



**DEPARTMENT OF
TRANSPORTATION**

DEPARTMENT OF TRANSPORTATION

**NOTICE TO CONTRACTORS,
PROPOSAL, SPECIAL PROVISIONS,
CONTRACT AND CONTRACT BOND
FOR**

**CITY SANITARY SEWER REPLACEMENT, WATERMAIN
ADJUSTMENTS, STORM SEWER UPGRADES**

CITY

**PROJECT NO. 2026-02 ()
(PCN X06T)**

SD HIGHWAY 37

IN BEADLE COUNTY

NOTICE TO ALL BIDDERS

TO REPORT BID RIGGING ACTIVITIES, CALL: 1-800-424-9071

THE U.S. DEPARTMENT OF TRANSPORTATION (DOT) OPERATES THE ABOVE TOLL-FREE "HOTLINE" MONDAY THROUGH FRIDAY, 8:00 A.M. TO 5:00 P.M., EASTERN TIME. ANYONE WITH KNOWLEDGE OF POSSIBLE BID RIGGING, BIDDER COLLUSION, OR OTHER FRAUDULENT ACTIVITIES SHOULD USE THE "HOTLINE" TO REPORT SUCH ACTIVITIES.

THE "HOTLINE" IS PART OF THE DOT'S CONTINUING EFFORT TO IDENTIFY AND INVESTIGATE HIGHWAY CONSTRUCTION CONTRACT FRAUD AND ABUSE AND IS OPERATED UNDER THE DIRECTION OF THE DOT INSPECTOR GENERAL.

ALL INFORMATION WILL BE TREATED CONFIDENTIALLY AND CALLER ANONYMITY WILL BE RESPECTED.

* * * *

PLANS, PROPOSALS AND ADDENDA

AFTER AWARD OF CONTRACT, THE LOW BIDDER WILL RECEIVE TEN (10) COMPLIMENTARY SETS OF PLANS, PROPOSALS, PROJECT Q & A FORUM, AND ADDENDA FOR FIELD AND OFFICE USE. AN ELECTRONIC COPY WILL ALSO BE PROVIDED. ANY ADDITIONAL COPIES REQUIRED WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

* * * *

NOTICE TO CONTRACTORS

Bid proposals for this project will be prepared, transmitted, and received electronically by the South Dakota Department of Transportation (SDDOT) via the South Dakota Electronic Bid System until 10 A.M. Central time, on November 4, 2026, at which time the SDDOT will open bids. All bids will be checked for qualifications with results posted on the SDDOT website. The South Dakota Transportation Commission will consider all bids at a scheduled Commission meeting.

The work for which proposals are hereby requested is to be completed within the following requirement(s):

FIELD WORK COMPLETION: **NOVEMBER 3, 2028**

The DBE goal for this project is: **N/A**

Work Type for this project is: **Work Type 2 or Work Type 3**

Bidding package for the work may be obtained at:
<http://apps.sd.gov/hc65bidletting/ebslettings1.aspx#no-back-button>

The South Dakota Standard Specifications for Roads and Bridges, 10-7-26 Version, may be obtained at <https://dot.sd.gov/doing-business/contractors/standard-specifications/> .

The electronic bid proposal must be submitted by a valid bidder as designated by their company's <http://apps.sd.gov/HC65C2C/EBS/BidAdminAuthorizationForm.pdf>. A bidding administrator will have privileges in the SDEBS to prepare bids, submit bids, and authorize additional company employees to prepare and submit bids. Additionally, a bidding administrator will be responsible for maintaining the list of authorized bidders for the company and will have the ability to add employees, remove employees, and set-up bidder identifications and passwords within the SDEBS. Bidding Administrator authorization will remain in full force and effect until written notice of termination of this authorization is sent by an Officer of the company and received by the Department.

A bidder identification and password, coupled with a company identification previously assigned by the Department, will serve as authentication that an individual is a valid bidder for the company.

Contact information to schedule a preconstruction meeting prior to commencing with the work on this project.

Brad Letcher
901 Dakota North PO Box 940
Huron, SD 57350-0940
Phone: 605/353-7140

PROPOSAL

Revised 8/10/11

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION, STATE OF SOUTH DAKOTA:

Ladies / Gentlemen:

The following proposal is made on behalf of the undersigned and no others. It is in all respects fair and is made without collusion on the part of any other person, firm or corporation not appearing in the signature to this proposal.

The undersigned certifies that she / he has carefully examined the plans listed herein, the Specifications hereinbefore referred to, the Special Provisions and the form of contract, both of which are attached hereto. The undersigned further certifies that she / he has personally inspected the actual location of the work, together with the local sources of supply and that she / he understands the conditions under which the work is to be performed, or, that if she / he has not so inspected the actual location of the work, that she / he waives all right to plea any misunderstanding regarding the location of the work or the conditions peculiar to the same.

On the basis of the plans, Specifications, Special Provisions and form of contract proposed for use, the undersigned proposes to furnish all necessary machinery, tools, apparatus and other means of construction, to do all the work and furnish all the materials in the manner specified, to finish the entire project **within the contract time specified** and to accept as full compensation therefore the amount of the summation of the products of the actual quantities, as finally determined, multiplied by the unit prices bid.

The undersigned understands that the quantities as shown in the Bid Schedule are subject to increase or decrease, and hereby proposes to perform all quantities of work, as increased or decreased, in accordance with the provisions of the specifications, and subject to any applicable special provisions, and at the unit prices bid.

The undersigned understands that the "Total or Gross Amount Bid" as immediately hereinbefore set forth is not the final amount which will be paid if this proposal is accepted and the work done, but that such amount is computed for the purpose of comparison of the bids submitted and the determination of the amount of the performance bond.

The undersigned further proposes to perform all extra work that may be required on the basis provided in the specifications, and to give such work personal attention in order to see that it is economically performed.

The undersigned further proposes to both execute the contract agreement and to furnish a satisfactory performance bond, in accordance with the terms of the specifications, within twenty (20) calendar days after the date of Notice of Award from the South Dakota Department of Transportation that this proposal has been accepted.

REV. 1/19/22

INDEX OF SPECIAL PROVISIONS

PROJECT NUMBER(S): 2026-02 () PCN: X06T

TYPE OF WORK: CITY SANITARY SEWER REPLACEMENT, WATERMAIN
ADJUSTMENTS, STORM SEWER UPGRADES

COUNTY: BEADLE

The following clauses have been prepared subsequent to the Standard Specifications for Roads and Bridges and refer only to the above described improvement, for which the following Proposal is made. In case of any discrepancy or conflict between said specifications and these Special Provisions, the latter are to govern.

