1) Prepare the seedbed before the ground freezes.
- 2) To ensure protection of the seed, apply on a frosty morning or before a predicted snow.
- 3) Seeding may be done by hand or with seeding equipment.
- 4) For hydraulic seeding, apply the fertilizer at no more than 0.5 pounds nitrogen per 1000 square feet, followed by the seed.

- b. **Frost Seeding (Overseeding):**

- 1) Complete frost seeding, also referred to as overseeding, in the spring when the ground is friable from frost action (February 1 to April 1).
- 2) Frost seeding is not allowed on more than 1 inch of snow.
- 3) Seeding can be done with a hand-operated cyclone seeder or other equipment.
- 4) Seedbed preparation will not be required provided the ground is friable from frost action.

3.04 CONVENTIONAL SEEDING (Continued)**F. Mulching:**

1. Mulch all conventionally seeded areas the same day the seed is sown. Uniformly distribute the mulch over the required areas at a rate of 1.5 tons/acre for dry cereal straw, or native grass straw. Prairie hay is not suitable for Type 1 (lawn seeding).
2. Work the mulch into the soil with mulch anchoring equipment designed to anchor the mulch into the soil by means of dull blades or disks with a minimum of two passes. Operate equipment in a manner to minimize displacement of the soil and disturbance of the design cross-section.
3. Do not operate mulch-blowing equipment on slopes steeper than 2.5 to 1 or on slopes that may rut. Use attachments to apply mulch without traversing slopes.
4. Do not mulch when wind velocities exceed 15 mph.

3.05 HYDRAULIC SEEDING**A. Order of Operations:**

1. Seedbed preparation
2. Seed application, fertilizing, and mulching

B. Seedbed Preparation: Follow seedbed preparation for conventional seeding in Section 9010, 3.04.

C. Seed Preparation: Inoculant, in the quantities specified above, may be applied directly into the supply tank with seed, water, and other material.

D. Seed Application, Fertilizing, and Mulching:

1. Application Process:
 - a. Combination: Place all material, seed, fertilizer, mulch, and tackifier (if applicable) in hydraulic mulching equipment specifically manufactured for hydraulic seeding.
 - b. Separate: At the Contractor's option and at no additional cost to the Contracting Authority, the hydraulic seeding, fertilizing, and mulching may be undertaken separately. If hydraulic seeding is done separately, add 50 pounds of wood cellulose fiber complying with Section 9010, 2.07, B as a tracer for each 500 gallons of water in the hydraulic seeder tank. If operations are undertaken separately, complete fertilizing and mulching application within 24 hours of completing seeding work. Do not separate the applications if inclement weather is forecasted within 24 hours of the scheduled application period.
2. Ensure the hydraulic equipment, pump, and application process do not damage or crack seeds.
3. Mix materials with fresh potable water using a combination of both recirculation through the equipment's pump, and mechanical agitation to form a homogeneous slurry.
4. Apply mixture within 1 hour after seed and fertilizer are placed in the hydraulic seeder.
5. If necessary, dampen dry, dusty soil, to prevent balling of the material during application.

3.05 HYDRAULIC SEEDING (Continued)

6. Apply the slurry evenly over all specified areas at component material rates specified.
 - a. Wood Cellulose Mulch:
 - 1) Mulch: Minimum 3,000 lb/acre dry weight.
 - 2) Tackifier: Minimum 50 lb/acre.
 - b. Bonded Fiber Matrix: Minimum 3,000 lb/acre dry weight.
 - c. Mechanically-bonded Fiber Matrix: Minimum 3,000 lb/acre dry weight.
 7. Retain and count empty bags of mulch to ensure final application rate.
 8. Hydromulching may be done over conventional seeding and/or fertilizing, if approved by the Engineer.
- E. Native Grass, Wildflower, and Wetland Grass Seeding:** Hydraulic seeding of native grasses, wildflowers, and wetland grasses is allowed only if approved by the Engineer. If allowed, increase specific seed rates by 25%. Do not apply fertilizer.

3.06 PNEUMATIC SEEDING

- A. Order of Operations:** 1) seedbed preparation, 2) seed preparation, and 3) seed application.
- B. Seedbed Preparation:** Follow seedbed preparation for conventional seeding in Section 9010, 3.04.
- C. Seed Preparation:** Follow seed preparation for conventional seeding in Section 9010, 3.04. Pre-inoculate seed in the quantities specified above prior to placing in the seed equipment.
- D. Seed Application:**
1. Place all material, seed, fertilizer, and compost in equipment with a calibrated seeder attachment specifically designed for pneumatic seeding. Do not apply fertilizer with native grass, wildflower, or wetland seeding.
 2. Apply compost to a 1 inch minimum depth on all designated disturbed areas. Apply the compost with a pneumatic (air blower) system with sufficient power and hose to reach 300 feet. Driving on the soil to apply compost will not be allowed.
 3. Inject seed and fertilizer into the top 1/4 inch to 1/2 inch of compost during application with a calibrated seed injector at the specified rate. Do not inject native grasses and forbs more than 1/4 inch.

3.07 WATERING

- A.** Provide water, equipment, transportation, water tanker, hoses, and sprinklers.
- B.** Use enough water to keep the soil and mulch moist to a depth of 1 inch and ensure growth of the seed. For turfgrass seeding areas, sufficiently water to keep the soil moist for a minimum of 21 days. If natural rainfall is adequate to keep the soil and mulch moist, artificial watering may not be needed.

3.08 RE-SEEDING

- A.** 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.
- B.** 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 no additional cost to the Contracting Authority.

3.09 CLEAN UP

All work related to clean up throughout the project and upon completion is the responsibility of the Contractor, at no additional cost to the Contracting Authority.

- A. Remove all excess materials, debris, and equipment upon completion of work.
- B. Clean all paved surfaces open for public use at the end of each day and prior to forecasted precipitation.
- C. Repair any damage resulting from seeding operations.
- D. Remove hydraulic slurry and other excess debris related to seeding operations from buildings, landscaping, mulch, pavement, signs, sign posts, and any other areas not specified for application, at the end of each day.

3.10 ACCEPTANCE AND WARRANTY**A. Acceptance:**

- 1. Guarantee in writing that all work has been completed as specified and provide the date that all activities were completed. When a warranty is a separately-bid item, this also establishes the beginning of the warranty period.
- 2. Acceptance will occur, provided seeded areas are in a live, healthy, growing, and well-established condition without eroded areas, bare spots, weeds, undesirable grasses, disease, or insects.
 - a. Projects without a separately-bid warranty will be accepted no sooner than 60 days from the date that all activities were completed.
 - b. When a warranty is established as a bid item and the warranty period exceeds 60 days, projects may be accepted after all specified work, excluding the warranty, is satisfactorily completed, and a supplemental contract for the warranty is executed according to the Code of Iowa Section 573.27.

B. Warranty:

- 1. Required only when established as a bid item by the Engineer.
- 2. The warranty is to guarantee completed seeding areas for a maximum period of twelve months.
- 3. During the warranty period, correct and reseed any defects in the seeded areas and grass stand, such as weedy areas, eroded areas, and bare spots, until all affected areas are accepted by the Engineer.
- 4. Replace or repair to original condition, all damages to property resulting from the seeding operation or from the remedying of defects, at the Contractor's expense.
- 5. Replacement costs are the Contractor's responsibility, except for those resulting from loss or damage due to occupancy of the project in any part, vandalism, civil disobedience, acts of neglect on the part of others, physical damage by animals, vehicles, fire, or losses due to curtailment of water by local authority, or by "Acts of God."

END OF SECTION

EROSION AND SEDIMENT CONTROL**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. NPDES General Permit No. 2
- B. Stormwater Pollution Prevention Plan (SWPPP)
- C. Erosion Control Measures
- D. Velocity and Flow Control Measures
- E. Sediment Control Measures
- F. Application/Installation of Measures
- G. Removal/Replacement of Measures

1.02 DESCRIPTION OF WORK

- A. Furnish all materials; install, construct, maintain, and remove specified erosion control devices; at locations specified in the contract documents, or where specified by the Engineer.
- B. Complete the required construction work on this project, while minimizing soil erosion and controlling water pollution. Maintain these features as specified, from initial construction stages to final completion of the project.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Upon request, provide copies of all records and documentation related to compliance with the Iowa DNR NPDES Permit.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 - General Provisions and Covenants.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Implement erosion and sediment control measures at the appropriate time(s).
- B. Coordinate construction to minimize damage to erosion and sediment control devices.

1.07 SPECIAL REQUIREMENTS**A. Permit:**

1. When applicable, comply with the requirements of the Iowa Department of Natural Resources, *NPDES (National Pollutant Discharge Elimination System) General Permit No. 2 for Stormwater Discharge Associated with Industrial Activity for Construction Activities*, and the Stormwater Pollution Prevention Plan.
2. For projects covered under the Iowa DNR General Permit No. 2, sign on as a co-permittee with the owner and any other contractors or subcontractors.
3. When applicable, comply with the local jurisdiction's permitting requirements.

B. Protection of Property: Prevent accumulation of soil, sediment, or debris from project site onto adjoining public or private property. Remove any accumulation of soil or debris immediately, and take remedial actions for prevention.

C. Permit Compliance: When applicable, conduct all operations in compliance with the Iowa DNR NPDES General Permit No. 2. Labor, equipment, or materials not included as a bid item, but necessary to prevent stormwater contamination from construction related sources, are considered incidental. Incidental work related to compliance with the permit may include, but is not limited to: hazardous materials protection, fuel containment, waste disposal, and providing employee sanitary facilities.

D. Project Staging: Replacing erosion and sediment control practices that are damaged or removed by the contractor in a manner that is inconsistent with the current project staging or SWPPP is the Contractor's responsibility and will be at the Contractor's expense.

1.08 MEASUREMENT AND PAYMENT**A. Stormwater Pollution Prevention Plan (SWPPP):****1. Preparation:**

- a. **Measurement:** Lump sum item; no measurement will be made.
- b. **Payment:** Payment will be at the lump sum price for SWPPP preparation.
- c. **Includes:** Lump sum price includes, but is not limited to, development of a SWPPP by the Contractor meeting local and state agency requirements, filing the required public notices, filing a Notice of Intent for coverage of the project under the Iowa DNR NPDES General Permit No. 2, and payment of associated NPDES permit fees.
- d. **Other:** Item will be paid for upon approval of the SWPPP by the Engineer, and after the Notice of Intent has been filed by the Contractor.

2. Management:

- a. **Measurement:** Lump sum item; no measurement will be made.
- b. **Payment:** Payment will be at the lump sum price for SWPPP management.
- c. **Includes:** Lump sum price includes all work required to comply with the administrative provisions of the Iowa DNR NPDES General Permit No. 2; including record keeping, documentation, updating the SWPPP, filing the Notice of Discontinuation, etc. Item also includes weekly inspections required to satisfy the provisions of General Permit No. 2, unless otherwise specified in the contract documents.
- d. **Does Not Include:** Unit price does not include installation or maintenance of erosion and sediment control practices.
- e. **Other:** The Engineer may make partial payments based on estimates of the project completion. Final payment will be made when the site reaches final stabilization and the Notice of Discontinuation is filed.

1.08 MEASUREMENT AND PAYMENT (Continued)**B. Compost Blankets:**

1. **Measurement:** Measurement will be in square feet for each thickness of compost blanket.
2. **Payment:** Payment will be at the unit price per square foot for each thickness of compost blanket.
3. **Includes:** Unit price includes, but is not limited to, furnishing and spreading compost over the designated area.

C. Filter Berms:

1. **Measurement:** Measurement will be in linear feet for each size of filter berm, measured longitudinally along the top of the berm.
2. **Payment:** Payment will be at the unit price per linear foot for each size of berm.
3. **Includes:** Unit price include, but is not limited to, furnishing material and constructing the filter berm, including vegetation if specified.

D. Filter Socks:

1. **Installation:**
 - a. **Measurement:** Measurement will be in linear feet for each size of filter sock.
 - b. **Payment:** Payment will be at the unit price per linear foot for each size of filter sock.
 - c. **Includes:** Unit price includes, but is not limited to, anchoring stakes.
2. **Removal:**
 - a. **Measurement:** Measurement will be in linear feet of filter sock removed.
 - b. **Payment:** Payment will be at the unit price per linear foot of filter sock removed.
 - c. **Includes:** Unit price includes, but is not limited to, restoration of the area to finished grade and off-site disposal of filter socks and accumulated sediment.

E. Temporary Rolled Erosion Control Products (RECP):

1. **Measurement:** Measurement will be in square yards, based on the width specified in the contract documents and actual measured length, for each type of temporary RECP.
2. **Payment:** Payment will be at the unit price per square yard for each type of temporary RECP.
3. **Includes:** Unit price includes, but is not limited to, excavation, staples, anchoring devices, and material for anchoring slots.

F. Wattles:

1. **Installation:**
 - a. **Measurement:** Measurement will be in linear feet for each type and size of wattle.
 - b. **Payment:** Payment will be at the unit price per linear foot for each type and size of wattle.
 - c. **Includes:** Unit price includes, but is not limited to, anchoring stakes.

1.08 MEASUREMENT AND PAYMENT (Continued)**2. Removal:**

- a. **Measurement:** Measurement will be in linear feet of wattle removed.
- b. **Payment:** Payment will be at the unit price per linear foot of wattle removed.
- c. **Includes:** Unit price includes, but is not limited to, restoration of the area to finished grade and off-site disposal of wattle and accumulated sediment.

G. Check Dams:**1. Rock Check Dams:**

- a. **Measurement:** Measurement will be in ton of stone installed.
- b. **Payment:** Payment will be at the unit price per ton of stone installed.
- c. **Includes:** Unit price includes, but is not limited to, engineering fabric.

2. Manufactured Check Dams:**a. Installation:**

- 1) **Measurement:** Measurement will be in linear feet for each type and size of manufactured check dam.
- 2) **Payment:** Payment will be at the unit price per linear foot for each type and size of manufactured check dam.
- 3) **Includes:** Unit price includes, but is not limited to, anchoring stakes.

b. Removal:

- 1) **Measurement:** Measurement will be in linear feet for each type of manufactured check dam removed.
- 2) **Payment:** Payment will be at the unit price per linear foot for each type of manufactured check dam removed.
- 3) **Includes:** Unit price includes, but is not limited to, restoration of the area to finished grade and off-site disposal of manufactured check dam and accumulated sediment.

H. Temporary Earth Diversion Structures:

- 1. **Measurement:** Measurement will be in linear feet for each type and size of temporary earth diversion structure.
- 2. **Payment:** Payment will be at the unit price per linear foot of temporary earth diversion structure.
- 3. **Includes:** Unit price includes, but is not limited to, removal of the structure upon completion of the project.

I. Level Spreaders:

- 1. **Measurement:** Measurement will be in linear feet of level spreaders.
- 2. **Payment:** Payment will be at the unit price per linear foot of level spreader.
- 3. **Includes:** Unit price includes, but is not limited to, maintaining the spreader during the period of construction and removal upon completion of the project, unless otherwise specified in the contract documents.

1.08 MEASUREMENT AND PAYMENT (Continued)**J. Rip Rap:**

1. **Measurement:** Measurement will be in tons for each type of rip rap.
2. **Payment:** Payment will be at the unit price per ton of rip rap.
3. **Includes:** Unit price includes, but is not limited to, engineering fabric.

K. Temporary Pipe Slope Drains:

1. **Measurement:** Measurement will be in linear feet for each type and size of temporary pipe slope drain, measured from end of apron to end of apron.
2. **Payment:** Payment will be at the unit price per linear foot for each type and size of pipe.
3. **Includes:** Unit price includes, but is not limited to, excavation, furnishing and installing pipe and pipe aprons, grading, and removal of the slope drain upon completion of the project.

L. Sediment Basin:

1. **Outlet Structure:**
 - a. **Measurement:** Each size of sediment basin outlet structure will be counted.
 - b. **Payment:** Payment will be at the unit price for each sediment basin outlet structure.
 - c. **Includes:** Unit price includes, but is not limited to, concrete base, dewatering device, anti-vortex device, outlet pipe, and anti-seep collars (if specified).
 - d. **Does Not Include:** Unit price does not include earthwork required for construction of the sediment basin.
2. **Removal of Sediment:**
 - a. **Measurement:** Each occurrence of sediment removal will be counted.
 - b. **Payment:** Payment will be at the unit price for each occurrence of sediment removal.
 - c. **Includes:** Unit price includes, but is not limited to, dewatering and removal and off-site disposal of accumulated sediment.
3. **Removal of Outlet Structure:**
 - a. **Measurement:** Each sediment basin outlet structure removed will be counted.
 - b. **Payment:** Payment will be at the unit price for each sediment basin outlet structure removed.
 - c. **Includes:** Unit price includes, but is not limited to, dewatering and off-site disposal of the outlet structure, concrete base, emergency spillway, and accumulated sediment.
 - d. **Does Not Include:** Unit price does not include earthwork required to remove the sediment basin and restoration of the area to finished grade.

M. Sediment Trap Outlet:

1. **Installation:**
 - a. **Measurement:** Measurement will be in tons of crushed stone placed.
 - b. **Payment:** Payment will be at the unit price per ton of crushed stone.
 - c. **Includes:** Unit price includes, but is not limited to, engineering fabric.
 - d. **Does Not Include:** Unit price does not include earthwork required for construction of the sediment trap.

1.08 MEASUREMENT AND PAYMENT (Continued)**2. Removal of Sediment:**

- a. **Measurement:** Each occurrence of sediment removal will be counted.
- b. **Payment:** Payment will be at the unit price for each occurrence of sediment removal.
- c. **Includes:** Unit price includes, but is not limited to, dewatering and removal and off-site disposal of accumulated sediment.

3. Removal of Device:

- a. **Measurement:** Each sediment trap outlet removed will be counted.
- b. **Payment:** Payment will be at the unit price for each sediment trap outlet removed.
- c. **Includes:** Unit price includes, but is not limited to, dewatering and off-site disposal of sediment trap outlet and accumulated sediment.
- d. **Does Not Include:** Unit price does not include earthwork required to remove the sediment trap outlet and restoration of the area to finished grade.

N. Silt Fence or Silt Fence Ditch Check:**1. Installation:**

- a. **Measurement:** Measurement will be in linear feet of silt fence or silt fence ditch check.
- b. **Payment:** Payment will be at the unit price per linear foot of silt fence or silt fence ditch check.
- c. **Includes:** Unit price includes, but is not limited to, anchoring posts.

2. Removal of Sediment:

- a. **Measurement:** Each occurrence of sediment removal will be counted.
- b. **Payment:** Payment will be at the unit price for each occurrence of sediment removal.
- c. **Includes:** Unit price includes, but is not limited to, dewatering and removal and off-site disposal of accumulated sediment.

3. Removal of Device:

- a. **Measurement:** Measurement will be in linear feet of silt fence removed.
- b. **Payment:** Payment will be at the unit price per linear foot of silt fence removed.
- c. **Includes:** Unit price includes, but is not limited to, restoration of the area to finished grade and off-site disposal of fence, posts, and accumulated sediment.

O. Stabilized Construction Entrance:**1. Stabilized Construction Entrance by Square Yard:**

- a. **Measurement:** Measurement will be in square yards of material placed.
- b. **Payment:** Payment will be at the unit price per square yard of material placed.
- c. **Includes:** Unit price includes, but is not limited to, subgrade stabilization fabric.

2. Stabilized Construction Entrance by Ton:

- a. **Measurement:** Measurement will be in tons of material placed.
- b. **Payment:** Payment will be at the unit price per ton of material placed.
- c. **Includes:** Unit price includes, but is not limited to, subgrade stabilization fabric.

1.08 MEASUREMENT AND PAYMENT (Continued)**P. Dust Control:****1. Water for Dust Control:**

- a. Measurement:** Measurement will be by metering of water applied to haul roads and other areas to control dust. If metering is not available, measurement will be by counting the loads from a transporting tank of known volume and gauging the contents of the transporting truck for partial loads.
- b. Payment:** Payment will be at the unit price per 1,000 gallons of water used.
- c. Includes:** Unit price includes, but is not limited to, furnishing, transporting, and distributing water to the haul road.

2. Dust Control Product:

- a. Measurement:** Measurement will be in square yards of the treated area.
- b. Payment:** Payment will be at the unit price per square yard of product applied.
- c. Includes:** Unit price include, but is not limited to, furnishing and incorporating the dust control product to the haul road.

Q. Erosion Control Mulching:**1. Conventional Mulching:**

- a. Measurement:** Measurement will be in acres of conventional mulch.
- b. Payment:** Payment will be at the unit price per acre of conventional mulch.
- c. Includes:** Unit price includes, but is not limited to, furnishing and incorporating mulch in the area designated in the contract documents.

2. Hydromulching:

- a. Measurement:** Measurement will be in acres for each type of hydromulch.
- b. Payment:** Payment will be at the unit price per acre for each type of hydromulch.
- c. Includes:** Unit price includes, but is not limited to, furnishing mulch and tackifier (if applicable), providing equipment specific to hydromulching, and applying the mulch to the specified area.

R. Turf Reinforcement Mats (TRM):

- 1. Measurement:** Measurement will be in squares for each type of turf reinforcement mat, each square containing 100 square feet.
- 2. Payment:** Payment will be at the unit price per square for each type of turf reinforcement mat.
- 3. Includes:** Unit price includes, but is not limited to, excavation, staples, anchoring devices, and material for anchoring slots.

S. Surface Roughening:

- 1. Measurement:** Measurement will be in square feet of surface roughening, including directional tracking or grooving/furrowing.
- 2. Payment:** Payment will be at the unit price per square foot of surface roughening.
- 3. Includes:** Unit price includes, but is not limited to, providing equipment to complete directional tracking or grooving/furrowing and completing surface roughening of slopes specified in the contract documents.

1.08 MEASUREMENT AND PAYMENT (Continued)**T. Inlet Protection Device:****1. Installation:**

- a. Measurement:** Each type of inlet protection device will be counted.
- b. Payment:** Payment will be at the unit price for each inlet protection device.
- c. Includes:** Unit price includes, but is not limited to, removal of the device upon completion of the project.

2. Maintenance:

- a. Measurement:** Each inlet protection device maintenance occurrence will be counted.
- b. Payment:** Payment will be at the unit price for each inlet protection device maintenance occurrence.
- c. Includes:** Unit price includes, but is not limited to, removal and off-site disposal of accumulated sediment.

U. Flow Transition Mat:

- 1. Measurement:** Measurement will be in square feet of flow transition mat.
- 2. Payment:** Payment will be at the unit price per square foot of flow transition mat.
- 3. Includes:** Unit price includes, but is not limited to, anchoring devices.

V. End of Season Temporary Erosion Control:

- 1. Measurement:** Measurement will be in acres of end of season temporary erosion control applied.
- 2. Payment:** Payment will be at the unit price per acre for end of season temporary erosion control.
- 3. Includes:** Unit price includes, but is not limited to, furnishing, placing, and maintaining the end of season temporary erosion control throughout the winter season.

PART 2 - PRODUCTS**2.01 COMPOST BLANKETS**

Comply with Section 9010, 2.07, C for compost material requirements for compost blankets.

2.02 COMPOST BLANKET AND FILTER BERM TACKIFIER

- A. Use a biodegradable, organic binding agent or polyacrylamide that can be mixed with, or injected into, compost or filter material as it is placed, which is not detrimental to the establishment of vegetation.
- B. Use in filter berms or compost blankets when specified in the contract documents.
- C. Apply at the rate recommended by the manufacturer.

2.03 FILTER MATERIAL

Material for use in filter socks, filter berms, and other areas, as specified in the contract documents.

- A. Use material derived from wood, bark, or other, non-toxic vegetative feedstocks.
- B. Use material with no visible admixture of refuse or other physical contaminants, nor any material toxic to plant growth.
- C. Use material meeting the following particle sizes:

Sieve Size	Percent Passing ¹
2"	100
1"	90-100
3/8"	0-30

¹The target flow rate of in-place material is 10 gal/min/lf. The Engineer may approve use of alternate materials meeting the target flow rate.

2.04 FILTER SOCK

- A. For slope and sediment control applications, use a continuous, tubular, knitted, mesh netting with 3/8 inch openings, constructed of 5 mil thickness, photodegradable HDPE.
- B. For inlet protection, use a continuous, tubular, knitted, mesh netting with 3/8 inch openings, constructed of 500 denier polypropylene.
- C. Use 1 inch by 2 inch (minimum) hardwood stakes or stakes of equivalent strength.

2.05 TEMPORARY ROLLED EROSION CONTROL PRODUCTS (RECP)

Use temporary rolled erosion control products that are classified and have material properties according to the Erosion Control Technology Council's (ECTC) guidelines as follows:

A. Material Classification:

- 1. **RECP Type 1 (Ultra Short-term):** Functional longevity of 3 months or less and classified as follows:
 - a. **RECP Type 1.A:** Mulch control net, consisting of a photodegradable synthetic mesh or woven biodegradable natural fiber netting.
 - b. **RECP Type 1.B:** Netless rolled erosion control blankets, consisting of natural and/or polymer fibers, mechanically interlocked and/or chemically adhered together to form a RECP.

2.05 TEMPORARY ROLLED EROSION CONTROL PRODUCTS (RECP) (Continued)

- c. **RECP Type 1.C:** Single-net erosion control blankets and open weave textiles, consisting of processed degradable natural and/or polymer fibers, mechanically bound together by a single rapidly-degrading, synthetic or natural fiber netting, or an open weave textile of processed rapidly-degrading natural or polymer yarns or twines woven into a continuous matrix.
 - d. **RECP Type 1.D:** Double-net erosion control blankets, consisting of processed degradable natural and/or polymer fibers, mechanically bound together between two rapidly-degrading, synthetic or natural fiber nettings.
- 2. **RECP Type 2 (Short-term):** Functional longevity between 3 and 12 months and classified as follows:
 - a. **RECP Type 2.A:** Mulch control net, consisting of a photodegradable synthetic mesh or woven biodegradable natural fiber netting.
 - b. **RECP Type 2.B:** Netless rolled erosion control blankets, consisting of natural and/or polymer fibers, mechanically interlocked and/or chemically adhered together to form a RECP.
 - c. **RECP Type 2.C:** Single-net erosion control blankets and open weave textiles, consisting of an erosion control blanket composed of processed degradable natural or polymer fibers, mechanically bound together by a single degradable synthetic or natural fiber netting to form a continuous matrix, or an open weave textile composed of processed degradable natural or polymer yarns or twines woven into a continuous matrix.
 - d. **RECP Type 2.D:** Double-net erosion control blanket, consisting of processed degradable natural and/or polymer fibers, mechanically bound together between two degradable synthetic or natural fiber nettings.
- 3. **RECP Type 3 (Extended Term):** Functional longevity between 12 and 24 months and classified as follows:
 - a. **RECP Type 3.A:** Mulch control nets, consisting of a slow-degrading synthetic mesh or woven natural fiber netting.
 - b. **RECP Type 3.B:** Erosion control blankets and open weave textiles, consisting of processed slow-degrading natural or polymer fibers, mechanically bound together between two slow-degrading synthetic or natural fiber nettings to form a continuous matrix, or an open weave textile composed of processed slow-degrading natural or polymer yarns or twines woven into a continuous matrix.
- 4. **RECP Type 4 (Long Term):** Functional longevity of 36 months and classified as follows: Erosion control blankets and open weave textiles, consisting of processed slow-degrading natural or polymer fibers, mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix, or an open weave textile composed of processed slow-degrading natural or polymer yarns or twines woven into a continuous matrix.

B. Properties and Performance:

- 1. Testing performed according to the ECTC's Testing Procedures for Rolled Erosion Control Products. Verify manufacturer's test results by independent testing.

2.05 TEMPORARY ROLLED EROSION CONTROL PRODUCTS (RECP) (Continued)

2. Material properties meeting the Erosion Control Technology Council's (ECTC) Standard Specifications for Rolled Erosion Control Products as follows:

Classification	Slope Application	Channel Application	Min. Tensile Strength
	Max. Grade*	Permissible Shear Stress	
RECP Type 1.A	5:1 (H:V)	0.25 lb/ft ²	5 lb/ft
RECP Type 1.B	4:1 (H:V)	0.50 lb/ft ²	5 lb/ft
RECP Type 1.C	3:1 (H:V)	1.50 lb/ft ²	50 lb/ft
RECP Type 1.D	2:1 (H:V)	1.75 lb/ft ²	75 lb/ft
RECP Type 2.A	5:1 (H:V)	0.25 lb/ft ²	5 lb/ft
RECP Type 2.B	4:1 (H:V)	0.50 lb/ft ²	5 lb/ft
RECP Type 2.C	3:1 (H:V)	1.50 lb/ft ²	50 lb/ft
RECP Type 2.D	2:1 (H:V)	1.75 lb/ft ²	75 lb/ft
RECP Type 3.A	5:1 (H:V)	0.25 lb/ft ²	25 lb/ft
RECP Type 3.B	1.5:1 (H:V)	2.00 lb/ft ²	100 lb/ft
RECP Type 4	1:1 (H:V)	2.25 lb/ft ²	125 lb/ft

*Product tested according to ECTC Test Method No. 2 and meeting the ECTC Standard Specifications for "C" factor.

- C. RECP Anchors:** Stakes or staples as recommended by manufacturer, with a minimum length of 6 inches.

2.06 WATTLES

- A. Netting:** Open weave, degradable netting. Nominal diameter of 9 inches, or as specified.
- B. Fill Material:** Straw, wood excelsior, coir, or other natural materials approved by the Engineer.
- C. Stakes:** 1 inch by 1 inch (minimum) wooden stakes, or stakes of equivalent strength.

2.07 CHECK DAMS**A. Synthetic Permeable Check Dam (HDPE):****1. Ditch Berm:**

- Installed height of 9 to 10 inches.
- Manufactured check dam constructed from sheets of perforated, UV-stabilized High Density Polyethylene (HDPE).
- Perforations of 30 to 40% open area.

2. RECP for Permeable Check Dam (when specified): RECP Type 4, 4 feet wide.**3. Anchors:** As recommended by the manufacturer.**B. Triangular Foam Check Dam:** Triangular-shaped device with a height of 8 to 10 inches and a base of 16 to 20 inches.**1. Inner Support Material:** Urethane foam.**2. Outer Cover:** Woven geotextile material shaped to fit around the inner support material, extending 2 to 3 feet beyond the bottom edge of the triangular-shaped inner support.**3. Length:** 7 feet.

2.07 CHECK DAMS (Continued)**C. Rock Check Dam:**

1. **Aggregate:** Erosion stone complying with Iowa DOT Article 4130.04.
2. **Engineering Fabric:** Comply with Section 9040, 2.20.

2.08 LEVEL SPREADERS

- A. Provide 2 inch by 8 inch (minimum) pressure-treated timber of the length specified.
- B. Use timbers that are relatively straight and have a minimum length of 5 feet each.

2.09 RIP RAP

- A. **Class A Revetment:** Comply with Iowa DOT Section 4130.
- B. **Class B Revetment:** Comply with Iowa DOT Section 4130.
- C. **Class D and E Revetment:** Comply with Iowa DOT Section 4130.
- D. **Erosion Stone:** Comply with Iowa DOT Section 4130.

2.10 TEMPORARY PIPE SLOPE DRAINS

- A. PVC, HDPE, and metal pipes as specified in Section 4020, 2.01.
- B. HDPE, Type C (corrugated interior).
- C. All pipes listed are allowed for use within the right-of-way.

2.11 SEDIMENT BASIN OUTLET STRUCTURES

- A. **Base:** Class C concrete unless otherwise specified in the contract documents.
- B. **Riser:** CMP complying with Section 4020; diameter as specified in the contract documents.
- C. **Dewatering Device:**
 1. Drill holes in the riser of the number, diameter, and at the elevation specified in the contract documents.
 2. 1/4 inch by 1/4 inch or 1/2 inch by 1/2 inch wire mesh for hardware cloth.
- D. **Barrel:** CMP complying with Section 4020; diameter as specified in the contract documents.
- E. **Anti-Vortex Device:** CMP complying with Section 4020; diameter according to Figure 9040.116 and riser diameter as specified in the contract documents.
- F. **Anti-Seep Collar:**
 1. Corrugated metal sheet of same material and gage as barrel section.
 2. Size according to Figure 9040.117.

2.12 SEDIMENT TRAPS

- A. Erosion Stone:** Comply with Section 9040, 2.09.
- B. Engineering Fabric:** Comply with Section 9040, 2.20.

2.13 SILT FENCE

- A. Fabric:** Comply with Iowa DOT Article 4196.01.
- B. Posts:** 4 foot minimum steel (T-section) weighing at least 1.25 pounds per foot, exclusive of anchor plate. Painted posts are not required.
- C. Fastener:** Wire or plastic ties with a minimum tensile strength of 50 pounds.

2.14 STABILIZED CONSTRUCTION ENTRANCE

- A. Entrance Stone:** Comply with Iowa DOT Section 4122, Gradation 13, Macadam crushed stone.
- B. Subgrade Stabilization Material:** Use woven, UV-stabilized geotextile with a minimum tensile strength of 135 lb/ft.

2.15 DUST CONTROL

- A. Water:** Use potable water or water from a source approved by the engineer.
- B. Calcium Chloride:** Comply with Iowa DOT Article 4194.01.
- C. Lignosulfonate (Tree Sap):** Use a commercially-available product with known lignin content.
- D. Soapstock (Soybean Oil):**
 - 1. Use a commercially-available, undiluted, soybean oil soapstock emulsion.
 - 2. Comply with manufacturer's recommendations for storage, transportation, temperature, and application equipment requirements.

2.16 EROSION CONTROL MULCH

- A. Conventional Mulch:**
 - 1. Use dry cereal straw (oats, wheat, barley, or rye) or native grass straw.
 - 2. Use material that is free of noxious weeds, seed-bearing stalks, or roots, and will be inspected and approved by the Engineer prior to use.
 - 3. Other materials, subject to the approval of the Engineer, may be used.
- B. Hydromulch:**
 - 1. **Wood Cellulose Mulch:** Comply with Section 9010, 2.07.
 - 2. **Bonded Fiber Matrix (BFM):** Comply with Section 9010, 2.07.
 - 3. **Mechanically Bonded Fiber Matrix (MBFM):** See Section 9010, 2.07.