The Contractor's attention is directed to the need for securing from the Department of Environment & Natural Resources, Foss Building, Pierre, South Dakota, permission to remove water from public sources (lakes, rivers, streams, etc.). The Contractor should make his request as early as possible after receiving his contract, and insofar as possible at least 30 days prior to the date that the water is to be used.

Robin Wallum is the official in charge of the Huron Career Center for Beadle County.

THE FOLLOWING ITEMS ARE INCLUDED IN THIS PROPOSAL FORM:

Instructions for Bidders, dated 10/2/26.

Special Provision Regarding Combination Bids, dated 9/17/26.

Special Provision Regarding the City Portion for Subletting, dated 10/2/26.

Sanitary Sewer Construction, Section 100.

Storm Sewer Construction, Section 200.

Water Main Construction, Section 300.

Special Provision for Progress Payments.

City of Huron Specifications for Warranty for Construction.

List of Utilities.

Standard Title VI Assurance, dated 3/1/16.

Special Provision For Implementation of Clean Air Act & Federal Water
Pollution Control Act, dated 9/1/97.

2026-02 (), PCN X06T
CITY SANITARY SEWER REPLACEMENT, WATERMAIN ADJUSTMENTS, STORM
SEWER UPGRADES
SD HIGHWAY 37

INSTRUCTIONS FOR BIDDERS

October 2, 2026

- 1) This City Sanitary Sewer Replacement, Watermain Adjustments, Storm Sewer Upgrades Project will be let and awarded by the South Dakota Department of Transportation.
- 2) South Dakota Department of Transportation Standard Specifications for Roads and Bridges Sections 2 and 3 regarding letting and awarding of contracts shall be followed.
- 3) Bidders submitting a bid on this project shall also submit a bid for Project NH-CR-EM 0037(156)125 PCN 06JA, Beadle County. Award of these projects will be to the same bidder based on the total of the two projects.
- 4) A prospective bidder must request any explanation regarding the meaning or interpretation of the bidding package in adequate time to allow a Department reply to reach all prospective bidders before submission of final bid proposals. The bidder will contact the Department by submitting a request for explanation to the project Q&A forum.
- 5) All bid bonds shall be made out to the Department of Transportation
- 6) The contract completion date for this project will be the same as specified of Project NH-CR-EM 0037(156)125 PCN 06JA, Beadle County. Any delays in completing this contract will not be a basis for an extension of the contract completion time for PCN 06JA, Beadle County.
- 7) After award of contract, the Contractor shall furnish satisfactory proof of coverage of insurance. Copies of Certificates of Insurance shall be furnished to the Department of Transportation AND City of Huron. The Contractor will be required to provide a performance bond in a sum equal to the total amount of the contract, in a form acceptable to the City. The performance bond shall remain in effect for a period of one year after the City considers the contract to be completed and accepted.
- 8) The contractor is required to schedule and conduct a preconstruction meeting that shall be held jointly with the preconstruction meeting for the state contract. Additionally the contractor is responsible for contacting the city for a list of required submittals upon receiving Notice of Award of the contract.
- 9) Construction engineering for this contract will be performed by the City of Huron.
- 10) Payment for this Utilities project will be made to the Contractor by the City of Huron.

* * * *

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION REGARDING
COMBINATION BIDS**

**2026-02 (), PCN X06T
CITY SANITARY SEWER REPLACEMENT, WATERMAIN
ADJUSTMENTS, STORM SEWER UPGRADES
BEADLE COUNTY**

SEPTEMBER 17, 2026

Bidders submitting a bid on this project **MUST ALSO** submit a bid on project:

NH-CR-EM 0037(156)125, PCN 06JA
SD HIGHWAY 37
URBAN GRADING, PCC SURFACING, STORM SEWER, CURB & GUTTER, SIDEWALK,
LIGHTING, SIGNALS
BEADLE COUNTY

Award of both projects will be to the same bidder based on the total of the two projects.

Work on PCN (06JA) CANNOT be used to meet the DBE Goal established for this project.

After award, the contracts will be administered as entirely separate contracts.

* * * *

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION REGARDING
THE CITY PORTION FOR SUBLETTING**

**2026-02 (), PCN X06T
BEADLE COUNTY**

OCTOBER 2, 2026

This project is let in combination with State Project Number NH-CR-EM 0037(156)125 PCN 06JA. The provisions of section 8.1 of the specifications requiring the Contractor to perform work amounting to not less than 30% of the total contract cost with the Contractor's own organization will not apply to the work on this contract.

* * * *

City of Huron Supplemental Standard

Specifications for

Sanitary Sewer Construction

Section 100

Adopted: December 29, 2014
Revised:

City of Huron
Public Works/Engineering
239 Wisconsin Ave SW
P.O. Box 1369
Huron, SD 57350-1369

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Section 100

City of Huron Supplemental Standard

Specifications for

Sanitary Sewer Construction

1.0 GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all the necessary labor, materials, equipment, tools, and supplies that are necessary to install a complete sanitary sewer system, as shown on the plans and/or called for in the specifications or its addenda. It is the intent of the specifications to install a complete system or job.

1.2 TERM OF WARRANTY

See Section 500 for Warranty for Construction Activity.

1.3 QUALITY CONTROL AND SUBMITTALS

Retesting of work required because of nonconformance to the specified requirements shall be performed by the same independent firm on the instructions of the Engineer. Payment for retesting performed during the contract period and during the warranty period will be charged to and will be the responsibility of the Contractor.

Shop drawings and data shall be submitted for, but not be limited to, the following items:

Manholes, pipe, pipe fittings, bedding material, stabilization material, granular material, and any other pertinent information concerning construction materials that the Engineer deems necessary for the review of the materials used on the project in accordance with the specifications and drawings.

Manhole shop drawings shall be submitted for each manhole and shall indicate the sections to be used with sizes and heights. A drawing showing the profile of the manhole must be submitted and shall be detailed to scale to show all segments of the manhole in a profile view.

The Contractor shall submit the number of copies that the Contractor requires plus three copies which the Engineer will retain. The Contractor shall obtain shop drawing approval before any of the work related to that material is performed.