2.17 TURF REINFORCEMENT MATS (TRM)**A. Material Classification:**

1. **TRM Type 1:** Use a TRM that is constructed of a web of mechanically or melt-bonded polymer netting, monofilaments, or fibers that are entangled to form a strong and dimensionally stable mat. Bonding methods include polymer welding, thermal or polymer fusion, or the placement of synthetic fibers between two high-strength, biaxially-oriented nets, mechanically bound by parallel stitching with polyolefin thread. Products may contain a degradable component.
2. **TRM Type 2 and 3:** Use a TRM that is constructed of a web of mechanically or melt-bonded polymer netting, monofilaments, or fibers that are entangled or woven to form a strong and dimensionally stable mat. Non-woven bonding methods include polymer welding, thermal or polymer fusion, or the placement of fibers between two high-strength, biaxially oriented nets, mechanically bound by parallel stitching with polyolefin thread. Use only components that are 100% synthetic and resistant to biological, chemical, and ultraviolet degradation.
3. **TRM Type 4:** Use a high performance/survivability TRM that is composed of monofilament yarns woven into a resilient uniform configuration. Use a mat that has a matrix that exhibits very high interlock and reinforcement capacities with both soil and root systems and demonstrate a high tensile modulus. TRMs manufactured from discontinuous or loosely held together by stitched or glued, netting, or composites are not allowed in this category. Use only components that are 100% synthetic and resistant to biological, chemical, and ultraviolet degradation. Use this category when field conditions exist with high loading and/or high survivability requirements.

B. Properties and Performance: Meet the minimum material and performance requirements contained in the following table:

Property ¹		Test Method	Type 1	Type 2	Type 3	Type 4
Material	Thickness	ASTM D 6525	0.25 in	0.25 in ⁵	0.25 in ⁵	0.25 in ⁵
	Tensile Strength ²	ASTM D 6818	125 lb/ft	240 lb/ft	750 lb/ft	3,000 lb/ft
	UV Resistance ³	ASTM D 4355	80% @ 500 hrs	80% @ 1,000 hrs	80% @ 1,000 hrs	90% @ 3,000 hrs
Performance	Maximum Shear Stress ⁴ (Channel Applications)	ASTM D 6460	7 lb/ft ²	10 lb/ft ²	12 lb/ft ²	15 lb/ft ²

¹ For TRMs containing degradable components, all values must be obtained on the non-degradable portion of the matting.

² Minimum Average Roll Values, machine direction only.

³ Tensile strength of structural components retained after UV exposure.

⁴ Minimum shear stress that fully-vegetated TRM can sustain without physical damage or excess erosion (0.5 in soil loss) during a 30 minute flow event in large scale testing. Acceptable large scale testing protocol includes ASTM D 6460 or independent testing conducted by the Texas Transportation Institute, Colorado State University, Utah State University, or other approved testing facility. Bench scale testing is not acceptable.

⁵ Type 2, 3, and 4 TRM may include additional degradable components as long as material and performance requirements are met by the 100% synthetic components.

2.18 INLET PROTECTION**A. Drop-in Intake Protection:**

1. Use a manufactured device that is inserted into the intake and is capable of trapping or filtering sediment from runoff prior to entering the storm sewer.
2. All components must be contained entirely below the surface of the intake grate.
3. Incorporate means of emergency outflow to prevent flooding if plugged with sediment.

B. Surface-applied Intake Protection:

1. Use devices or filter socks, placed around or over the intake, that are capable of trapping or filtering sediment from runoff prior to entering the storm sewer.
2. Do not allow the device to completely block or plug the intake, preventing inflow.

2.19 FLOW TRANSITION MATS

Comply with the following and Iowa DOT Materials I.M. 469.10.

A. Mat:

1. Constructed of 85% minimum UV resistant material with a maximum ground cover of 80%.
2. Meet the requirements of the following table:

Property	Test Method	Value
Mass/Unit Area (max.)	ASTM D 6566	3 lbs/SF
Minimum Thickness	ASTM D 6525	0.4 inch
Maximum Thickness	ASTM D 6525	1.1 inch
Tensile Strength	ASTM D 6818	550 lbs/ft
Minimum Percent Open Area	ASTM D 6567	20%
UV Stability	ASTM D 4355	85%

B. Anchoring Devices:

1. Furnish bullet tip style anchors made of a metal alloy attached to a wire rope.
2. Anchors capable of withstanding a minimum 300 pounds (136 kg) of pull out resistance in cohesive soils.
3. Wire rope a minimum of 30 inches (762 mm) in length with a minimum breaking strength of at least 300 pounds (136 kg).
4. The top washer a minimum of 3 inches (76 mm) in diameter and constructed of a UV resistant plastic.
5. Each anchor equipped to allow the retightening of the anchor when deemed necessary by the Engineer.

2.20 ENGINEERING FABRIC

Comply with Iowa DOT Article 4196.01, B, 3.

PART 3 - EXECUTION**3.01 SWPPP PREPARATION**

- A. Prepare a SWPPP according to the requirements of the Iowa DNR NPDES General Permit No. 2.
- B. Ensure that controls utilized in the SWPPP conform to the type and quantity of erosion and sediment controls specified in the contract documents.
- C. Submit the completed SWPPP to the Engineer for review and approval prior to filing the Notice of Intent.
- D. Upon approval of the Engineer, file public notices, as required by the NPDES General Permit No. 2.
- E. File the Notice of Intent and fee, as required by the NPDES General Permit No. 2.

3.02 SWPPP MANAGEMENT

Coordinate and carry out all requirements of Iowa DNR NPDES General Permit No. 2 and any local ordinance requirements, including:

- A. Update the SWPPP according to the requirements of the NPDES General Permit No. 2.
- B. Revise the SWPPP and implement changes, as necessary, to prevent sediment or hazardous materials from being transported off the site.
- C. Submit all SWPPP revisions to the Engineer for review and approval.
- D. Perform and maintain records of weekly erosion and sediment control site inspections, unless otherwise specified in the contract documents.
- E. Maintain records of transfer of responsibility under the NPDES General Permit No. 2.
- F. Retain all records on-site, or as required by the NPDES General Permit No. 2.
- G. After final stabilization, file a Notice of Discontinuation, according to the NPDES General Permit No. 2.
- H. Provide all records and documentation to the Engineer upon completion of the project. Retain a copy of all records for the period required under the Permit.
- I. Continue to perform the work required under this item throughout the duration of the project, and until final stabilization is achieved and a Notice of Discontinuation is filed.

3.03 EROSION AND SEDIMENT CONTROL INSPECTION

- A. Perform inspections according to and at frequency required by the Iowa DNR NPDES General Permit No. 2.
- B. Schedule necessary maintenance or improvements for items that are included in the contract documents.
- C. Notify the Engineer immediately of situations requiring attention beyond that provided for in the contract documents.

3.03 EROSION AND SEDIMENT CONTROL INSPECTION (Continued)

- D. Provide copies of the inspection reports to the Engineer.

3.04 EQUIPMENT

Comply with Iowa DOT Article 2601.03.

3.05 COMPOST BLANKETS (Figure 9040.101)

- A. Loosen the ground surface to a minimum depth of 1 inch.
- B. Evenly spread compost, as specified in the contract documents, or as directed by the Engineer.
- C. Divert concentrated flows away from the slope.
- D. Do not operate heavy equipment over the compost blanket after placement, or throughout the required period of protection.
- E. Inspect the ground under the blanket at regular intervals for signs of erosion.

3.06 FILTER BERMS (Figure 9040.102)

- A. Install filter berm along the contour as specified in the contract documents, or as directed by the Engineer.
- B. Turn the ends of the filter berm uphill to prevent runoff from flowing around the end of the berm.
- C. When a vegetated berm is specified, apply seed to the surface of the berm.
- D. Replace the berm when sediment accumulation reaches one-half of the height of the berm.

3.07 FILTER SOCKS (Figure 9040.102)**A. Installation:**

1. Fill mesh filter sock with filler material to the size and length specified in the contract documents.
2. Place the filter sock along the contour as specified in the contract documents, or as directed by the Engineer.
3. Construct a "J-hook" at each end of a continuous run of filter sock, by turning the end of the sock uphill, as necessary to prevent runoff from flowing around the ends when water behind the sock ponds up to a level even with the top of the sock.
4. Drive stakes into the ground at a maximum spacing of 10 feet, and as required to secure the sock and prevent movement.
5. Repair or replace non-functioning filter socks that allow water to flow under the sock, are torn, or are otherwise damaged, due to inadequate installation.
6. Remove filter material from damaged socks that are located along streambanks; around intakes, in ditches, or in other locations where the material may be carried to surface waters.

3.07 FILTER SOCKS (Continued)

B. Removal: When specified in the contract documents, or as directed by the Engineer; remove the filter sock upon completion of the project, and after final stabilization is achieved; or as indicated in the SWPPP, if applicable.

1. Upon completion of the project, completely remove socks and filter material that are located along streambanks, around intakes, in ditches, or in other locations where the filter material may be carried to surface waters if the sock degrades and/or tears.
2. Slice the sock longitudinally. Remove and dispose of the filter sock material and stakes.
3. Spread the filter material and accumulated sediment to match finished grade and to ensure proper drainage.
4. If the site has been brought to finished grade and prepared for permanent seeding, spread and incorporate the filter material into the surface by tilling, or as required to break up any large particles and provide a finished surface suitable for permanent seeding.

C. Replacement:

1. When accumulated sediment reaches a level one-half the height of the sock, or when the sock becomes clogged with sediment and no longer allows runoff to flow through, remove the sock as described above, and replace according to the installation instructions above.
2. At the Engineer's option, the existing filter sock and accumulated sediment may be left in place, and a new filter sock installed up-slope from the existing filter sock.

3.08 TEMPORARY ROLLED EROSION CONTROL PRODUCTS (RECP) (Figures 9040.103 and 9040.104)

Install temporary RECPs according to the manufacturer's published installation recommendations, subject to the following minimum requirements:

A. Slope Application:

1. Grade and smooth surface. Remove all rocks, clods, vegetation, or other obstructions that will prevent direct contact between the RECP and the soil surface.
2. When specified, prepare seedbed and place seed and fertilizer according to Section 9010 prior to placing RECP.
3. Install anchor trench at top of slope. Seed and fertilize trench after backfill and compaction, if seeding is specified.
4. Unroll the RECP down or horizontally across the slope.
5. Place consecutive blankets down the slope end-over-end, shingle style.
6. Overlap ends of consecutive rolls a minimum of 3 inches, and install anchors at a maximum spacing of 18 inches along all overlaps.
7. Overlap edges of adjacent rolls a minimum of 2 inches.
8. Install anchors at edge seams between rows.

3.08 TEMPORARY ROLLED EROSION CONTROL PRODUCTS (RECP) (Continued)**B. Channel/Ditch Application:**

1. When specified, prepare seedbed and place seed and fertilizer according to Section 9010, prior to placing RECP.
2. Place end of first roll in the anchor slot at the center of the upstream channel and secure with anchors.
3. Position adjacent rolls in the anchor slot, overlapping adjacent rolls a minimum of 3 inches.
4. Place backfill material in anchor slot and compact. Unroll RECP over compacted slot and secure with anchors.
5. Unroll RECP downstream. Maintain a minimum 3 inch overlap between adjacent rolls. Secure edge lap with anchors.
6. Install intermittent staple check slots every 30 feet.
7. Construct end lap at end of roll and beginning of new roll. Overlap roll ends with upstream RECP on top.
8. Excavate longitudinal trench along both sides of the channel at the outside edges of installation. Place outer edges of RECP into longitudinal slot. Install anchors, place backfill material, and compact.
9. Terminate installation at downstream end with staple check.
10. Install anchors in a regular pattern over entire area covered according to manufacturer's published recommendations (minimum three anchors per square yard).

3.09 WATTLES (Figure 9040.105)**A. Installation:**

1. Construct a shallow trench, 2 to 4 inches deep, matching the width and contour of the wattle.
2. Install wattle along contour of slope.
3. Turn ends of wattle uphill to prevent water from flowing around ends.
4. Place and compact excavated soil against the wattle, on the uphill side.
5. Drive stakes through the center of the wattle, into the ground at a maximum spacing of 4 feet along the length of the wattle, and as needed to secure the wattle and prevent movement.
6. Abut ends of adjacent wattles tightly. Wrap joint with a 36 inch wide section of silt fence and secure with stakes.

- B. Removal:** When specified in the contract documents, or as directed by the Engineer, remove the wattle upon completion of the project, and after final stabilization is achieved; or as indicated in the SWPPP, if applicable.

3.09 WATTLES (Continued)

1. Completely remove the wattle netting, filler material, and stakes.
2. Spread the accumulated sediment to match finished grade and to ensure proper drainage.
3. When allowed by the Engineer, the wattle netting may be sliced open and the filler material spread out over the ground. Removal of netting and stakes and spreading of sediment is still required.

C. Replacement:

1. When accumulated sediment reaches a level one-half the height of the wattle, or when the wattle becomes clogged with sediment and no longer allows runoff to flow through, remove the wattle as described above, and replace according to the installation instructions above.
2. At the Engineer's option, the existing wattle and accumulated sediment may be left in place, and a new wattle installed up-slope from the existing wattle.

3.10 CHECK DAMS (Figure 9040.106)**A. Synthetic Permeable Check Dam (HDPE):**

1. Install according to the manufacturer's recommendations.
2. When specified, provide an RECP under the check dam, installed according to the manufacturer's recommendations.

B. Triangular Foam Check Dam: Install according to the manufacturer's recommendations.**C. Rock Check Dam:** Construct according to Figure 9040.107.**D. Removal:** When specified in the contract documents, or as directed by the Engineer, remove check dams upon completion of the project, and after final stabilization is achieved; or as indicated in the SWPPP, if applicable.

1. Remove the check dam and dispose of materials, or salvage to the contractor.
2. Remove the accumulated sediment or spread to match finished grade; ensure proper drainage.
3. Stabilize the area disturbed by removal operations.

3.11 TEMPORARY EARTH DIVERSION STRUCTURES (Figure 9040.108)

- A. Ensure positive drainage along the diversion toward the outlet area.
- B. Adequately compact fill to prevent failures or seepage.
- C. Outlet the diversion to undisturbed and/or stabilized areas only.
- D. Stabilize the surface of the earth diversion with temporary erosion control seeding, as specified in Section 9010.

3.12 LEVEL SPREADERS (Figure 9040.109)

- A. Butt multiple timbers together, as necessary to provide the required length.
- B. Ensure the spreader is installed level in all directions. Adjust as necessary during construction to maintain spreader in a level condition.
- C. Excavate a depression behind the spreader to the depth specified in the contract documents. The depression may be over-excavated up to 1 foot to provide an area for sediment accumulation.
- D. Grade as required to prevent flow around the ends of spreader.
- E. Remove the accumulated sediment from the depression when the depth is reduced below that specified in the contract documents.

3.13 RIP RAP (Figures 9040.110 and 9040.111)

Install rip rap (revetment stone or erosion stone) as shown on Figures 9040.110 and 9040.111.

3.14 TEMPORARY PIPE SLOPE DRAINS (Figure 9040.112)

- A. Place slope drain on undisturbed soil or well compacted fill.
- B. Carefully compact cohesive soils around inlet ends of the drain in 6 inch lifts.
- C. Discharge slope drain to a stable outlet or to a sediment retention device.

3.15 SEDIMENT BASIN OUTLET STRUCTURES (Figures 9040.113 and 9040.114)

A. Concrete Base: Construct the concrete base and anchor riser section, as shown on Figure 9040.115.

B. Dewatering Device:

- 1. Drill holes in the riser section. The number, diameter, and configuration will be specified in the contract documents.
- 2. Wrap the perforated section of the riser pipe with metal hardware cloth.

C. Anti-vortex Device: If required by the contract documents, firmly attach the cylinder to the top of the riser by welding or other means. Comply with Figure 9040.116.

3.16 ANTI-SEEP COLLAR (Figure 9040.117)

A. General: Place backfill material and compact over-excavation areas to a minimum of 95% Standard Proctor Density per Section 3010.

B. Concrete Collar:

- 1. Place collars a minimum of 2 feet from pipe joints.
- 2. Provide Class C concrete per Section 6010.

3.16 ANTI-SEEP COLLAR (Continued)**C. CMP Collar:**

1. Provide collar of same gage as the pipe barrel on which it is used.
2. Paint or tag unassembled collars to identify matching pairs.
3. Furnish each collar with two 1/2 inch diameter rods with tank lugs for connecting collars to pipe.
4. Install collar with corrugations vertical.
5. Seal the tap between the two half sections and between the pipe and connecting band with a bituminous jointing compound at the time of installation.

3.17 SEDIMENT TRAPS (Figure 9040.118)

Construct the storage area to the size and elevations specified in the contract documents.