The Contractor shall follow the Sanitary Sewer Backup Prevention Program established by the City at all times. The Contractor shall complete all daily checklists and the Sanitary Sewer Temporary Bypass Plan. A comprehensive Sanitary Sewer Bypass Plan shall be submitted before or at the preconstruction meeting when sewer bypassing is necessary. The Contractor shall submit the Daily Checklist for the Sanitary Sewer Backup Prevention Plan to the Engineer at the end of the day on every Friday or the end of the working week after the project site is secured and no additional work is being performed on the site. Forms for the Sanitary Sewer Backup Prevention Program are available at the Office of the City Engineer.

1.4 PAYMENT

Payments to the Contractor shall be made in accordance with the General Conditions.

1.5 ACCEPTANCE

Acceptance of the work shall be in accordance with the General Conditions.

1.6 SEWAGE LIFT STATION

The sewage lift station specifications shall be as specified in the Special Provisions.

1.7 REFERENCES

- A. ASTM A48-83—Gray Iron Castings (Class 35).
- B. ASTM A53—Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless.
- C. ASTM C478—Precast Reinforced Concrete Manhole Sections and Steps.
- D. ASTM F679—Standard Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.
- E. ASTM C923—Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- F. ASTM C-990—Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
- G. ASTM D1248—Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
- H. ASTM D1784—Standard Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- I. ASTM D1785—Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.

- J. ASTM D2241—Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).
- K. ANSI/ASTM D2321—Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- L. ASTM D2680—Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
- M. ASTM D2990 – Tensile, Compressive and Flexural Creep and Creep-Rupture of Plastics.
- N. ANSI/ASTM D3034—Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
- O. ASTM D3212—Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seal.
- P. ASTM D5813 – Cured in Place Thermosetting Resin Sewer Pipe.
- Q. ASTM D790 – Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials.
- R. ASTM F1216 – Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin Impregnated Tube.
- S. ASTM F1743 – Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
- T. ANSI/AWWA C105—Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
- U. ANSI/AWWA C111—Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
- V. ANSI/AWWA C151—Ductile Iron Pipe, Centrifugally Cast, for Wastewater and Other Liquids.
- W. ANSI/AWWA C600—Installation of Ductile Iron Water Mains and Their Appurtenances.
- X. ANSI/AWWA C905—Standard Specification for Polyvinyl Chloride (PVC) Water Transmission Pipe (Nominal Diameters 14–36 inches).
- Y. AASHTO M-198.
- Z. Federal Specifications CRD-D-572.
- AA. Federal Specifications SS-S-210A.
- AB. Federal Specifications TT-S-001657.
- AC. South Dakota Department of Transportation Standard Specifications for Roads and Bridges.

2.0 MATERIALS

2.1 SANITARY SEWER GRAVITY PIPE

- 2.1.1 POLYVINYL CHLORIDE (PVC) Sewer Pipe and Fittings. PVC pipe 15 inches in diameter or smaller shall meet the requirements of ASTM D-3034, Type PSM, SDR 35 minimum; PVC pipe 18 inches

through 36 inches in diameter shall meet the requirements of ASTM F-679, minimum wall thickness T-1. The pipe shall be made of PVC plastic having a cell classification of 12454-B or 12454-C or 12364-C or 13364-B.

Wyes and service line bends installed at a depth of greater than 14 feet shall be SDR 26. All other wyes shall be SDR 35 minimum.

- 2.1.2 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS, AWWA C905, PVC pipe, 30 inches in diameter and greater, shall meet the requirements of AWWA C905, dimension ratio (DR) 32.5. All pipes shall have the same outside diameter as ductile iron pipe.
- 2.1.3 Ductile Iron Pipe and Fittings (DIP). Ductile iron pipe shall be acceptable for use on 54-inch diameter pipe and larger and as specified in the Special Provisions. Ductile iron pipe shall be push-on joint type and shall be coated on the outside with bituminous coating (minimum 1 mil thickness). The wall thickness shall be determined based on the laying condition and the depth of cover required. Ductile iron pipe shall meet the requirements of ANSI A21.51AWWA C151 standards. All ductile iron pipe shall be furnished with a fusion bonded polyethylene lining in accordance with ANSI/ASTM D1248. The lining shall have a minimum thickness of 60 mils. All ductile iron pipe shall be installed with polyethylene encasement in accordance with AWWA C105 unless otherwise directed by the City Engineer. Ductile iron pipe thickness class shall be as specified on the drawings and/or in the Special Provisions.

2.2 PIPE JOINT MATERIALS

- 2.2.1 Polyvinyl Chloride (PVC) Sewer Pipe. PVC Sewer Pipe shall have a flexible elastomeric seal (O-ring or rubber sealing elastomeric gasket joint), and conform to the latest revisions of ASTM D3212. Solvent cement joints **will not** be allowed for pipe and fittings.
- 2.2.2 Polyvinyl Chloride (PVC) Pipe, AWWA C905. PVC AWWA C905 pipe joints shall conform to the same standards as PVC Sewer Pipe.
- 2.2.3 Ductile Iron Pipe. Ductile Iron Pipe joints shall be Push-On Joints conforming to AWWA C111-80 Standards. Installation procedures shall conform to AWWA C600 Standards.

2.3 SANITARY SEWER FORCE MAIN PIPE

2.3.1 POLYVINYL CHLORIDE (PVC) PIPE

All pipe for sanitary sewer pressure piping (force mains) shall conform insofar as appropriate to the City of Huron Supplemental Standard Specifications for water main.

2.3.2 DUCTILE IRON PIPE (DIP)

All pipe for sanitary sewer pressure piping (force mains) shall conform insofar as appropriate to the City of Huron Supplemental Standard Specifications for water main.

2.4 MISCELLANEOUS PIPE MATERIALS

2.4.1 PIPE COUPLINGS

Clamp style couplings shall be "Power Seal Model 3541" as manufactured by Power Seal Pipeline Products Corporation, Adjustable Repair Coupling with 300 series stainless steel shear ring as manufactured by Mission Rubber Company, Inc., "Strong Back RC Series Repair Coupling," as manufactured by Fernco, Inc., or approved equal shall be used on all pipe.

All couplings shall bear the manufacturer's identifying mark and size.

Reducing couplings will not be allowed.

2.4.2 TAPPING SADDLES

Tapping saddles shall be the "Inserta Tee" as manufactured by Inserta Fittings Company or approved equal for use on all pipes.

2.4.3 CAPS/PLUGS

PVC caps and plugs shall be the gasketed or solvent welded sewer fitting type. Caps and plugs for clay pipe shall be made using nonshrink grout placed continuously for a 1-foot distance into the pipe with a watertight mechanical plug.

2.4.4 INSULATION

Type IV Styrofoam Brand—"Square Edge" as manufactured by Dow Chemical Company or approved equal shall be used for insulating sewer pipes where required. The thickness and dimensions shall be specified on the drawings or in the Special Provisions.

Approved equal products from other manufacturer's shall be Extruded Polystyrene Board Insulation formed from polystyrene base resin by an extrusion process using hydro chlorofluorocarbons as blowing agent to comply with ASTM C578, Type IV, with 1.60 lb/cu ft minimum density and a compressive strength of 25 lb/sq in as specified in ASTM D1622 and ASTM D1621

respectively. The maximum thermal conductivity of the insulation shall conform with ASTM C518, C177, and C578. The maximum water absorption percentage by volume shall be 1 percent in accordance with ASTM D2842. The range of water vapor permeance shall be 0.4 to 1.0 perm in accordance with ASTM E96.

2.4.5 SANITARY SEWER SERVICE WYES

Refer to Section 2.1 for material type. Wyes with the same main line and branch line diameter will not be allowed (example: 4x4, 6x6, 8x8, etc.).

2.4.6 SANITARY SEWER FORCE MAIN TRACER WIRE AND TERMINAL BOXES

Force main tracer wire shall be in accordance with the supplemental specifications for Water Main Tracer Wire. The force main tracer wire shall also conform to the Standard Plate for sanitary sewer force main tracer wire. The tracer wire color shall be green. The tracer wire shall be 10 AWG, solid-strand, soft-drawn copper per ASTM B-3. The tracer wire terminal boxes shall be placed at no more than 1,000 feet apart from one another or as specified on the drawings.

2.5 MANHOLE MATERIALS

- 2.5.1 Precast Manholes. Precast concrete manholes shall conform to ASTM Designation C478 with all current revisions. The inside diameter shall be 48 inches unless otherwise stated in the plans or Special Provisions. Manholes are to have a minimum diameter of 60 inches when either the influent or effluent pipes are 18 inches and greater. The wall thickness shall be a minimum of 5 inches with one cage reinforcing with a minimum of 0.12 square inches of reinforcement per lineal foot of wall. The upper section of the manhole shall be a special precast cone made expressly for this purpose providing a 24-inch diameter opening at the top. The cone section shall be concentric and shall not be eccentric (offset). All manholes shall be constructed **without** steps or ladders. Upon request from the City, the Contractor and/or supplier shall supply the City with a test report from an independent testing laboratory showing compliance with this specification.

O-ring gaskets, "Tylox Super Seal" gasket as manufactured by Hamilton Kent, or continuous butyl rubber rope gasket shall be provided for constructing watertight manhole joints. The butyl rubber rope gasket shall conform to or exceed all requirements of Federal Specification SS-S-210A and AASHTO M-198.

Lift holes shall not extend through the manhole walls on 48-inch diameter manholes. Lift holes shall be filled with nonshrink grout. Nonshrink grout shall conform to the following requirements:

Premixed compound consisting of no-metallic aggregate, cement, water reducing, and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. Approved manufacturers are:

“Supreme Grout” – by Hanson Pipe and Products

“Crystex” – by L & M Construction Chemicals

“588 Non-Metallic, Nonshrink Grout” – by W.R. Meadows

“Master Flow 713” – by Master Builders

“Songrout” – by Sonneborn

“Five Star Grout” – U.S. Grout Corp. or approved equal.

On manholes where the lift holes extend through the wall sections, a lift hole plug as manufactured by Press Seal Corporation or approved equal and nonshrink grout shall be installed at each lift hole.

- 2.5.2 Cast-in-Place Manholes. Concrete used for poured manhole bases, pipe cradles, or other monolithically poured structures shall conform to the requirements of Class M6 Section 462 of the “Standard Specifications for Roads and Bridges of the South Dakota Department of Transportation.” Water stops for the manhole base and wall sections shall conform to the following requirements:

Polyvinyl Chloride: Federal Specifications CRD-D-572 W.R. Meadows Inc.; B.F. Goodrich Company; Progress Unlimited or approved equal.

- a. Construction joints—Use flat profile mechanical ribbed ends 7 inches wide, 5/16-inch minimum thickness.
- b. Expansion joints—Use split center bulb with mechanical ribbed ends 9 inches wide, 1/2-inch minimum thickness.
- c. Use on all new pours.

- 2.5.3 Reinforcement. Reinforcement bars for manholes shall be structural grade, manufactured by the open hearth process from new billets. All bars shall be deformed and Grade 60.

2.5.4 Manhole Liners

2.5.4.1 General

HDPE manhole liners shall be used on all sanitary sewer manholes with 10-inch diameter or greater pipes. PVC T-Lock liner will be allowed on some structures where it is determined by the Engineer to be acceptable. Specifications for the PVC T-Lock liner shall be supplied for each individual project. The manhole liner specifications shall apply to PVC T-Lock liner where applicable when specified.

Manhole liners shall be “GSE Studliner” as manufactured by GSE Lining Technologies, Inc., “AGRU Sure-Grip” as manufactured by AGRU America or approved equal.

The manhole liner specified in this section shall be furnished by a manufacturer who is fully experienced, reputable, and qualified in the manufacturing of the materials and who has in their employ a full-time field service representative with at least five years field experience. The manhole liner shall be designed, constructed, and installed using techniques recommended by the manufacturer.

The manufacturer of the lining shall attest to the successful use of its product as a lining for sewer pipes, manholes or pump stations in sewage conditions, or other chemical environments recognized as corrosive or otherwise detrimental to concrete.

2.5.4.2 Materials and Dimensions

The material used in the embedment liner and in all welding strips shall be made from 97–98 percent virgin high-density polyethylene and 2–3 percent carbon black or pigmentation for the purpose of an otherwise specified color. Plasticizers shall not be added to the resin formulation. The material color shall be yellow, white, or off-white. Dark colors will not be acceptable.

Embedment sheets for field installation shall be produced in rolls that are a minimum of 6.5 feet (2 m) in width with 2.0 mm thickness for precast concrete pipe and manholes.