3.18 SILT FENCES (Figure 9040.119)**A. Installation:**

1. Install material along the contour of the ground, as specified in the contract documents, or as directed by the Engineer.
2. Install silt fence with a mechanical soil slicing machine that creates a slit in the ground while simultaneously installing the fabric. The trenching method may be used when situations will not allow soil slicing, as determined by the Engineer.
3. Construct a "J-hook" at each end of a continuous run of silt fence, by turning the end of the silt fence uphill, as necessary to prevent runoff from flowing around ends when water behind the fence ponds to a level even with the top of the fence.
4. Insert 12 inches of fabric to a minimum depth of 6 inches (fabric may be folded below the ground line).
5. Compact installation by driving along each side of the silt fence, or by other means, as necessary to adequately secure the fabric in the ground, to prevent pullout and water flow under the fence.
6. Drive steel posts into the ground alongside the silt fence, to a minimum depth of 20 inches, unless otherwise specified by the Engineer. Space posts as shown on Figure 9040.119 or as required to adequately support silt fence.

B. Maintenance: Repair or replace non-functioning silt fence that allows water to flow under the fence, is torn, or is otherwise damaged, due to inadequate installation, at no additional cost to the Contracting Authority.

C. Removal:

1. Remove the silt fence upon final stabilization of the project area, or according to the staging indicated in the SWPPP.
2. Remove and dispose of silt fence and posts.
3. Remove sediment or spread to match finished grade; ensure proper drainage.
4. Stabilize the area disturbed by removal operations.

3.18 SILT FENCES (Continued)**D. Replacement:**

1. When accumulated sediment reaches a level one-half the height of the fence, remove the silt fence as described above, and replace according to the installation instructions above.
2. At the Engineer's option, the existing silt fence and accumulated sediment may be left in place, and a new silt fence installed up-slope from the existing silt fence.
3. When allowed by the Engineer, the existing silt fence may be left in place and the accumulated sediment removed to the original ground line and within 6 inches of the silt fence. Carefully inspect the existing silt fence for structural integrity and signs of undermining. Make any necessary repairs.

3.19 STABILIZED CONSTRUCTION ENTRANCE (Figure 9040.120)

- A. Install a stabilized construction entrance at all locations where construction traffic leaving the site presents the potential for sediment track-out.
- B. Remove vegetation and excavate soft soils from entrance area. Thoroughly compact subgrade prior to placing stone.
- C. Install culvert under entrance if necessary to maintain drainage.
- D. Grade entrance to prevent runoff from flowing onto street. Direct all runoff from entrance to a sediment retention device.
- E. When specified, install subgrade stabilization fabric prior to placing crushed stone.
- F. Install layer of crushed stone to the thickness (6 inches minimum) and dimensions specified in the contract documents.
- G. Remove the accumulated sediment and install new stone, as required to prevent track-out.

3.20 DUST CONTROL

A. Water: Apply frequent light watering to ground surface, as required to control dust.

B. Calcium Chloride: Apply according to Iowa DOT Section 2314.

C. Lignosulfonate (Tree Sap):

1. Loosen the top 1 to 2 inches of the roadway surface.
2. Apply solution with a 50% residual concentration, at a rate of 0.50 gal/yd², to deliver a 25% residual. For diluted solutions, increase the application rate, as required, to deliver an equivalent 25% residual.
3. Allow product to penetrate through the loosened material.
4. Tight-blade road surface.

D. Soapstock (Soybean Oil):

1. Loosen the top 1 to 2 inches of the roadway surface.
2. Apply undiluted soapstock at a rate of 0.70 gal/yd².

3.20 DUST CONTROL (Continued)

3. Allow product to penetrate through the loosened material.
4. Tight-blade road surface.

3.21 EROSION CONTROL MULCHING**A. Conventional Mulching:**

1. Use conventional mulching when the surface cannot be stabilized by seeding, due to season or ground conditions.
2. Uniformly distribute mulch over the required areas, at a rate of 2 tons/acre for dry cereal straw, or 2.5 tons/acre for prairie hay.
3. Work the mulch into the soil with a mulch tucker, designed to anchor the mulch into the soil, by means of dull blades or disks.

B. Hydromulching:

1. Place mulch and tackifier (if applicable) in equipment specifically manufactured for hydraulic mulching.
2. Mix materials with fresh, potable water using a combination of re-circulation through the equipment's pump and mechanical agitation to form a homogeneous slurry.
3. If necessary, dampen any dry, dusty soil as required to prevent balling of the material during application.
4. Apply hydromulch in multiple layers from opposing directions, where possible.
5. Apply the slurry evenly over all specified areas, at the minimum component material rates specified:
 - a. Wood Cellulose Mulch:
 - 1) Mulch: Minimum 3,000 lb/acre dry weight.
 - 2) Tackifier: Minimum 50 lb/acre.
 - b. Bonded Fiber Matrix: Minimum 3,000 lb/acre dry weight.
 - c. Mechanically Bonded Fiber Matrix: Minimum 3,000 lb/acre dry weight.
6. Retain and count empty bags of mulch to ensure final application rate.

3.22 TURF REINFORCEMENT MATS

Install according to the manufacturer's published installation literature for the product specified and application (slope or channel).

3.23 SURFACE ROUGHENING**A. Directional Tracking:**

1. Do not use on slopes steeper than 3:1.
2. Operate tracked equipment up and down exposed slope to create ridges perpendicular to the slope.
3. Continue operation until the entire surface has been tracked.

3.23 SURFACE ROUGHENING (Continued)**B. Grooving/Furrowing:**

1. May be used on all slopes.
2. Use rippers, disks, harrows, chisel plows, or other equipment capable of operating on the slope and creating grooves a maximum of 15 inches apart and 3 inches deep.
3. Operate equipment along the contour of the slope to create grooves that are perpendicular to the slope.
4. Perform over all exposed slopes as specified.

3.24 INLET PROTECTION

- A. Install inlet protection devices according to the manufacturer's recommendations.
- B. Remove the accumulated sediment, as required to maintain the inlet protection device in working order. Remove any accumulated sediment from streets open to traffic if it encroaches into the traveled roadway.

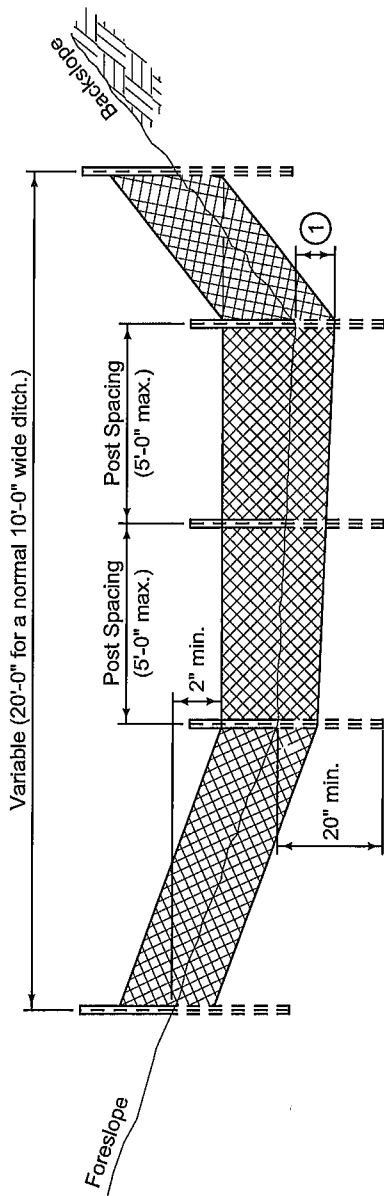
3.25 FLOW TRANSITION MATS

Install according to the manufacturer's published recommendations.

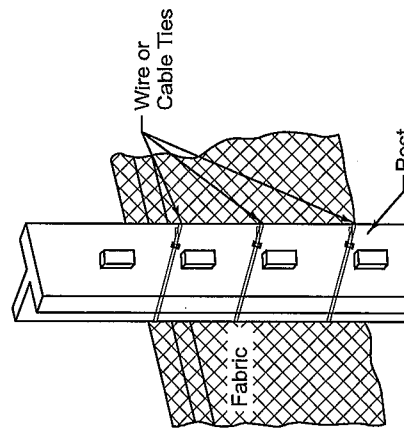
3.26 TEMPORARY EROSION CONTROL SEEDING

Comply with Section 9010.

END OF SECTION



TYPICAL SILT FENCE DITCH CHECK



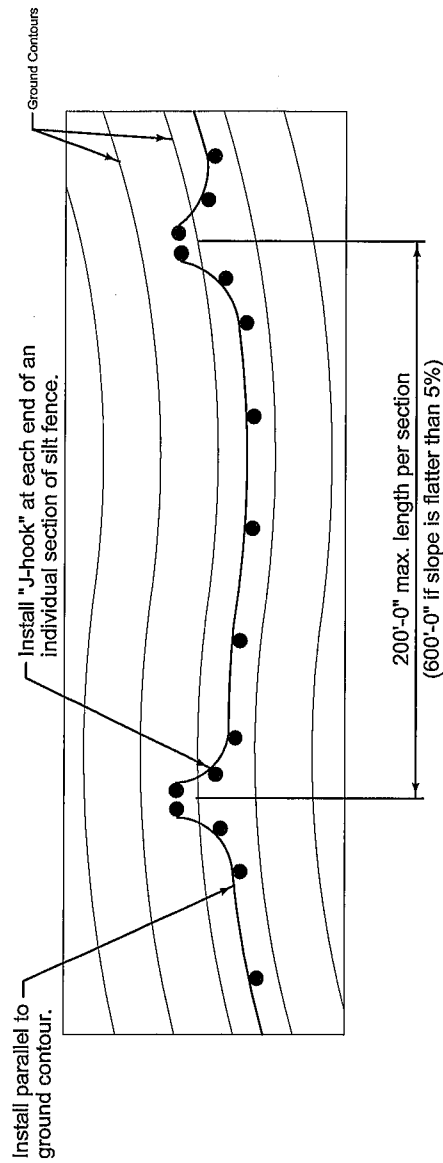
ATTACHMENT TO POST

- ① Insert 12 inches of fabric a minimum of 6 inches deep (fabric may be folded below the ground line).

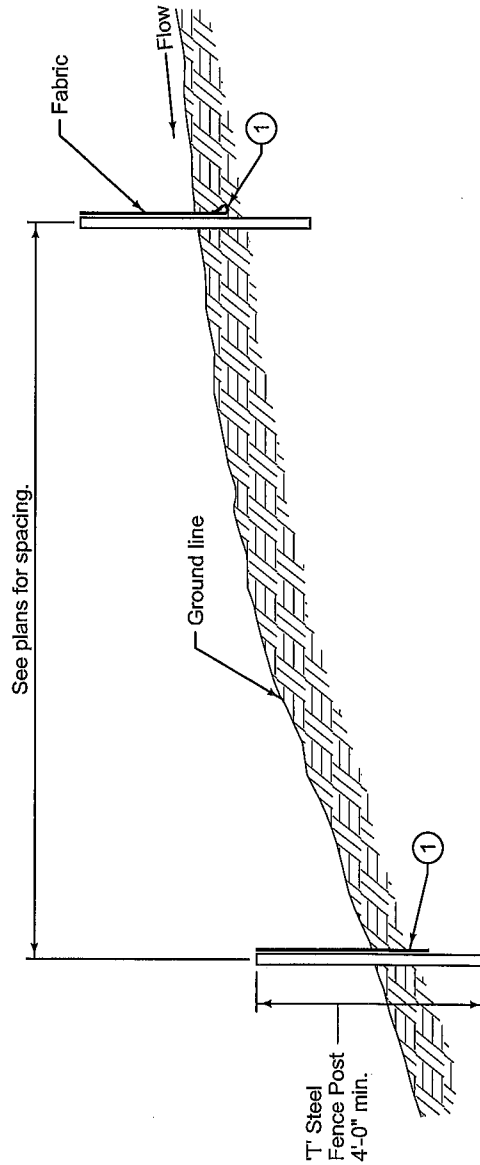
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SHEET 1 of 2		

SUDAS Standard Specifications

SILT FENCE

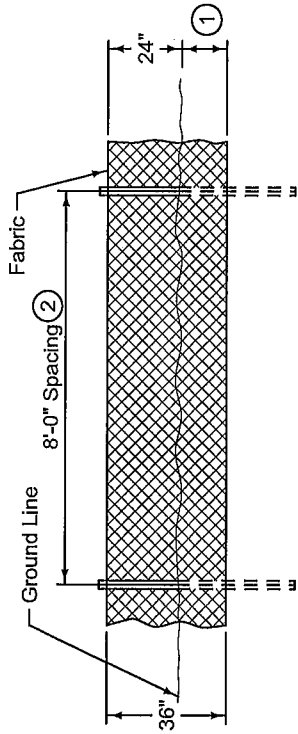


TYPICAL SILT FENCE INSTALLATION ON LONGITUDINAL SLOPES
(Plan View)



TYPICAL SILT FENCE INSTALLATION ON LONGITUDINAL SLOPES
(Profile View)

- ① Insert 12 inches of fabric a minimum of 6 inches deep (fabric may be folded below the ground line).
- ② Reduce post spacing to 5'-0" at water concentration areas, or as required to adequately support fence.



DETAILS OF SILT FENCE ON LONGITUDINAL SLOPES

	REVISION 2 10-21-14	
	9040.119	
SHEET 2 of 2		

SUDAS Standard Specifications

SILT FENCE

Waterloo Water Works

(March 28, 2018)

Accepted Products for Water Distribution Materials

1. **WATER PIPE: (Ductile) ANSI/AWWA – A21.51/C151**
American, Clow, McWane, U.S. Pipe, and Griffin
Class 52 for direct bury piping unless otherwise indicated or specified.
Class 53 for suspended from structures and bolted or restrained joint pipe
2. **GASKETS:**
Nitrile gaskets to be used in L.U.S.T. areas and in other areas shown on plans
Standard gaskets shall be vulcanized styrene butadiene rubber
Field-loc gaskets where approved (or required)
All push-on type joint pipe will be similar to Fastite, Tyton, or approved equal and will be electronically conductive through each joint with and limited to one of the following methods.
 - a. The pipe gasket will be conductive using a minimum of four copper inserts integrally situated in the gasket, thereby forming a continuous conductive joint.
 - b. A conductive serrated silicon bronze wedge installed at the bell and spigot ends respectfully of the pipe thereby forming a conductive joint. Two wedges per joint for pipe through 12". Four wedges per joint for larger diameter pipe.
3. **FITTINGS: (Ductile Iron Standard) ANSI/AWWA – A21.10/C110 3" to 24" – 350 psi (with NSS Cor-Blue Nuts and Bolts)** (Ductile Iron Compact) AWWA C153, 350 psi
Clow, Tyler/Union, U.S. Pipe, or Sigma
4. **TAPPING SLEEVES: (Stainless Steel)**
Smith Blair – 662 or 663, Ford FAST, Mueller – H304, Romac SST, JCM – 432
Smith Blair – 664 or Romac SST
5. **MECHANICAL JOINT RESTRAINT DEVICE: (Megalug – with NSS Cor – Blue Nuts and Bolts)**
Ebaa Iron Sales Inc. – 1100 series for ductile iron, or Star Grip 3000 for ductile iron,
6. **STAINLESS STEEL REPAIR CLAMPS: (With Stainless Steel Nuts & Bolts)**
Smith-Blair 261, Ford-FS1, Romac-SS1
7. **VALVES: (Resilient Seated Gate Valves) ANSI/AWWA – C509 (with NSS Cor-Blue Nuts and Bolts)**
Clow F-2640, Kennedy 8571 SS, Mueller Resilient Seat – A-2360-20,
U.S. Pipe, East Jordan, or American Flow Control

8. **TAPPING VALVES: (with NSS Cor-Blue Nuts and Bolts)**
Full Bodied Clow – F-2640, Mueller – T-2360-16, Kennedy 8950 SS, U.S. Pipe – A-USPO-16,
East Jordan, or American Flow Control
9. **VALVE BOXES:**
Tyler – (Series 6860, Range 63" to 83") or equal
10. **HYDRANTS: AWWA C502 (5¼ Main Valve Size, Standard Threads (NST) on the two and one-half (2½) inch connections and four and one-half (4½) inch connection) (factory applied epoxy paint in Safety Blue) (opening counter clockwise) (Pentagon operating nut) (six (6) inch MJ shoe) (without chains) (Waterous Pacer WB-67-250 only)**
(Clow F-2545 Medallion, Mueller Super Centurion 250, Waterous Pacer WB-67-250, East Jordan [color red] allowed for private developments)
11. **HYDRANT MARKERS:**
RoDon Hydra – finder with flat bracket 5' in length
12. **SLEEVE TYPE COUPLING:**
Standard solid black sleeve–Tyler/Union 5-1442, Griffin (NSS Cor-Blue Nuts and Bolts)
Bolted Straight Coupling with (stainless steel nuts and bolts) – Smith-Blair 442 or Romac Style 501 – Shop Coat/Epoxy
13. **TRACER WIRE TERMINAL BOX (DAYLIGHT BOX):**
Bingham & Taylor P200NFG Telescoping 12" Top x 12" Bottom, Blue Lid Water, 2 Terminal.
14. **TRACER WIRE CONNECTORS:**
Twister DB Plus Wire Connector
15. **POLYWRAP:**
8 mil. V-bio enhanced polyethylene encasement. [color blue]
16. **TRACER WIRE:**
#12 solid copper, LLDPE insulation in blue for trenched piping
#12 copper coated, steel core for trenchless methods
17. **SERVICE SADDLES: ANSI/AWWA – Required on all Ductile Iron (1¼" to 2" only)**
AY McDonald 3845, 3846 or Smith-Blair 325,397 single flat stainless steel strap, studs, washers, nuts with bronze body, or fusion bonded flexi-coat epoxy coated ductile iron body
18. **CORPORATION VALVES: ANSI/AWWA C800 (Compression Type)**
AY McDonald or Mueller ball style rated for minimum 300 PSIG water pressure

19. SERVICE PIPE: (K-Copper) (Class 52 Ductile Iron)

Any other material must be reviewed and approved by the City of Waterloo Plumbing Board and the Waterloo Water Works

20. BALL CURB VALVES: ANSI/AWWA C800 (Compression Type)

AY McDonald or Mueller ball style rated for minimum 300 PSIG water pressure

21. CURB BOX ARCH PATTERN: ANSI/AWWA C800 – with stainless steel rod and cotter pin

AY McDonald 5601, 5603 with 5660SS - 5' 0" stainless steel shut off rod

22. OTHER ACCEPTED MATERIALS:

PVC and HDPE water main pipe and other materials may be accepted on a case by case basis by the Waterloo Water Works (WWW). If said pipe and/or materials are included in Bid Documents prepared by or for the WWW, then they are accepted by the WWW.