Locking studs of the same material as that of the liner shall be integrally extruded with the sheet and have a minimum height of 0.40 inches (10 mm). The maximum distance between studs shall be 2.127 inches. A minimum of 39 studs per square foot shall be installed on the liner.

2.5.4.3 LINER PHYSICAL PROPERTIES

All plastic embedment sheets and welding strips shall have the following physical properties when tested in accordance with the following table.

Nominal Properties for Manhole Liner		
Property	Test Method	Value
Thickness (Min)	ASTM D 751	+/- 10%
Density g/cm ³ (Min)	DIN 53479 / ASTM D 792	0.94
Tensile Properties	DIN 53455 / ASTM D 638	
Tensile Strength at Yield, lb/in ² (Min)		2,200
Tensile Elongation at Break, % (Min)		600
Tensile Strength at Break, lb/in ² (Min)		3,600
Carbon Black Content % (Max)	ASTM D 1603	2-3
Dimensional Stability, %	DIN 53515	+/-2
Linear Coefficient, in/in/°C	ASTM D 696	1.2x10-4
Service Temperature		-70 to 176 °F
Stud Pull Out Strength (Min)		>4,300 psf

Embedment sheets and welding strips shall be free of cracks, cleavages, or other defects adversely affecting the protective characteristics of the material. The Engineer may reject any materials which may be defective.

Liner shall have demonstrated good chemical resistance via testing in accordance with EPA 9090.

Weld strips shall have good impact resistance, be flexible, and have an elongation sufficient to bridge up to 0.5-inch settling cracks, which may occur in the manhole/pipe or in the joint after installation without damage to the strip. The lining shall be repairable at any time after installation in pipe, manholes, or structures by methods approved and recommended by the manufacturer.

2.5.4.4 SUPPLY OF MATERIAL

Manhole/pipe embedment sheets shall be supplied as pipe size sheets or tubes fabricated by shop welding the basic size sheets together. For tank containment structures, either roll goods or prefabricated panels shall be supplied. Shop welds shall be made by a butt weld and fusing the sheets together by a thermal process such as an extrusion weld, fusion weld, or equal so as to produce continuous welded seams. Specimens taken from shop welded seams shall show no cracks or separations and shall be tested in

tension. Each specimen shall withstand a minimum shear strength of 60 percent of parent tensile yield strength.

During installation of the embedment sheet onto the forms, there shall be no cuts made within the liner for purposes such as strapping of sheet. If straps are utilized they shall be placed so that the straps are positioned between embedment studs. Sheets may be supplied in prefabricated, pipe sized tubular shaped sheets, ready to install onto the inner form, or roll goods having specified dimensions listed in the Materials and Dimensions section.

Joint strips for pipe seaming shall be approximately 4 inches wide with a minimum width of 3.75 inches. Thickness of joint strips shall be 3.0 mm.

HDPE plastic adjusting rings shall be used on all lined manholes where necessary. Concrete adjusting rings will not be allowed unless otherwise specified.

- 2.5.5 Bench and Inverts. All manhole bench and inverts shall be preformed at the manufacture. Hand forming of manhole bench and inverts will not be allowed on new manholes, except as approved by the City Engineer. Bench and inverts shall be polyethylene preformed invert as manufactured by Royal Environmental Systems or approved equal. Bench and inverts may also be formed by using a bench and invert forming system as manufactured by Press Seal, A-Lok or approved equal.

- 2.5.6 Manhole Castings. All frame and covers shall be constructed with gray iron having a tensile strength of not less than 35,000 pounds per square inch. The frame and covers shall conform to ASTM A48, Class 35B. The castings shall be heavy-duty type, designed for H2O loading conditions. The castings shall be free from cracks, blowholes, porosity, shrinkage distortion, or other imperfections. They shall be true to pattern and free from warpage. The frame and covers shall fit together in a satisfactory manner. Machined bearing surfaces shall be provided to prevent rocking and rattling. All covers shall be supplied with concealed pick holes as specified in the standard plates. All covers shall be letter marked "SANITARY SEWER."

All covers shall be supplied with self-sealing type "T" gaskets as manufactured by Neenah Foundry Company or approved equal. The covers shall be delivered from the manufacturer with pre-installed glued-in gaskets. The gasket shall be installed in a machined groove and be continuous around the perimeter. The gasket material shall be oil resistant Nitrile (60 DURO) glued in the groove, and have a maximum swell of 90 percent when tested in

accordance with ASTM D471 using ASTM No. 3 oil. The glue shall be Lock-rite Black Max as manufactured by 3M Products.

Manhole frame and covers shall be installed in accordance with the standard plates or as specified. Neenah R1772 manhole frame and covers shall be installed at all manholes unless otherwise specified. Neenah R1713 manhole frame and covers shall be installed where manholes are located into concrete pavement thicker than 6 inches. Neenah R1712 bolt-down-type manhole frame and covers shall be installed in specified areas outside of the street ROW which are in areas without hard surfacing. Neenah R1916C bolt-down-type manhole frame and covers shall be installed in specified areas outside of the street ROW which are in areas with hard surfacing.

Covers and frames shall be dimensioned as follows:

Neenah R1772 as manufactured by Neenah Foundry Company or approved equal. The cover diameter = 22 3/4 inches, cover height = 1 3/4 inches, frame height = 7 inches.

Other frame and covers that are acceptable, but shall only be installed where specified and in specific conditions are:

Neenah R1713 as manufactured by Neenah Foundry or approved equal. The cover and frame shall be dimensioned as follows: 22 3/4 inches, cover height = 1 3/4 inches, frame height = 9 inches.

Neenah R1712 (with bolt-down cover plate) as manufactured by Neenah Foundry or approved equal. The cover and frame shall be dimensioned as follows: 22 3/4 inches, cover height = 1 3/4 inches, frame height = 9 inches. See Standard Plates for bolt-down cover plate dimensions.

Neenah R1916C bolt-down type as manufactured by Neenah Foundry or approved equal dimensions shown on Standard Plates.

2.5.7 Manhole Adjusting Rings

2.5.7.1 Materials for Concrete Adjusting Rings

Bricks, blocks, or shimming devices will not be allowed for use in adjusting manholes.

Adjusting rings: Concrete adjusting rings shall be in accordance with ASTM C478. The inside diameter of the ring shall be 24 inches.