GENERAL SPECIAL PROVISIONS

1. SCOPE OF WORK

The work covered by this contract consists of furnishing all labor, equipment, and materials and performing all operations, in connection with the **2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP**, as shown on the contract drawings and in accordance with these specifications.

The contract drawings which accompany and form a part of this contract and specifications are dated 04-20-2023, 2023. They have the general title of **2022 2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP**

The drawings are numbered and separately entitled as follows:

<u>Sheet No.</u>	<u>Description</u>
1.	Title Sheet
2.	General Notes
3.-4.	Estimated Quantities and Bid Reference Notes
5.	Overall Plan
6.	Plan and Profile Matthew Dr. to North of Mark Dr.
7.	Plan and Profile From North of Mark Dr. to Sager Ave.
8.	Plan and Profile West Sager Ave.
9.	Plan and Profile Middle Sager Ave.
10.	Plan and Profile East Sager Ave.
11.	Water Services
12.-13.	Sager Ave. Water Service Plan and Profiles
14.	Tie-in Details
15-18.	Details
19.	Construction Phasing Plan

The standard specifications of the Waterloo Water Works, Iowa and Divisions 3,5,7,8,9 and 10 of the current Edition of the Statewide Urban Design and Specifications (SUDAS) are to be used along with the special provisions described herein and shall be considered as part of the contract documents.

2. CONFLICTING SPECIFICATIONS

In the case of conflicts between the Construction Plans, Contract Specifications, and Contract Documents, the most stringent requirement, as determined by the Engineer, shall be the prevailing requirements.

3. **DUMPING AREAS**

Excess material resulting from construction operations shall be hauled to the County Landfill or other area secured by the Contractor and approved by the Owner. Rubble, rubbish, trees, brush, and other unsuitable backfill material, as designated by the Engineer, shall be hauled to the County Landfill. All Landfill charges are to be considered incidental to the contract and are the responsibility of the Contractor.

4. **CONSTRUCTION DAMAGE**

The Contractor shall exercise care during construction operations to ensure the safety and protection to existing features located near or within the limits of construction. Damage caused by negligence or poor workmanship, as determined by the Engineer, shall be considered the Contractor's responsibility.

5. **REMOVED MATERIALS**

All materials removed as part of this Contract shall remain the property of the Waterloo Water Works unless the Waterloo Water Works determines that the materials are not salvageable and the Waterloo Water Works does not want to retain ownership of the materials. Materials designated in the field by the Engineer as non-salvageable shall be hauled and disposed of by the Contractor at no cost to the Waterloo Water Works. All other materials shall be transported to locations as directed by the Engineer. No separate measurement or payment will be made for hauling or disposing of removed materials and it shall be considered incidental to applicable items.

6. **OVERHAUL**

Overhaul will not be paid for "surplus material" obtained from any of the items of construction under this contract. The cost of overhaul will be considered as incidental to the items to which it applies.

7. **PAY ITEMS**

All pay items are listed in the proposal and shall include the purchase of all materials, delivery of these materials, and furnishing all labor, plant and miscellaneous work needed to make the item complete. All such cost shall be incidental to the proposed item to which it applies and shall not be considered for separate payment.

8. **BREAKDOWN OF LUMP SUM CONTRACT PRICE ITEMS**

The Contractor shall, immediately upon execution and delivery of the contract, before the first estimate for payment is made, deliver to the Engineer a detailed estimate giving a complete breakdown of the lump sum contract prices. The submitted breakdown shall be approved by the Engineer prior to any payment of any lump sum price item.

9. **PERMISSION TO HAUL OVER STREETS, RAILROADS AND HIGHWAYS**

The Contractor will be required to secure, from the proper authorities, permission or permit which may be required to haul over streets, highways, railroads or private property, and any hauling operations of the Contractor shall be subject to the requirements of such permits, permission, and to all applicable regulations, laws, and ordinances governing hauling and movement of equipment over streets, railroads, highways and private property. Any costs or inconvenience caused by obtaining any necessary permits or permission shall be considered completely covered by the price bid for the items in the proposal.

10. **CONSTRUCTION SCHEDULING**

The Engineer shall approve Contractor's work schedule prior to starting. All revisions shall also be approved. The Engineer may change the schedule to accommodate changing construction conditions.

The Contractor shall coordinate the work under this contract with contractors performing work under other contracts which may be performed concurrently.

The Contractor shall be responsible to notify the Police, Fire, Street and Engineering Departments of the closing and opening of streets.

The Contractor shall commence work within ten (10) days after receipt of the "Notice to Proceed" and diligently execute the work of the contract to completion.

11. **PRE-CONSTRUCTION CONFERENCE**

Before any work is started, the Contractor shall arrange with the Engineer to hold a pre-construction conference to discuss problems and schedules of contracts.

12. **UNDERGROUND UTILITIES**

It is the responsibility of the Contractor to obtain the location of gas lines, water lines, electric, telephone, and cable television cables or wires from the various utility companies and the City electrician before starting any excavation. The Contractor shall be responsible for any damage to any underground utilities. The Contractor shall expose those utilities indicated on the plans so that elevations may be determined before beginning construction. This work shall be considered incidental to other items of work.

If the Contractor believes that additional costs have been incurred due to a utility being improperly located, the resolution of the additional costs incurred shall be made between the Contractor and the respective utility company.

13. **TRAFFIC SIGNS AND STREET SIGNS**

The Contractor shall contact the City of Waterloo Traffic Operations Department to have any street sign that will be affected by construction removed and replaced when the work has been completed. There shall be no separate payment for this work and it shall be considered incidental to the Contract.

14. TRAFFIC CONTROL DURING CONSTRUCTION

The Contractor shall, at his own expense and without further or other order, provide, erect and maintain, at all times during the progress and suspension of the work and until completion and final acceptance thereof, suitable and requisite barricades, signs or other adequate protection, as required by the latest edition of Part VI of the "Manual on Uniform Traffic Control Devices" and shall provide, keep and maintain such barricades, signs, etc., as may be required or as may be ordered by the Engineer, to ensure the safety of the public as well as those engaged on the work. All barricading plans shall be reviewed by the Engineer.

The Contractor shall determine, provide and obtain approval from the City Engineer on all detour locations for all street closings, barricades and posting prior to construction. These shall meet requirements of the City Police Traffic Department. The Contractor shall notify the City Engineer's Office and the Police, Fire and Street Departments when the street is closed for construction. All barricading shall be in accordance with the latest edition of Part VI of the "Manual on Uniform Traffic Control Devices." Encapsulated lens sheeting is not required on this project.

The Engineer, or authorized representative, shall periodically review traffic control that has been put in place by the Contractor. If traffic control devices are found to be without proper maintenance, penalties shall be assessed. Improper maintenance shall include, but not be limited to, the following situations:

- A. Less than 100 percent of lights in working order.
- B. Any barricade or sign moved or tipped over.
- C. Fencing not supported in a vertical position.
- D. Fencing not placed around excavations when workers/equipment are not working at the location.
- E. Lack of proper barricades or signage.

Each incident is treated as a separate citation on an individual basis. It is not intended that minor deficiencies be price adjusted if corrected the day notification is given. In addition to a price adjustment, the Engineer may suspend work for irresponsible and/or repeated failure to construct the project using proper traffic control procedures.

Penalties:	1st Offense	Written warning given by City.
	2nd Offense	\$ 200
	3rd Offense	\$ 500
	4th Offense	\$1,000

5th Offense	\$2,000
6th Offense	Engineer's discretion (amount
or more	equal or greater than \$2,000)

15. GRADES, LINES, LEVELS AND SURVEYS

All necessary grades, lines, levels and surveys shall be established by the Engineer.

The Contractor shall verify all grades, lines, levels and dimensions as shown on the drawings, and he shall report any errors or inconsistencies in the same to the Engineer before commencing work.

16. SAFETY OF WORKERS AND PUBLIC

The Contractor shall, at all times, take necessary precautions to protect the life and health of all persons employed on this project and the public. He shall provide necessary safety devices and safeguards in accordance with latest and best accident prevention practices. All such protection shall be furnished to employees without cost.

No direct measurement of payment shall be made for this protection, but shall be considered incidental to other items of work. The public shall be kept outside of any work area.

17. WORKING ON SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS

The Contractor shall notify the Engineer in writing forty-eight (48) hours in advance if work on Saturday is planned. By noon the Friday before the planned Saturday work, the Contractor shall confirm the Saturday work schedule with the project inspector.

Work on Sunday requires prior approval of the Engineer. The Contractor shall not work the following days in 2023 due to City holidays: May 29, July 4, September 4, November 23-24, December 25.

SPECIAL PROVISIONS

1. MECHANICALLY COMPACTED BACKFILL

All ditches in street right of way shall be mechanically compacted to ninety-five percent (95%) of Standard Proctor Density. Payment for this work shall be incidental to the contract and no separate payment shall be made for compaction of backfill.

2. PAYMENT FOR WATER MAIN

This paragraph shall apply to the unit prices for water main and appurtenances and restrict full payment of the unit bid price until the project is completed and surface is restored. By providing a breakdown on the unit price, the intent is to encourage the Contractor to promptly restore the trenches. The breakdown of the unit price does not give the Contractor the choice of eliminating a portion of the work under this unit price or delaying his schedule for reason of obtaining payment based on a certain percentage of his preference.

<u>Contract</u> <u>for Water Main</u>	<u>Payment as % of</u> <u>Unit Price</u>
A. Trench excavation, including removal and stockpiling of crushed rock and/or topsoil from existing street, removal of surfacing, laying of pipe, dewatering, pumping, and other appurtenant work.	40%
B. Backfill of trench and compaction with moisture and density control of pipe and appurtenances. If such compaction with moisture and density control is not required, 65% of the unit bid price will be paid when backfill is complete.	25%
C. Shaping of trench area surface ready to natural grade including relaying of topsoil and all other work as further described in this paragraph. When all work is completed, payment shall be made on 100% of the unit bid price for water main.	35%

3. LIQUIDATED DAMAGES

Time is an essential element of this contract. It is important that the work be diligently pursued to completion. If the work is not completed within the specified contract period, plus authorized extensions, the Contractor shall pay to the Waterloo Water Works

Liquidated Damages in the amount of \$500.00 per day, for each day, as further described herein, in excess of the authorized time.

Days beyond the specified completion date for which Liquidated Damages will be charged will be working days that the Contractor does, or could have and worked from Monday through Saturday. Sundays will be counted only if work is performed. Partial working days will be considered as a full working day. Days not chargeable for Liquidated Damages will include rain days, Sundays if no work is done, and legal holidays.

Working days will cease to be charged when only punch list items remain to be completed. Punch list items do not include contract bid items or approved change/extra work orders.

When the Contractor believes the project to be substantially completed, a written notice stating the same shall be submitted to the Engineer and a request made for a Punch List. If the work under the Contract extends beyond the normal construction season for such work, the Contractor shall submit to the Engineer in writing a request that working days counted toward the project be suspended until work is resumed the following construction season. This amount is not construed as a penalty. These damages are for the cost to the Waterloo Water Works of providing the required additional inspection, engineering and contract administration.

4. ARTIFICIAL LIGHTING

No artificial lighting will be allowed during construction of this project.

5. STANDARD SPECIFICATIONS

The Standard Specifications which are referenced in the contract documents are designated as follows:

STANDARD SPECIFICATIONS OF THE WATERLOO WATER WORKS

WATERLOO STANDARD SPECIFICATIONS - "Standard Specifications for Municipal Public Works Construction, City of Waterloo, Iowa."

IDOT STANDARD SPECIFICATIONS - "Standard Specifications for Highway and Bridge Construction, Iowa Department of Transportation, Ames, Iowa, Series of 2001" (unless otherwise noted) and current revisions thereof.

SUDAS - "Iowa Statewide Urban Standard Specifications for Public Improvements", latest edition.

6. QUANTITY ADJUSTMENTS

All Bid Items are exempted from consideration under the provisions of Section B. "Scope of Work," Paragraph 7 of the "General Specifications for Construction" concerning the variance of the "As-Built" quantity of the listed item by more than twenty (20%) percent from the estimated quantity specified in the contract.

7. CLEARING AND GRUBBING

The Contractor shall protect all trees and shrubs from construction activities that are identified as such by the Engineer.

8. PERCENT OF CONTRACT TO BE PERFORMED BY PRIME CONTRACTOR

The Prime Contractor shall be required to perform at least 51 percent of the total contract amount of this project. Purchasing of materials for subcontractors will not be an acceptable method for the prime contractor to meet the 51 percent requirement.

9. CLEAN-UP AND RESTORATION OF DISTURBED AREAS

The Contractor is required to remove all construction related debris from all areas disturbed by his/her activities and shall restore said areas to the area's elevation, slope and drainage pattern that existed prior to construction of this project. This includes, placement of a 6" (minimum) rolled thickness of topsoil that is clear of all rock, sub-base, foundation stone and bedding stone. Said topsoil may be derived from topsoil that was stripped, salvaged and separately stockpiled from on-site excavation areas, provided that said topsoil is free from debris, rock, sub-base, foundation stone and bedding stone. Said topsoil may also be procured from off-site sources at contractor's expense, if free from debris and if approved by the owner's representative. Clean-up and restoration of disturbed areas is an incidental item to the contractor's work and shall not be measured or paid for separately.

GENERAL SPECIFICATIONS FOR CONSTRUCTION

CITY OF WATERLOO, IOWA Department of Engineering

SECTION A - Definitions of Terms

SECTION B - Scope of work

SECTION C - Control of Materials and Work

SECTION D - Procedure and Progress

SECTION E - Measurements and Payments

SECTION F - Legal Relations and Responsibility

SECTION A - DEFINITIONS OF TERMS

1. **CITY.** The City of Waterloo, Iowa.
2. **WATERLOO WATER WORKS, WATER WORKS, OR OWNER.** The Waterloo Water Works, Waterloo, Iowa, which is the Party of the First Part of the accompanying contract, acting through its authorized representative.
3. **BOARD OR BOARD OF WATER WORKS TRUSTEES.** The duly appointed Board of Trustees of the Waterloo Water Works, Waterloo, Iowa.
4. **ENGINEER.** Wayne Claassen Engineering and Surveying, Inc., 2705 University Avenue, P.O.Box 898, Waterloo, Iowa 50704.
5. **COUNCIL.** The duly elected Council of the City of Waterloo, Iowa.
6. **CITY ENGINEER.** The City Engineer of Waterloo, Iowa, or his authorized representative.
7. **INSPECTOR.** The authorized representative of the Engineer, assigned to the detailed inspection of the work or materials therefore and to such other duties as may be delegated to him in these specifications.
8. **CONTRACTOR.** The Party of the Second Part in the accompanying contract for the improvement covered by these specifications, or his authorized representative.
9. **SUBCONTRACTOR.** Any person, firm, or corporation who has, with the approval of the Board, contracted with the Contractor to execute and perform in his stead all or any part of the contract.
10. **BIDDER.** Any individual, firm, or corporation submitting a proposal for all or a part of the work provided for in these specifications.

11. **PROPOSAL GUARANTEE.** The security designed in the Notice of Bidders or Proposal to be furnished by the bidder as a guarantee of good faith to enter into a contract and furnish an acceptable bond for the work contemplated if it be awarded him.

12. **SURETY.** The corporate body bound with and for the Contractor for the acceptable performance of the contract.