Mortar: Mortar shall be Standard Portland Cement Type I, hydrated lime, and clean, sharp, well-graded sand, free from foreign materials. The minimum design compressive strength shall be no less than 4,000 psi.

2.5.7.2 Materials for Plastic Adjusting Rings

Sealant: Butyl Rubber Sealant in trowelable form shall be used. EZ-STIK #3 as manufactured by Pre-seal Gasket Corporation or approved equal. The material must meet or exceed the requirements of Federal Specification TT-S-001657, ASTM C-990 and AASHTO M-198.

Plastic Adjusting rings: The adjusting rings shall be injection molded HDPE as manufactured by Ladtech, Inc. or approved equal. The adjusting rings shall be manufactured from polyethylene plastic as identified in ASTM D-1248 (Standard Specification for Polyethylene Plastic Molding and Extrusion Materials). Material properties shall be tested and qualified for usage in accordance with the ASTM Test Methods referenced in ASTM D-1248. The plastic adjusting rings shall be manufactured utilizing the injection molding process as defined by SPE (Society of Plastic Engineers). The adjusting rings shall be tested to assure compliance with impact and loading requirements in accordance with the AASHTO Standard Specification for Highway Bridges. The adjusting rings shall meet and exceed the static load requirements of ASSHTO highway Bridge Specification HS-25 (21,280 lbs). The rings must withstand 1,000,000 plus full load cycles of 10 seconds or less duration. The rings must perform without failure to a minimum of 150 percent of these load values. The adjusting rings shall be sized to conform to the standard 24-inch manhole opening.

2.5.8 Manhole Boots

Manhole boots for connecting pipes to the manholes shall be a watertight flexible connection meeting the requirements of ASTM C923. The rubber boots shall be supplied with two stainless steel clamps for attaching the boot to the pipe. A stainless steel "power sleeve" shall be supplied for connecting the boot to the manhole. The boots shall be type PSX as manufactured by Press Seal Corporation or approved equal.

2.5.9 Manhole External Frame Seal

Manhole external frame seals shall be Wrapid Seal as manufactured by CANUSA-CPS, Infi-shield Uni-Band as manufactured by Sealing Systems Inc., I/I Barrier by Strike Products, and Internal/External Frame Seal as manufactured by Adaptor Inc., or approved equal. Infi-Sheild manhole external frame seals manufactured by Sealing Systems will only be allowed in street pavement areas. The seal (for the Sealing Systems, Inc. product) shall be a continuous band made of high quality EPDM (Ethylene Propylene Diene Monomer) rubber with a minimum thickness of 60 mils. Each unit shall have a 2-inch-wide mastic strip on the top and bottom of the band. The mastic shall be nonhardening butyl rubber sealant with a minimum thickness of 3/16 inch and shall seal to the cone/top of the manhole section and over the flange of the casting.

2.5.10 Drop Manholes

The "Reliner Inside Drop System" as manufactured by Duran, Inc. or approved equal shall be used for all drop manhole connections with an incoming pipe size of 12 inches or less. For all incoming pipes that are greater than 12 inches, which require drop manhole sections, a pipe section shall be used to construct the drop manhole section. See the Standard Plates for details.

Clamping brackets: The clamping brackets shall be stainless steel "Reliner" adjustable clamping brackets with stainless steel fasteners as Manufactured by Duran, Inc. or approved equal as shown in the Standard Plates.

Pipe and fittings: PVC.

Couplings: Fernco rubber coupling or approved equal for the drop manhole assembly.

2.5.11 Manhole Markers

Two types of manholes markers shall be used were indicated.

Type 1 manhole markers shall be circular dome-type with a minimum of 3" in diameter, composed of polymer materials, UV-protected, guaranteed not to fade, chip, or peel, and have an anchor bar included. The post and marker shall remain impact-resistant in temperatures of -20°F to 140°F and capable of vehicle impacts up to 35 mph. The main post shall be 96" in length. The main post color shall be white and the dome section green. The graphics shall consist of a solvent-based ink that is abrasive and UV-resistant. The graphics shall be placed on the dome section and shall have a minimum graphics area of 14" by 8". The markers

shall be labeled "CAUTION SANITARY SEWER PIPELINE/ MANHOLE CALL BEFORE DIGGING." The Type 1 manhole markers shall be dome-type Linemarker markers as manufactured by Carsonite, Pro-Mark markers as manufactured by Pro-Mark Utility Supply, Inc., or equal.

Type 2 manhole markers shall be in accordance with the SDDOT standard specifications and the standard plates. Type 2 manhole markers shall be used in all interstate and highway ditch right-of-way areas and where specified. Type 1 manhole markers shall be used in all other installations.

2.5.12 Manhole Construction Plate Marker

Manhole construction plate markers shall be constructed in accordance with the Standard Plates detail. The manhole construction plate marker shall be constructed using "Flex-Guide 300 Series" delineator post and base as manufactured by Davidson Traffic Control Products or approved equal.

2.6 BEDDING MATERIAL

The bedding material for all sanitary sewer pipes shall be 1/4 inch to 3/4 inch clean angular, crushed rock with the following gradation requirements:

- 95 percent passing 3/4 inch sieve
- 95 percent retained in the No. 4 sieve and well graded.

2.7 TRENCH STABILIZATION MATERIAL

The trench stabilization for all sanitary sewer trenches where necessary shall be 3/4 inch to 4 inches crushed angular, well graded material. Larger material may be used if necessary and required to stabilize the bottom of the trench.

2.8 GEOTEXTILE FABRIC

Geotextile fabric shall be as specified in the Special Provisions.

2.9 GRANULAR MATERIAL

Granular material shall be "well graded subbase material" in accordance with the Standard Specifications (SDDOT Standard Specifications for Roads and Bridges). Sand may be used if approved by the Engineer.

2.10 K-CRETE

K-Crete shall be a controlled low strength concrete that is highly flowable without segregation.

2.11 CASING PIPE AND BORING MATERIALS

- 2.11.1 Casing Pipe: Steel seamless casing pipe, Grade B ASTM A53. With joints butt welded around the entire pipe. Wall thickness shall be designed and specified with each individual project.
- 2.11.2 Casing Spacers: Shall be as specified on the Standard Plates.
- 2.11.3 End Seals: Shall be as specified on the Standard Plates.
- 2.11.4 Carrier pipe: Shall be as specified in the Supplemental Standard Specifications, Special Provisions, or drawings.

2.12 SANITARY SEWER SERVICE LINES

2.12.1 GENERAL

Pipe: Refer to Section 2.1 for material type. Pipe: Schedule 40 PVC, for cleanouts.

2.12.2 SANITARY SEWER SERVICE BENDS

Refer to Section 2.1 for material type. Bends greater than 45 degrees will not be allowed.

2.12.3 SANITARY SEWER SERVICE CLEANOUTS

2.12.3.1 PIPE

Pipe: Schedule 40 PVC.

2.12.3.2 PROTECTIVE CAP AND COVER

Cover: Neenah R1976 or approved equal. The cover shall be labeled "SEWER."

See Standard Plates for details.

2.12.4 SANITARY SEWER SERVICE PIPE COUPLINGS

The clamp style coupling shall be "Power Seal Model 3541" as manufactured by Power Seal Pipeline Products Corporation, Adjustable Repair Coupling with 300 series stainless steel shear ring as manufactured by Mission Rubber Company, Inc., "Strong Back RC Series Repair Coupling" as manufactured by Fernco, Inc., or approved equal will be allowed for sewer services.

All couplings shall bear the manufacturer's identifying mark and size.

2.12.5 REDUCERS

Where reducers are necessary and approved for connections to existing service lines, reducers shall be eccentric type manufactured of approved pipe material. Coupling connections shall not be made to the reducers and reducing couplings will not be allowed. Reducers will only be allowed for special situations as determined necessary by the City Engineer.

2.12.6 SANITARY SEWER SERVICE PIPE LINING REPAIRS

Two types of sanitary sewer service pipe lining repairs will be allowed for services, Sliplining and CIPP.

2.12.6.1 SANITARY SEWER SERVICE SLIPLINING

Pipe: Refer to Section 2.1 for material type and also HDPE pipe will be allowed with a minimum SDR rating of 17. HDPE pipe shall not be coiled type. HDPE pipe shall have joints at 20 or 40 segments. HDPE pipe shall be PE 3608 sanitary sewer pipe.

Couplings: Refer to Section 2.12.4.

HDPE fusion connection: Butt welded fusion and electrofusion will be allowed for connections of the HDPE pipe.

2.12.6.2 CURED IN-PLACE SANITARY SEWER SERVICE PIPE LINING

Materials:

Tube: The sewn tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216, Section 5.1 or ASTM F1743, Section 5.2.1 or ASTM D 5813, Sections 5 and 6. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections. The wet out tube shall have a relatively uniform thickness that when compressed at installation pressures will equal or exceed the calculated minimum design CIPP wall thickness. The tube shall be manufactured to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during installation. The outside layer of the Tube shall be coated with an impermeable, flexible membrane that will contain the resin and allow the resin impregnation (wet out) procedure to be monitored. The Tube shall contain no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident. The wall color of the interior pipe surface of CIPP after installation shall be a relatively light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made. Seams in the Tube shall be stronger than the non-seamed felt material. The Tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol.

Resin:

The resin system shall be a corrosion resistant polyester or vinyl ester system including all required catalysts, initiators that when cured within the tube create a composite that satisfies the requirements of ASTM F1216, ASTM D5813 and ASTM F1743, the physical properties herein, and those which are to be utilized in the submitted and approved design of the CIPP for this project. The resin shall produce a CIPP that will comply with the structural and chemical resistance requirements of this specification.

Design Calculations and Physical Properties:

The Cured in place pipe (CIPP) material shall meet the following requirements:

Chemical Resistance: The pipe shall be resistant to a variety of chemical effluents as described in ASTM D543.

Flexural modulus: Test method D790, 300,000 psi minimum. Flexural strength: Test method D790, 4,500 psi minimum. Design pipe thickness: Shall be a minimum of 6 mm for 4- and 6-inch pipe. The CIPP liner thickness shall be calculated and designed based on the below listed conditions of the existing pipe to be rehabilitated. All design calculations shall be based on ASTM F1216 Appendix X1, and design calculation documentation shall be submitted to the City Inspector for review prior to installation. All design calculations shall be based on the following:

1. All pipes shall be considered fully deteriorated.
2. Ground water to the ground surface.
3. 2 percent ovality/deviation.
4. Soil load of 120 lbs/cu ft with applicable live load.
5. Safety factor of 2.0.

2.12.7 SANITARY SEWER SERVICE PIPE BEDDING MATERIAL

The bedding material for all sanitary sewer pipes shall be 1/4 inch to 3/4 inch clean angular, crushed rock or pea rock with the following gradation requirements:

95 percent passing 3/4 inch sieve

95 percent retained in the No. 4 sieve and well graded.

3.0 CONSTRUCTION REQUIREMENTS

3.1 ALIGNMENT AND GRADE

The Engineer will furnish all the necessary line and grade stakes, benchmarks, or other necessary control. It is the responsibility of the Contractor to protect these stakes, and any replacement of stakes shall be at the expense of the Contractor. The Contractor shall carry line and grade into the trench by means of an approved laser beam system and by a surveying level instrument. At no time shall the Contractor change the grade without approval of the Engineer. If underground interference is encountered at the assigned grade, the Contractor shall notify the Engineer and wait until the revised grade for the sewer has been determined, if necessary. As a secondary check to the laser beam device, the Contractor shall check the grade from the grade stake to pipe invert a minimum of every 100 feet using a surveying level instrument.

3.2 UNDERGROUND INTERFERENCE

The location of underground public or private utilities may be shown on the plans, as reported by the various utility companies and the City, but this **does not** relieve the Contractor of the responsibility of determining the accuracy or completeness of said locations. The Contractor shall determine the location of all underground ducts, conduits, pipes, cables, or structures which will be affected by the work, and shall take steps necessary to support and protect said structures by any means suitable to the owners of the structure involved and the Engineer. When necessary, the Contractor shall conduct operations as to permit access to the work site and provide time for utility work to be accomplished during the progress of the work.

Portions of utilities which are found to interfere with the line and grade of the sewer will be relocated, altered, or reconstructed by the owners, or the Engineer may order changes in the work to avoid interference. Such changes will be considered to be extra work and will be paid for through a change order. When the plans or specifications provide for the Contractor to alter, relocate, or reconstruct a utility, all costs for such work shall be included in the bid for the items of work necessitating such work unless a separate bid item is provided. Temporary or permanent relocation or alteration of utilities requested by the Contractor for the Contractor's convenience shall be the Contractor's responsibility, and the Contractor shall make all arrangements and bear all costs. In those instances where utility relocation or reconstruction is impractical, the Engineer may order a deviation from line and grade.