13. **PROPOSAL.** The written Proposal, submitted by the bidder in the prescribed manner and on the standard form, for the improvements covered by these specifications.

14. **SPECIFICATIONS.** The documents that set forth the manner in which the proposed work is to be accomplished which have been prepared by the Engineer and approved by the Board, official copies of which are now on file with the General Manager of the Waterloo Water Works.

15. **SPECIAL PROVISIONS.** Clauses or memoranda not contained herein, applying to the contract of which these specifications are a part, which change or supplement these specifications.

16. **CONTRACT.** The agreement entered into between the Waterloo Water Works and the Contractor, setting forth the terms under which the work covered by the plans and specifications is to be performed. The contract includes all conditions, definitions, and instructions set forth in the official publications relating to the work, the official contract and specifications, the Proposal, official plans, and all supplemental agreements entered into by the parties to the contract.

17. **NOTICE TO BIDDERS.** The notice called attention of bidders to the time and place for receiving bids, containing a brief description of the work, and briefly setting forth the requirements and conditions for submission of Proposals.

18. **INSTRUCTIONS TO BIDDERS.** The clauses setting forth in detail the information relative to the proposed work and requirements for the submission of Proposals.

19. **PLANS.** The plans for the improvement covered by the specifications and approved by the Board, official copies of which are on file with the General Manager of the Waterloo Water Works.

20. **CONTRACT BOND.** The bond executed by the Contractor and his surety in favor of the Waterloo Water Works, Waterloo, Iowa, guaranteeing the complete execution of the contract in accordance with the plans and specifications, the payment of all debts pertaining to the work, and maintenance of the work as provided by law or by the specifications.

21. **CONTRACT PERIOD.** The period from the specified date for beginning the work to the specified date of completion, both dates inclusive. The contract period may be

extended by the Board, as provided in these specifications, in which event the contract period includes the new date of completion.

22. **OFFICIAL PUBLICATIONS.** The official publications are the formal resolutions and notices relative to the proposed improvement that are required by law to be published in a prescribed manner and that have actually been published in accordance with the statutes relating thereto. Attention is directed to the fact that these official publications are by statute vested with all of the force and effect of contract obligations.

23. **A.S.T.M.** Abbreviation for American Society for Testing Materials.

24. **A.W.W.A.** Abbreviation for American Water Works Association.

25. **WORK.** The term "Work" of the Contractor and Subcontractor includes labor or materials or both, equipment, transportation, or other facilities necessary to complete the contract.

26. **TIME.** All time limits stated in the contract documents are of the essence in the contract.

SECTION B - SCOPE OF WORK

1. **CORRELATION AND INTENT OF DOCUMENTS.** The Contract documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the documents is to include all labor, materials, equipment, and transportation necessary for the proper execution of the work. Materials or work described in words which, so applied, have a well-known technical or trade meaning shall be held to refer to such recognized standard.

2. **DRAWINGS AND SPECIFICATIONS.** Unless otherwise provided in the contract documents, the engineer shall furnish to the Contractor, free of charge, all copies of drawings and specifications reasonably necessary for the execution of the work.

The Contractor shall keep one (1) copy of all drawings and specifications on the work available to the Engineer and to his representatives.

3. **CONTRACTOR'S UNDERSTANDING.** It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature, character and location of the work, the conformance to the ground, the character, quality, and quantity of the materials to be encountered, the character of the equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can, in any way, affect the work under this contract. No verbal agreement or conversation with any officer, agent, or employee of the Waterloo Water Works, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations herein contained.

4. **REPORTING ERRORS AND DISCREPANCIES.** If the Contractor, in the course of the work, finds any discrepancies between the plans and the physical conditions of the locality, or any errors of omission in plans or in the layout as given by said stakes and instructions, it shall be his duty to inform the Engineer immediately, in writing, and the Engineer shall promptly correct the same.

5. **ALTERATION OR CORRECTION OF PLANS.** The plans are made up from surveys that are presumably correct and represent the foreseen construction requirements. Any modification of the plans which may be required by the exigencies of the construction or any corrections made necessary because of errors in the original surveys, will be made by the Engineer. Should corrections or modifications of the plans or specifications require a different quality or class of work than that upon which the unit prices in the Proposal are based, or if the modifications or corrections are required in parts of the work partially completed and such modifications result in an increased cost to the Contractor, the amount to be paid for work resulting from such changes shall be agreed upon in writing at the time the changes are ordered and before the work is begun by the Contractor. No allowance will be made for anticipated profits on work not performed.

6. **CHANGES IN THE WORK.** The Waterloo Water Works, without invalidating the contract, may order extra work or make changes by altering, adding to, or deducting from the work, the contract sum being adjusted by agreement or arbitration before such changed work is undertaken. All such work shall be executed under the conditions of the original contract, except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

7. **INCREASED OR DECREASED QUANTITIES.** The right is reserved without impairing the contract, to order the performance of such work of a class not contemplated in the Proposal or to increase or decrease the quantities as may be considered necessary to complete fully and satisfactorily the work included in the contract. However, when the work is completed without change in the plans, and the measured quantity of any item of work varies by more than twenty percent (20%) from the estimated quantity specified in the contract, an adjustment in price may be made for such item of work by agreement between the Engineer and the Contractor, subject to the approval of the Board. Either party to the contract may request such an adjustment.

8. **LANDS AND RIGHT OF WAY.** The Waterloo Water Works shall provide the lands upon which the work under this contract is to be done, except that the Contractor shall provide land required for the erection of temporary construction facilities and storage of his material, together with the right of access to same.

9. **CITY WATER.** The Contractor shall be allowed to use City Water but before any water is used, he shall make application to the Waterloo Water Works, who will coordinate this with the Contractor. Waterloo Water Works personnel are the **only** personnel allowed to operate existing water mains, valves, hydrants, etc. The Contractor will be charged for meters, equipment and water, except for the water needed to load the new water main the first time which shall be at no cost to the Contractor.

10. **RIGHTS OF VARIOUS INTERESTS.** Whenever work being done by the Waterloo Water Work's forces or by other Contractors is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by the Engineer to secure the completion of the various portions of the work in general harmony.

11. **CLOSING STREETS TO TRAFFIC.** The Engineer shall be the judge of how many streets or parts of streets it is necessary for the Contractor to close at any time and may refuse to permit the closing of additional streets until such of the work is finished and opened to traffic as he may direct.

12. **OBSTRUCTION OF STREETS.** The work is to be carried on in such manner as to obstruct the streets, highways, and alleys as little as possible. The Contractor shall carry on the different parts of the work so as to complete the whole, as nearly as practicable, at the same time. In doing the work, the Contractor shall follow the directions of the Engineer as to the place or places where work shall be started or be carried on and the direction in which it shall be done.

13. **SHANTIES AND BUILDINGS.** Shanties or other buildings shall not be erected in or upon any street, highway, or alley without permission of the Engineer. If such permission be granted, it may be upon any reasonable terms prescribed by the person or body granting such permission.

14. **SANITARY CONVENIENCES.** The Contractor shall furnish the necessary sanitary conveniences, properly secluded, for the laborers on the work, and these shall be maintained in a manner that will be inoffensive to the public.

15. **CLEANING UP.** The Contractor shall, as directed by the Engineer, remove from the City's property and from all public and private property, at his own expense, all temporary structures, rubbish, and waste materials resulting from his operations before work can be considered completed. The Contractor shall also renew or replace any and all fences, sidewalks, or other property damaged or disturbed by his work.

16. **OMISSION OF PARTS OF GENERAL SPECIFICATIONS.** Parts of the General Specifications deemed not to apply to some particular work may be omitted by special reference in other parts of the contract documents.

SECTION C - CONTROL OF MATERIALS AND WORK

1. **SUPERVISION AND INSPECTION.** The Engineer shall have supervision of the construction provided for in this Contract and shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rate of progress on the work, and all questions regarding the acceptable fulfillment of the terms of the Contract. Materials and construction work shall, at all times, be subject to the inspection of the Engineer or his representatives. The Contractor shall be held strictly to the true intent of these specifications as regards the quality of materials, workmanship, and the diligent prosecution of the work.

Neither the Waterloo Water Works, the City, nor the Engineer is responsible for the safety of the Contractor's employees, subcontractors or subcontractor's employees. The Contractor, alone, shall be responsible for the safety, efficiency and adequacy for his/her safety and that of his/her employees and for any damages which may result from the failure of their improper construction appliances, methods, means, maintenance or operation.

The Engineer and his representatives shall, at all times, have access to the work wherever it is in preparation of progress, and the Contractor shall provide proper facilities for such access and for inspection.

If the specifications, the Engineer's instructions, law ordinances, or any public authority require any work and/or materials to be especially tested or approved, the Contractor shall give the Engineer timely notice of readiness for inspection. If the inspection is to be made by authority other than the Engineer, the Contractor shall notify the engineer of the date fixed for inspection. Inspections by the Engineer will be promptly made and, where practicable, at the source of supply. If any work should be covered up without the approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination at the Contractor's expense.

Re-examination of questioned work may be ordered by the Engineer, and, if so ordered, the work must be uncovered by the Contractor. If such work be found in accordance with the Contract, the Waterloo Water Works shall pay the cost of re-examination and replacement. If such work be found not in accordance with the Contract, the Contractor shall pay such cost unless he shall show that the defect in the work was caused by another Contractor, and, in that event, the Waterloo Water Works shall pay the cost.

2. **AUTHORITIES AND DUTIES OF INSPECTORS.** Inspectors may be stationed on the work to report to the Engineer as to the progress of the work and the manner in which it is being performed; also, to report whenever it appears that materials furnished and work performed by the Contractor fail to fulfill the requirements of the specifications and Contract, and to direct the attention of the Contractor to such failure or infringement; but such inspection shall not relieve the Contractor from any obligations to furnish acceptable materials or to provide completed construction that is satisfactory in every particular.

In case of any dispute arising between the Inspector and the Contractor as to materials furnished or the manner of performing the work, the Inspector shall have the authority to reject materials or suspend the work until the question at issue can be referred to and decided by the Engineer. Inspectors are not authorized to revoke, alter, enlarge, relax, or release any requirements of these specifications. The Inspector shall, in no case, act as foreman or perform other duties for the Contractor, or interfere with the management of the work by the latter.

3. **STATUS OF THE ENGINEER.** The Engineer shall have general supervision and direction of the work, except that this shall not include the safety of the Contractor's employees or the safety of the Contractor's subcontractor's employees or the public, which responsibility is solely the Contractor's. He has authority to stop the work whenever such stoppage may be necessary to insure the proper execution of the Contract. He shall also have

authority to reject any work and/or materials which do not conform to the specifications, to direct the application of forces to any portion of the work as, in his judgment, is required, and to order the force increased or diminished, and to decide questions which arise in the execution of the work.

4. **ENGINEER'S DECISIONS.** The Engineer shall, within a reasonable time, make decisions on all claims of the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the contract documents.

All such decisions of the Engineer shall be final except as to the element of time and financial consideration involved, which, if no agreement in regard thereto is reached, shall be subject to arbitration.

5. **STAKES AND INSTRUCTIONS.** The Contractor shall provide reasonable and necessary opportunities and facilities for setting stakes and making measurements. The Contractor shall not furnish stakes or men to set them. He shall not proceed until he has received from the Engineer such stakes and instructions as may be necessary to the progress of the work.

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 extra expense and shall be responsible for any mistakes that may be caused, by their loss or disturbance.

6. **SUPERINTENDENCE.** The Contractor shall keep on his work during its progress a competent superintendent and any necessary assistants, all satisfactory to the Engineer. The Superintendent shall not be changed except with the consent of the Engineer, unless the Superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The Superintendent shall represent the Contractor in his absence, and all directions given to him shall be as binding as if given to the Contractor. Important decisions shall be confirmed in writing to the Contractor. Other directions shall be so confirmed on written request in each case.

The Contractor shall give efficient supervision to the work using his best skill and attention. He shall carefully study and compare all drawings, specifications, and other instructions, and shall report at once to the Engineer any error, inconsistency, or omission which he may discover.

7. **REMOVAL OF UNAUTHORIZED WORK.** Work done without lines and grade being give, work done beyond lines shown on the plans or as given, except as herein provided, or any extra or additional work done without authority, will be considered as unauthorized and at the expense of the Contractor and will not be paid for under the provisions of the Contract. Work so done may be ordered removed and replaced at the Contractor's expense.

8. **REMOVAL OF DEFECTIVE MATERIALS OR WORK.** The Contractor shall promptly remove from the premises all materials condemned by the engineer as failing to conform to the Contract; whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the contract and without expense to the Waterloo

Water Works, and shall bear the expense of making good all work of other Contractors destroyed or damaged by such removal or replacement.

If the Contractor does not remove such condemned work and materials within a reasonable time, fixed by written notice, the Waterloo Water Works may remove them and may store the material at the expense of the Contractor. If the Contractor does not pay the expense of such removal within a reasonable time thereafter, the Waterloo Water Works may, upon ten (10) days' written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs and expense that should have been borne by the Contractor; or, if the net proceeds of such sale are insufficient to pay the expenses of removal, the Waterloo Water Works may deduct the balance from any amounts due the Contractor.

9. **MATERIALS, EQUIPMENT, APPLIANCES, AND FACILITIES.** Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary for the execution and completion of the work. Materials shall be of the quality specified for each particular part of the work.

Whenever, in construction of the work or in the manufacture of any article of appliance necessary for the construction or operation of the work, it is necessary to use any material that is not fully specified in these specifications, it shall be of good quality and shall meet with the approval of the Engineer.

Any appliance that is necessary for the construction or operation of the work and is commonly recognized as a part of the work, shall be furnished by the Contractor as part of the work, whether or not it is specifically called for in the plans and specifications, and such appliance shall be of good quality and standard make and shall meet with the approval of the Engineer.

10. **MATERIAL SAMPLES.** Before the contract is awarded, the bidder may be required to furnish a statement of the origin, composition, and manufacture of any and all materials proposed for use in the performance of the Contract, together with samples of the material. These samples will be considered as representative and typical of the material to be obtained from any particular source.

11. **CHARACTER OF WORKMEN AND EQUIPMENT.** The Contractor shall employ competent and efficient workmen for every kind of work. Any person employed on the work who shall refuse or neglect to obey the directions of the engineer or Inspector, or who shall be deemed incompetent or disorderly, or who shall commit trespass upon public or private property in the vicinity of the work, shall be dismissed when the Engineer so orders, and shall not be re-employed unless express permission be given by the Engineer. The Contractor shall, at all times, enforce discipline and good order among his employees.

The methods, equipment, and appliances used on the work, and the labor employed, shall be such as will produce a satisfactory quality of work and shall be adequate to complete the contract within the specified time limit.

12. **HIRING WATERLOO WATER WORKS EMPLOYEES.** The Contractor shall not employ and hire any of the Waterloo Water Work's employees without the permission of the Waterloo Water Works.

13. **LABOR.** Local labor shall be given preferences so far as practicable.

14. **THE WATERLOO WATER WORK'S RIGHT TO DO WORK.** If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the Waterloo Water Works, after three (3) days' written notice to the Contractor may, without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor, provided, however, that the Engineer shall approve both such action and the amount charged to the Contractor.

SECTION D - PROCEDURE AND PROGRESS

1. **ORDER OF COMPLETION - USE OF COMPLETED PORTIONS.** The Contractor shall complete any portion or portions of the work in such order or time as the Engineer may require. The Waterloo Water Works shall have the right to take possession of an use completed or partially completed portion of the work at any time, but such taking possession and use shall not be deemed an acceptance of work so taken or used, or any part thereof. If such prior use increases the cost of or delays the work, the Contractor shall be entitled to such extra compensation or extension of time, or both, as the Engineer may determine.

2. **WEATHER.** During stormy or inclement weather, all work shall be suspended, except such as can be done in an acceptable manner. Permission to work during freezing, stormy, or inclement weather shall in no way be construed as a release of the Contractor's responsibility regarding the quality of the finished work at such time.

3. **SUNDAYS AND LEGAL HOLIDAYS.** Except for such work as may be required to properly maintain or protect completed or partially completed construction or to maintain lights and barricades, no work will be permitted on Sundays or legal holidays without specific permission of the Engineer.

4. **DELAYS AND EXTENSION OF TIME.** If the Contractor be delayed in the completion of the work by an act of neglect of the Waterloo Water Works, or its employees; or by any other Contractor employed by the Waterloo Water Works; or by changes ordered in the work; or by strikes, lockouts, fire, unusual delays in transportation, unavoidable casualties, or any cause beyond the Contractor's control; or by delay authorized by the Engineer pending arbitration; or by any cause which the Engineer shall decide justifies the delay, then the time of completion shall be extended for such reasonable time as the Engineer may decide will compensate for such delay.

No such extension shall be made for delay occurring more than thirty (30) days before claim therefore is made in writing to the Engineer. In the case of a continuing cause of delay, only one claim is necessary.

This article does not exclude the recovery of damages for delay by either party under provisions in the contract documents.

5. **TEMPORARY SUSPENSION OF WORK.** The Engineer shall have authority to suspend the work, wholly or in part, for such period or periods of time as he may deem necessary, due to unsuitable weather or such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as is necessary due to the failure to the Contractor to carry out orders given or to perform any or all provisions of the Contract.

6. **NOTICES - HOW SERVED.** Any notice to be given by the Waterloo Water Works to the Contractor under this contract shall be deemed to be served if the same be delivered to the man in charge of any office used by the Contractor or his foreman or agent at or near the work, or deposited in the post office, postpaid, addressed to the Contractor at his last known place of business.

7. **PROGRESS OF WORK.** The progress of the work shall be such that, at the expiration of one-fourth ($1/4$) of the contract period, one-eighth ($1/8$) of the work shall be completed; at the expiration of one-half ($1/2$) of the contract period, three-eighths ($3/8$) of the work shall be completed; at the expiration of three-fourths ($3/4$) of the contract period, the work shall be three-fourths ($3/4$) completed, and the whole work shall be completed at the expiration of the contract period.

If, at any time the above schedule is not being maintained, the Board may give written notice to the Contractor and his sureties that the specifications are not being complied with. Such notice shall state what action on the part of the Contractor is required to bring the work within the requirements of the specifications. If the Contractor fails, within ten (10) days, to proceed as directed in the said notice, then the Council shall have authority to annul this contract without process or action at law and take over the prosecution and completion of the work, as provided under the article covering Waterloo Water Work's right to terminate contract.

8. **RIGHT TO TERMINATE CONTRACT.** If the Contractor should be adjudged a bankrupt; or if he should make a general assignment for the benefit of this creditor; or if a Receiver should be appointed on account of his insolvency; or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough skilled workmen or proper materials; or if he should fail to make prompt payment to Subcontractors or for materials or labor; or if he should persistently disregard laws, ordinances, or the instructions of the Engineer; or if he should otherwise be guilty of a substantial violation of any provision of the contract, then the Waterloo Water Works, upon the certificate of the Engineer that sufficient cause exists to justify such action, may, without prejudice to any other rights or remedy, and after giving the Contractor seven (7) days' written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools and appliances thereon and finish the work by whatever method he may deem expedient. In such cases, the Contractor shall not be entitled to receive any further payment until the work is finished.

If the unpaid balance of the contract price shall exceed the expenses of finishing the work, including compensation for additional managerial and administration services, such excess shall

be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Waterloo Water Works. The expense incurred by the Waterloo Water Works as herein provided and the damage incurred through the Contractor's default shall be certified by the Engineer.

9. **REMOVAL OF EQUIPMENT.** In the case of annulment of this contract before completion, from any cause whatsoever, the Contractor, if notified to do so by the Waterloo Water Works; shall promptly remove any part or all of his equipment and supplies from the property of the Waterloo Water Works, failing which, the Waterloo Water Works shall have the right to remove such equipment and supplies at the expense of the Contractor.

SECTION E - MEASUREMENTS AND PAYMENT

1. **STANDARD OF MEASUREMENT.** All work completed under the contract shall be measured by the Engineer according to the United States standard measures.

2. **SCOPE OF PAYMENTS.** The Engineer's measurements of quantities shall be the basis for final payment for the work performed under this Contract. After the work is completed, the Engineer will make measurements and computations of the number of units of each of the various items of work completed, and the Contractor will be paid for the actual amount of work performed at the rates specified in his Proposal. Before final settlement is made, the Board may require the Contractor to submit a list of all persons furnishing labor or materials, with evidence that such persons have been paid in full. Payment shall be made in the manner set forth in official publications and Board Proceedings relative thereto.

3. **PAYMENT FOR EXTRA WORK.** Such extra work as may have been ordered by the Engineer and performed by the Contractor shall be compensated for as provided herein. If work is to be done or materials are to be furnished by the Contractor which cannot properly be classified under unit prices included in the Proposal, the Contractor shall be paid therefore the actual reasonable cost of the labor and materials entering permanently in such work, plus fifteen percent (15%) of the cost thereof. In computing the labor cost on such extra work, the following items shall be included:

- (a) Actual payroll expenditures for labor at the current rate therefore, and cost of materials.
- (b) Pay of foreman and timekeepers for actual time required on the extra work.
- (c) Liability insurance, prorated, for the extra work.

Labor cost items on extra work shall be furnished in duplicate by the Contractor to the Inspector daily. The Inspector shall check the items, and if he finds them to be correct, he shall so certify on the statement of cost, returning one copy to the Contractor and filing one copy with the Engineer.

The Engineer shall determine the cost of materials entering into extra work from the materials and receipted freight bills for the same.

For any special machine, power tools, or equipment, including fuel and lubricants, but not including small hand tools, which may be deemed necessary or desirable to use, the Contractor shall be allowed a reasonable rental thereon, to be agreed upon in writing by the Engineer before such work is begun, and to which sum no percentage is to be added.

The item of cost shall not include repairs or replacement of equipment or overhead expenses of any character. The fifteen percent (15%) allowed is considered to cover the use of hand tools and all overhead expenses except liability insurance.

In no case will a claim for extra compensation be allowed unless the work upon which the claim is based has been ordered in writing, except as provided hereinafter.

4. **CLAIMS FOR EXTRA COST.** If the Contractor claims that any instructions, by drawings or otherwise, involved extra cost under this contract, he shall give the Engineer written notice thereof within ten (10) days after completion of the work.

No such claim shall be valid unless so made.

5. **CLAIMS FOR EXTRA COMPENSATION.** If the Contractor deems that extra compensation is due him for work and/or materials that he considered is not clearly covered in the items for which he submitted unit prices in his bid and that were not ordered in writing by the Engineer as an extra s heretofore provided, the Contractor shall notify the Engineer, in writing, of his intention to make claim for extra compensation for work and/or material before starting construction. If such written notification is not given or the Engineer is not afforded proper facilities by the Contractor for keeping strict account of actual cost as defined herein, then the Contractor hereby agrees to waive the claim for extra compensation. Such notice to the engineer and the fact that the Engineer has kept account of cost as aforesaid, shall not in any way be construed as proving the validity of the claim, which must be passed upon by the Waterloo Water Works. In the event that the Waterloo Water Works finds the claim to be just, it shall be allowed and paid for as extra work as provided herein.

6. **COMPLETION REPORT AND OBJECTIONS THERETO.** Within ten (10) days after the full completion of the work to be done under this contract, the Engineer shall make a written statement of all the work done by the Contractor hereunder, stating the quantity of each item as found by him and including a statement of all credits for extra work and all credits or debits for changes, alterations, omissions, and defects, and shall forthwith deliver a copy of such statement to the Contractor. The Contractor shall compare such statement with his own records and shall then, in writing, either approve such statement or point out any claimed errors or omissions. If any of such claims are found correct, the Engineer shall, within ten (10) days, prepare a new statement, a copy of which shall in like manner be delivered unto the Contractor. The Engineer will not file a formal completion report with the Waterloo Water Works until the Contractor has approved the same.

If the figures of the Engineer and the Contractor cannot be reconciled, or there is a difference of opinion regarding some item or items, then such difference of opinion shall be submitted to arbitration as hereinafter provided, and the decision of the arbitrator or arbitrators shall be final, and the Engineer shall, within a period of five (5) days, file his completion report.

Before action by the Board upon such completion report, the Contractor shall also file a written statement of any claims he may have against the Waterloo Water Works, other than those shown by such completion report, growing out of this contract or the work done hereunder. The Waterloo Water Works shall retain ten percent (10%) of the amount due the Contractor on the completion report for a period of thirty (30) days. If no claims are filed against the Contractor within thirty (30) days, the final ten percent (10%) shall then be paid to the Contractor.

7. **WAIVER.** By the execution of this contract, the Contractor agrees that any objections he may have to the statement of the amount of work done hereunder included by the Engineer in this completion report, and any claims of the Contractor against the Waterloo Water Works growing out of this contract and the work done hereunder which are not stated in writing in the manner and within the time provided in Article 6, Section E hereof, shall be waived, and no such claim shall thereafter be asserted against the Waterloo Water Works.

SECTION F - LEGAL RELATIONS AND RESPONSIBILITIES

1. **LAWS RELATING TO WORK.** The Contractor is presumed to be familiar with all laws, ordinances, and regulations which may, in any manner, affect those engaged or employed upon the work or the materials or equipment used in or upon the work, and shall conduct the work so as not to conflict with such laws, ordinances, and regulations.

2. **PROTECTION OF WORK AND PROPERTY.** The Contractor for any part of the improvement shall be held responsible for the care of materials and of partially completed and completed work until final acceptance of the same by the Board. He will be required to make good at his own expense any damage which the work may sustain from any cause prior to the filing of the engineer's certificate of completion. He shall take all risk from floods and casualties of every description and make no charge for delay due to such cause. He may, however, be allowed a reasonable extension of time on account of such delays. He shall correct or make good at his own expense all damages to adjacent property due to the acts or negligence of his employees of the prosecution of his work, and save the Waterloo Water Works harmless therefore.

The Contractor shall be held liable and responsible for all damages done to water, sewer, drain, or other underground pipes and structures, and to sidewalks and private property.

3. **RESPONSIBILITY FOR ACCIDENTS.** The Contractor shall assume full responsibility for all damages sustained by persons or property due to the carrying on of his work until final acceptance thereof, or until released by the Engineer in writing.

4. **LIABILITY INSURANCE.** The Contractor shall carry liability insurance which shall save the Waterloo Water Works and the Engineer harmless and protect the public and any person from injury sustained by the reason of the prosecution of the work or the handling or

storing of materials therefore, and said Contractor shall also carry liability insurance which shall meet the requirements of the Iowa Worker's Compensation Law.

Before work shall be started on this contract, the Contractor shall furnish the General Manager of the Waterloo Water Works with proper affidavit or Affidavits executed by representatives of duly qualified insurance companies, evidencing that said insurance company or companies have issued liability insurance policies, effective during the life of the contract, or for a period of a least ten (10) days following the filing of written notice of cancellation, protecting the public and any person from injuries or damages sustained by reason of carrying on the work involved in the Contract. The affidavit shall specifically evidence the following forms of insurance protection:

- (a) Public liability insurance covering all operations performed by persons directly employed by the Contractor.
- (b) Public liability insurance covering all operations performed by any Subcontractor to whom a portion of the work may have been assigned.
- (c) Public liability insurance covering all work upon the project performed by any independent Contractor working under the direction of either the principal Contractor or a Subcontractor.
- (d) Motor vehicle bodily injury liability insurance and property damage liability insurance on all motor vehicles employed on the work, whether owned by the Contractor or by other persons, firms, or corporations.
- (e) The minimum protection shall be as follows:

Comprehensive General Liability Insurance

General Aggregate Limit	\$ 2,000,000.00
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Products—Completed Operations Aggregate Limit	\$ 2,000,000.00
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Each Occurrence Limit	\$ 2,000,000.00
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Comprehensive Automobile Liability
Insurance

	\$ 1,000,000.00
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The Contractor shall have the Waterloo Water Works, the Engineer, and the City of Waterloo, Iowa, named as an "Additional Named Insured". A certificate, or a policy if requested, shall be filed with the Owner.

All certificates and/or policies of insurance furnished by the Contractor to be filed with the General Manager of the Waterloo Water Works shall include the name and address of the agency

issuing the same. It shall also be required that the said General Manager be notified by registered mail of the cancellation or expiration of the above insurance.

5. **BARRICADES AND SIGNS.** The Contractor shall, at his own expense and without further or other order, provide, erect, and maintain, at all times during the progress and suspension of the work and until completion and final acceptance thereof, suitable and requisite barricades, signs, or other adequate protection, as required by the latest edition of the "Iowa Manual on Uniform Traffic Control Devices for Streets and Highways" and shall provide, keep, and maintain such barricades, signs, etc., as may be required or as may be ordered by the Engineer, to insure the safety of the public as well as those engaged on the work. All barricading plans shall be approved by the Engineer.

6. **ROYALTIES AND PATENTS.** The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Waterloo Water Works harmless from loss on account thereof, except that the Waterloo Water Works shall be responsible for all such loss when a particular process or the product of a particular manufacturer is specified.

7. **PERMITS AND REGULATIONS.** Permits and licenses of a temporary nature for the prosecution of the work shall be secured and paid for by the Contractor. Permits, license, and easements for permanent changes in existing facilities shall be secured and paid for by the Waterloo Water Works.

8. **CLAIMS FOR DAMAGES.** Any claim for damages arising under this Contract shall be made in writing to the party liable within a reasonable time of the first observance of such damage and no later than the time of final payment, except as expressly stipulated otherwise in the case of faulty work or materials, and shall be adjusted by agreement or arbitration.

The Contractor shall be held for the payment of all just claims against him arising out of the prosecution of this contract, and his bond will not be released until such claims are paid for dismissed.

9. **ASSIGNMENT OF CONTRACT.** The Contractor shall not sell or assign the contract or sublet any portion of the work provided for therein without the written consent of the Board.

10. **SUBCONTRACTORS.** The Contractor shall, as soon as practicable after the signature of the contract, notify the Engineer in writing of the names of the Subcontractors proposed for the work and shall not employ any that the Engineer may, within a reasonable time, object to as incompetent or unfit.

The Contractor agrees that he is as fully responsible to the Waterloo Water Works for the acts and omission 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.

Nothing contained in the contract documents shall create any contractual relation between any Subcontractor and the Waterloo Water Works.

11. **ARBITRATION.** All questions subject to arbitration under this Contract shall be submitted to arbitration at the choice of either party to the dispute.

The Contractor shall not cause a delay of the work during any arbitration proceedings, except by agreement with the Engineer.

The demand for arbitration shall be filed in writing with the Engineer, in the case of an appeal from his decision, within ten (10) days of its receipt, and in any other case, within a reasonable time after cause thereof, and in no case later than the time of final payment, except as otherwise expressly stipulated in the contract. If the Engineer fails to make a decision within a reasonable time, an appeal to arbitration may be taken as if his decision had been rendered against the part appealing.

No one shall be nominated or act as an arbitrator who is in any way financially interested in the contract or in the business affairs of either the Waterloo Water Works or the Contractor.

The general procedure shall conform to the laws of the State of Iowa. Unless otherwise provided by such laws, the parties may agree upon one arbitrator; otherwise, there shall be three--one named in writing by each party to this contract to the other party, and the third chosen by these two arbitrators, or, if they fail to select a third within ten (10) days, then he shall be chosen by the Comptroller of the State of Iowa. Should either party refuse or neglect to supply the arbitrators with any papers or information demanded in writing, the arbitrators are empowered by both parties to proceed ex parte.

If there be one arbitrator, his decision shall be binding; if three, the decision of any two shall be binding. Such decision shall be a condition precedent to any right of legal action, and, wherever permitted by law, it may be filed in Court to carry it into effect.

The arbitrators, if they deem that the case demands it, are authorized to award to the party whose contention is sustained such sums as they shall deem proper for the time, expense, and trouble incident to the appeal, and, if the appeal was taken without reasonable cause, damages for delay, the arbitrators shall fix their own compensation unless otherwise provided by agreement, and shall assess the costs and charges of the arbitration upon either or both parties.

The award of the arbitrators must be in writing, and it shall not be open to objections on account of the form of proceeding or the award, unless otherwise provided by the laws of Iowa.

In the event of such laws providing on any matter covered by this article otherwise than as hereinbefore specified, the method of procedure throughout and the legal effect of the award shall be wholly in accordance with the laws of the State of Iowa, it being intended hereby to lay down a principle of action to be followed, leaving its local application to be adopted to the legal requirements of the place in which the work is to be done.

12. **PERFORMANCE BOND.** The Contractor shall, at the time of execution and delivery of this contract and before the taking effect of same, furnish and deliver to the Waterloo Water Works a written bond of indemnity to the amount required by law in form and substance, and with surety thereon satisfactory and acceptable to the Waterloo Water Works, to insure the faithful performance by the Contractor of all the covenants and agreements on the part of the Contractor contained in this contract. This bond shall remain in force and effect for the full amount of the Contract.

13. **PERSONAL LIABILITY OF PUBLIC OFFICIALS.** In carrying out any of the provisions of the Contract or in exercising any power or authority granted him thereby, there shall be no liability upon the Engineer or his authorized assistants, either personally or as an official of the Waterloo Water Works, it being understood that in such matters he acts as the agent and representative of the Waterloo Water Works.

14. **JURISDICTION.** Any action in Court against the Contractor or sureties on his bond because of damages to property or individuals by said Contractor or his workmen, or because of the violation of any provisions of the specifications, or on account of the failure of said Contractor to comply fully with these provisions, shall be brought in the District Court of the State of Iowa in and for Black Hawk County.

15. **TERMINATION OF RESPONSIBILITY.** The Contract shall be considered as completed and the Contractor released from further obligations except as to the requirements of his bond, after the work has been completed and finally accepted and final estimates have been allowed and the completion report of the engineer has been filed and approved by the Council.

16. **WATERLOO WATER WORK'S LEGAL RIGHTS.** The Waterloo Water Works shall not be precluded by any measurements, estimate, or certificate made, either before or after the completion and acceptance of the work and payment therefore, from showing the true amount and character of the work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate, or certificate is untrue or incorrectly made, or the work or materials do not, in fact, conform to the Contract.

The Waterloo Water Works shall not be precluded, notwithstanding any such measurements, estimate, or certificate and payment in accordance therewith, from recovering from the Contractor and his surety such damages as it may sustain by reason of his failure to comply with the terms of the Contract. Neither the acceptance by the Waterloo Water Works or any of its representatives, nor any payment for or acceptance of the whole or any part of the work, nor any extension of time, nor any possession taken by the Waterloo Water Works, shall operate as a waiver on any portion of the contract or of any power herein reserved, or any right to damages herein provided. A waiver of any breach of the contract shall not be held to be a waiver of any other or subsequent breach.

SUPPLEMENTAL GENERAL SPECIFICATIONS FOR CONSTRUCTION

1. SUBCONTRACTS

The contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to require compliance by each subcontractor with the applicable provisions of the contract for the improvements embraced in this contract.

2. REVIEW BY THE WATERLOO WATER WORKS OF WATERLOO

The Waterloo Water Works, its authorized representatives and agents, shall at all times have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this contract, provided, however, that all instructions and approval with respect to the work will be given to the contractor only by the Waterloo Water Works through its authorized representative or agents.

3. INSPECTION

- a. The contractor shall furnish promptly all materials reasonably necessary for any tests which may be required. All tests by the Waterloo Water Works will be performed in such manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the Technical Specifications.
- b. Inspection of materials and appurtenances to be incorporated in the improvements embraced in this contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the Technical Specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the project site.

4. WARRANTY OF TITLE

No material, supplies, or equipment to be installed or furnished under this contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed thereon by him to the Waterloo Water Works free from any claims, liens, or charges. Neither the contractor nor any person, firm, or

corporation furnishing any material or labor for any work covered by this contract shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the contractor for their protection or any rights under any law permitting such persons to look to funds due the contractor in the hands of the Waterloo Water Works. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

5. SALES TAX

All Contractors shall prepare and require their Subcontractors to prepare, sign, and acknowledge before an Iowa Notary Public, an Iowa Department of Revenue Iowa Contractor's Statement, most recent version, listing their respective expenditures for all materials that become an integral part of the completed project: the purchase price, the amount of Use or Sales Tax paid, the names of the materials suppliers, and all other information required to complete said form. All Contractors shall file with the Owner executed copies of these forms covering all material incorporated by them or their Subcontractors. Receipt of said executed forms by the Owner shall be a prerequisite to final payment of retained percentage of Contract price to the Contractor.

FORM OF CONTRACT

CONTRACT FOR THE CONSTRUCTION OF 2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP WATERLOO WATER WORKS CITY OF WATERLOO, IOWA

This contract made and entered into this ____ day of _____, 2023, by and between the Board of Water Works Trustees of the Waterloo Water Works, Waterloo, Iowa, (hereinafter referred to as Board), and _____, of _____, Iowa, (hereinafter referred to as Contractor),

WITNESSETH:

- PAR. 1 Contractor agrees to build and construct the 2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP, WATERLOO WATER WORKS, WATERLOO, IOWA and furnish all necessary tools, equipment, materials and labor necessary to do all the work called for in the plans and specifications in a workmanship like manner and for the prices set forth in Contractor's proposal, which was accepted by the Waterloo Water Works, and which is understood and agreed to be a part of this contract.
- PAR. 2 It is understood and agreed that the resolution adopted by the Board ordering the construction of the improvement, the Notice to Contractors as published, the Instruction to Bidders, the Form of Proposal, the Construction and Maintenance Bonds, the Board Proceedings relating to this matter, and the Plans and Specifications shall all be considered as forming a part of the contract the same as though they were each set out in said contract.
- PAR. 3 The Contractor agrees to furnish at its own cost and expense, all necessary materials and labor for said work and to construct said improvements in a thorough, substantial, and workmanlike manner, and in strict accordance with the requirements of this contract, and of the plans and specifications made a part hereof by reference, and to the satisfaction and approval of the Waterloo Water Works and its engineer.
- PAR. 4 The Contractor agrees to perform said work and install said improvements on the terms set out in bid or proposal to the Waterloo Water Works which has been accepted by the Waterloo Water Works and which is by reference made a part of this contract.

- PAR. 5 The Contractor agrees to commence said work within ten (10) working days after receipt of "Notice to Proceed" and complete it on or before the dates set forth in the Notice of Public Hearing and Notice to Bidders, unless an extension of time is granted in writing by the Board.
- PAR. 6 Should the Contractor fail to complete said improvements in strict accordance with the terms and conditions of this contract, or the plans and specifications therefore promptly by the date herein specified, the Waterloo Water Works may pay such additional sums as it may be required to pay by reason of the failure of said contractor and deduct any and all such sums from any amount then due the Contractor.
- PAR. 7 The Contractor agrees to comply with and obey all ordinances of the City of Waterloo, Iowa, relating to the obstruction of streets and alleys, keeping open passage ways for water, traffic, and protecting any excavations in any street or alley, and maintaining proper and sufficient barricades with lights and signals during all hours of darkness, to see that the backfilling is properly done, and agrees to keep the Waterloo Water Works and the Engineer whole and defend any and all suits that may be brought against the Waterloo Water Works and the Engineer by reason of any injuries that may be sustained by any person or property allegedly caused by the Contractor, or his agents, while work is done pursuant to this agreement.
- PAR. 8 The Contractor agrees that in the event a law suit is brought against the Waterloo Water Works or the Engineer for damages allegedly sustained by reason of any act, omission or negligence of the Contractor or its agents, or on account of any injuries allegedly sustained by reason of any obstruction, hole, depression or barrier placed or dug by the defendant or its agents, in the doing of the work herein contracted for, that it will defend said suit and save the Waterloo Water Works and the Engineer harmless therein, and in case judgment is rendered against the Waterloo Water Works and the Engineer, the Contractor agrees to pay the same promptly. The Contractor agrees to carry public liability insurance in a solvent company in a sufficient amount to protect the Waterloo Water Works and the Engineer and those who use the streets of the City.
- PAR. 9 The Waterloo Water Works shall have the right to appoint one or more construction reviewers who shall review the progress of the work in detail; also, to make any test or any material to be used in such work. No material shall be used in any work until the same has first been approved by the construction reviewer. Such construction reviewer shall have full authority to pass judgment upon all materials and upon the manner of doing the work, and their judgment on rejecting any materials, substance, or manner of work shall be final unless it is revoked or modified by the Engineer.
- PAR. 10 Any material which has been rejected by the construction reviewer shall be at once removed from the line of work and shall not be again taken thereon or placed with the material proposed to be used without the written consent of the Waterloo Water Works Engineer.

- PAR. 11 The Contractor shall maintain no cause of action against the Waterloo Water Works on account of delays and prosecution of work, but if said work is delayed by the Waterloo Water Works, the Contractor shall have such extra time for completion of the job as was lost by reason of the delay caused by the Waterloo Water Works.
- PAR. 12 The Contractor agrees to pay punctually all just claims of labor, material, men, or subcontractors who shall perform labor or furnish materials entering into this improvement. It is agreed that the Waterloo Water Works need not pay the Contractor until all such claims are paid by the Contractor. It is agreed that the Waterloo Water Works shall not be liable for said labor, material, or men under this contract.
- PAR. 13 The Contractor agrees to furnish the Waterloo Water Works, simultaneously with this contract, a bond on a form to be provided by the Waterloo Water Works in the amount provided by law as stated in the Notice to Bidders, which shall be for the benefit of the Waterloo Water Works, and any and all persons injured by the breach of any of the terms of this contract. Said bond shall be filed with the General Manager of the Waterloo Water Works and shall be subject to the approval of the Board, and is by reference made a part of this contract.
- PAR. 14 The Contractor agrees that should it abandon work under this contract or cease the prosecution thereof for a period of thirty (30) consecutive days without reasonable cause, and should it fail to proceed with said work within ten (10) days after a notice to continue or carry it on has been mailed to it at the address given herein by the Waterloo Water Works, or after such notice has been served on it, then the Waterloo Water Works may proceed to complete said work, using any material, tools, or machinery found along said line of work, doing the work either by contract or as it may elect, and the Contractor and the sureties on its bond shall be liable to the Waterloo Water Works for the costs and expenses so paid out. Said costs shall be retained by the Waterloo Water Works from any compensation due, or to become due the Contractor, and may be recovered by the Waterloo Water Works in an action upon Contractor's bond.
- PAR. 15 In consideration of the full compliance on the part of the Contractor with all the provisions, stipulations, and conditions hereof, or contained in the various instruments made a part of this contract by reference, and upon completion and acceptance of said work, the Waterloo Water Works agrees to pay to the Contractor, in the manner set out in the Notice to Contractors, the amount of money due the Contractor for work performed and accepted, at the unit prices set out in the Contractor's proposal, which has been accepted by the Waterloo Water Works.
- PAR. 16 The total amount of the contract, based on the Engineer's estimates of quantities and the Contractor's unit bid prices, and for which 100% surety bond is required is
\$ _____.
- PAR. 17 After the completion of said work, the Contractor agrees to remove all debris and clean up said streets, and to save the Waterloo Water Works harmless from any damage

allegedly resulting from a failure to clean up and remove the debris or put the street back in a proper condition for travel.

PAR. 18 This contract is not divisible, but in the event of a conflict between this contract and the various instruments incorporated by reference, this contract shall govern.

PAR. 19 Before the Contractor shall be entitled to receive final payment for work done under this contract, it shall execute and file a bond in the penal sum of not less than 100% of the total amount of the contract, same to be known as "Maintenance Bond," and which bond must be approved by the Board, and which bond is in addition to the bond given by the Contractor to guarantee the completion of the work.

PAR. 20 The Contractor shall maintain all work done hereunder in good order for the period of two (2) years from and after the date it is accepted by the Board of the Waterloo Water Works. Said maintenance shall be made without expense to the Waterloo Water Works or the abutting property. In the event of the failure or default of the Contractor to remedy any or all defects appearing in said work within a period of two (2) years from the date of its acceptance by said Board and after having been given ten (10) days notice so to do by registered letter deposited in the United States Post Office in said town, addressed to said contractor at the address herein given, then the Waterloo Water Works may proceed to remedy such defects. The costs and expenses thereof to be recovered from the Contractor and the sureties on its maintenance bond by an action brought in any court of competent jurisdiction.

PAR. 21 The Contractor shall give notice to said Waterloo Water Works by registered letter directed to the General Manager of the Waterloo Water Works thereof not more than four (4) and not less than three (3) months prior to the expiration of the term during which the Contractor is required to maintain said improvements, in good repair by the terms of its Contract. The liability of the Contractor and of the sureties on its bond for maintenance of the said improvements shall continue until three (3) months after such notice has been given to the Board, and, in any event, until two (2) years after the acceptance of the work.

BOARD OF TRUSTEES WATERLOO WATER WORKS

Chad Coon, General Manager

Contractor

BY: _____

Title: _____

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, of _____,
(hereinafter called the Principal), and _____
of _____
(hereinafter called the Surety), are held and firmly bound unto the Waterloo Water Works
(hereinafter called the Oblige), in the penal sum of _____
_____ Dollars (\$ _____),
lawful money of the United States, to payment of which sum, well and truly to be made, the Principal
here firmly binds himself/themselves, his/their heirs, executors, and administrators, and the said
Surety binds himself, his successors, assigns, executors, and administrators, jointly and severally,
firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that,

WHEREAS the above bounden Principal did, on the _____ day of _____,
2023, enter into a written contract with the Waterloo Water Works for the construction of _____
Heartland Hills Area West Water Main Loop, a copy of which contract, together with all of its terms,
covenants, conditions, and stipulations, is incorporated herein and made a part hereof as full and
completely as if said contract were recited at length herein; and

WHEREAS, the Principal and Surety on this bond hereby agree to pay to all persons, firms or
corporations having contracts directly with the Principal or with subcontractors, all just claims due
them for labor performed or materials furnished in the performance of the contract on account of
which bond is given when the same are not satisfied out of the portion of the contract price which the
public corporation is required to retain until completion of the public improvement, but the Principal
and Surety shall not be liable to said persons, firms, or corporation unless the claims of said
claimants against said portion of the contract price shall have been established as provided by law.

Now, if the Principal shall in all respects fulfill his said contract according to the terms and
tenor thereof, and shall satisfy all claims and demands incurred for the same, and shall fully
indemnify and save harmless the Oblige from all costs and damages which it may suffer by reason of
failure to do so, and shall fully reimburse and repay the Oblige all outlays and expenses which it may
incur in making good any such default, then the obligation is to be void and of no effect, otherwise to
remain in full force and effect.

Every Surety on this bond shall be deemed and held, any contract to the contrary notwithstanding, to consent without notice:

1. To any extension of time to the contract in which to perform the contract.
2. To any change in the plans, specifications, or contract when such change does not involve an increase of more than twenty percent (20%) of the total contract price, and shall then be released only as to such excess increase.
3. That no provision of this bond or of any other contract shall be valid which limits to less than one (2) year from the time of the acceptance of the work the right to sue on this bond for defect in workmanship or material not discovered or known to the Oblige at the time such work was accepted.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of

_____, 2013.

Principal

By: _____

Surety

Attorney-in-Fact

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____ of _____
_____ (the "Principal"), and _____ of _____
_____ (the "Surety"), are held and firmly bound unto the Waterloo
Water Works (the "Obligee"), in the penal sum of _____
_____ Dollars (\$ _____), lawful money of the United
States, for the payment of said sum in connection with a contract (the "Contract") dated on
or about _____ for the purpose of 2023 HEARTLAND HILLS
AREA WEST WATER MAIN LOOP, WATERLOO WATER WORKS, WATERLOO, IOWA.
The Contract is incorporated herein by reference as though fully set forth herein.

Whenever the Principal shall be and is declared by the Obligee to be in default under the Contract, with the Obligee having performed its obligations in the Contract, then the Surety, acknowledging that time is of the essence, may promptly remedy the default, or shall promptly undertake to:

1. Complete the Contract in accordance with its terms and conditions; or
2. Obtain one or more bids for completing the Contract in accordance with its terms and conditions, and upon determination by the Surety of the lowest responsible bidder, or negotiated proposal, or, if the Obligee elects, upon determination by the Obligee and the Surety jointly of the lowest responsible bidder, or negotiated proposal, arrange for a contract between such party and the Obligee. The Surety will make available as work progresses sufficient funds to pay the cost of completion less the balance of the Contract price. The cost of completion includes responsibilities of the Principal for correction of defective work and completion of the Contract, the Obligee's legal and design professional costs resulting directly from the Principal's default, and liquidated damages or actual damages if no liquidated damages are specified in the Contract. The term "balance of the Contract price" means the total amount payable by the Obligee to the Principal under the Contract and any amendments thereto, less the amount properly paid by the Obligee to the Principal; or
3. Determine the amount for which it is liable to the Obligee and pay the Obligee that amount as soon as practicable.

In the event this bond is enforced, Principal and Surety agree to indemnify Obligee and hold Obligee harmless from and against any and all costs of enforcement, including but not limited to reasonable attorneys' fees and expenses.

Every Surety on this bond shall be deemed and held, any contract to the contrary notwithstanding, to consent to each and all of the following matters, without notice:

1. To any extension of time to the Contract in which to perform the Contract.
2. To any change in the plans, specifications, or Contract when such change does not involve an increase of more than twenty percent (20%) of the total Contract price, and shall then be released only as to such excess increase.
3. That no provision of this bond or of any other contract shall be valid which limits to less than one (2) year from the time of the acceptance of the work the right to sue on this bond for defect in workmanship or material not discovered or known to the Obligee at the time such work was accepted.

If the Principal performs the Contract, then this bond shall be null and void; otherwise it shall remain in full force and effect. In no event shall the Surety's total obligation exceed the penal amount of this bond.

Terms used herein shall include, as appropriate, the singular or plural number, or the masculine, feminine or neuter gender.

IN WITNESS WHEREOF, the undersigned Principal and Surety have executed this Performance Bond as of _____.

PRINCIPAL

SURETY

Name

Name

By: _____

By: _____

Title: _____

Title: _____

[attach Power of Attorney]

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

If this project includes Federal Funds, the following applies to the payment bond:

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

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

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

and, _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

(Name of Owner)

(Address of Owner)

hereinafter called OWNER, in the penal sum of _____ Dollars, (\$ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents. THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____ 20____, a copy of which is hereto attached and made a part hereof for the construction of:

2023 HEARTLAND HILLS AREA WEST WATER MAIN LOOP, WATERLOO WATER WORKS, WATERLOO, IOWA

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

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed there under or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

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

IN WITNESS HEREOF, this instrument is executed in _____ counterparts, each one of
(number)
which shall be deemed an original, this the _____ day of _____
20_____.

ATTEST:

Principal

(Principal) Secretary

(SEAL)

By _____(s)

(Address)

Witness as to Principal

(Address)

Surety

ATTEST:

By _____
Attorney-in-Fact

Witness as to Surety

(Address)

(Address)

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

If this project includes Federal Funds, the following applies to the payment bond:

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