The Contractor shall be responsible for notifying the various utility companies if the Contractor's work will expose, affect, or endanger any existing utility. All cost of investigation and any necessary protection, support, removal, or relocation of said structures shall be included in the

contract bid price for installing pipe or manholes. The Contractor shall not begin construction until all utility companies have been contacted and their respective underground utilities have been located and marked.

The bid item "locating utilities" will be used to locate sanitary sewer services only if the service location marked exceeds the actual service location by 4 feet in either direction and additional excavation is required. The bid item "verify utilities" will be used only when it is necessary to excavate down to the utility to determine if any vertical and/or horizontal conflicts exist between existing utilities and the proposed new sewer to be installed as shown on the plans. All costs of other exploratory investigation/excavation necessary for determining the location and depth of utilities shall be included in the contract bid price for installing pipe.

3.3 EXCAVATION AND TRENCHING

3.3.1 GENERAL

Excavation shall be classed as either earth or rock excavation. Rock excavation shall consist of solid rock lying in its natural bed which requires fracturing for its removal and boulders of 1 yard or more in volume. All other material shall be classed as earth excavation.

3.3.2 EARTH EXCAVATION

All sewers shall be built in open cut, except that where conditions warrant, the Engineer may permit the use of short tunnels.

The Contractor may use any means he desires to excavate to the proper depth and width necessary for the construction of the sewer according to the plans and specifications. The width of the trench at the top of the pipe shall be a minimum of 6 to 9 inches on each side of the pipe. Trenches shall be excavated with vertical sides from pipe flowline to a point 1 foot above top of pipe where possible.

3.3.3 SHEETING AND BRACING

If City, state, or federal regulations dictate the necessity of sheeting, bracing, or pulling a trench box or shield, the cost of such sheeting, unless a special price is called for in the contract proposal form, shall be included in the contract bid price for installing pipe.

3.3.4 EXCAVATION BELOW PIPE GRADE

Trench excavation below pipe grade shall be backfilled with bedding material approved by the Engineer and thoroughly tamped to provide a uniform and continuous bearing and support for the pipe.

3.3.5 EXCAVATION IN UNSTABLE OR UNSUITABLE SOIL

The Contractor shall notify the Engineer when material considered unstable for the pipe foundation is encountered and where additional support, stabilization, and undercutting of the pipe trench are necessary. If the Contractor cannot assure a product in accordance with the specifications, the Contractor may request the use of trench stabilization material and/or geotextile fabric where the trench base is not structurally adequate or otherwise unstable to provide a uniform stable pipe foundation and requires additional undercutting for placement of trench stabilization material and/or geotextile fabric.

The undercutting and use of trench stabilization material and/or geotextile fabric shall only be approved for use in extreme conditions where it is obviously necessary. Approval for the limits of the payment lines for use of trench stabilization material and geotextile fabric must be obtained from the Engineer, prior to installation. If trench stabilization material and/or geotextile fabric is necessary to stabilize the trench foundation, they shall be installed by the Contractor at the unit bid prices for those respective items.

If geotextile fabric is used, it should be placed on the neutral soils and extended up the trench sidewalls to a level of at least the mid-point of the pipe. Placement of the fabric should then be followed by placement of the stabilization material.

The Contractor will be fully responsible for constructing the sanitary sewer on a stable base and any defects resulting from improperly preparing the pipe foundation shall be the Contractor's responsibility.

The Contractor will be required to furnish weigh tickets for trench stabilization material on a daily basis.

Pipe bedding material will always be required in addition to trench stabilization material where trench stabilization material is used.

3.3.6 ROCK EXCAVATION

All rock excavation shall be under one classification. It shall include solid ledge rock in its natural location that requires systematic quarrying, drilling, and/or blasting for its removal and also boulders that exceed 1 cubic yard in volume.

When rock is encountered in the trench, it shall be stripped of earth and the Engineer shall be notified by the Contractor and given ample time to make a profile before removal operation begins.

Procedures for rock removal operations shall be subject to the approval of the Engineer. The use of explosives shall be limited to the magnitude of the charge that will not cause damage to the adjoining property through shock vibrations or other stress loadings. Also, the Contractor shall provide adequate blanket protection to ensure that there will not be fragments of rock or other debris flying through the air when discharging explosives. The Contractor shall employ personnel certified to execute blasting operations.

The entire rock removal operations shall be the responsibility of the Contractor, and the Contractor shall pay for any damages caused by the rock removal operations. Adequate insurance protection, in addition to the standard liability insurance required, shall be purchased by the Contractor for payment of any damages that may be caused by the use of explosives.

The Contractor shall notify the City one week prior to rock removal on any project so the City can televise any sanitary sewer lines in the area that might be disturbed. Once all rock removal is complete, the Contractor shall notify the City so the City can retelevise the line.

Explosive permits must be obtained from the City of Huron Fire Rescue as per City ordinance.

3.3.7 DEWATERING

Pipe jointing shall be accomplished in a relatively dry trench condition. **Joints shall not be connected under water.** If ground water is encountered, the Contractor shall dewater the trench with suitable pumps and equipment. Lowering of the groundwater level shall be by means of wells, well points, or other suitable means.

Water resulting from the dewatering operation shall be disposed of in a manner approved by the Engineer and South Dakota Department of Environment and Natural Resources. It shall not be pumped onto private property without the property owner's approval. Any damage to property, either public or private, shall be rectified to the satisfaction of the owner and the City. All applicable permits must be obtained by the Contractor before the dewatering operation begins.

The water discharged from the dewatering operations shall not be allowed to wash through any excavated material. The Contractor shall be responsible for any damages that might result from this operation.

3.3.8 SANITARY SEWER TEMPORARY BYPASS

The Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the affected section(s) of sewer main and shall also bypass the main sewer flow around the pipe being replaced, or into adjacent sanitary sewers. No sewage will be allowed outside of the sanitary sewer collection system (sewage will not be allowed to be discharged onto the ground). The Contractor shall be responsible for the design, installation, and operation of the temporary bypass system. The temporary bypasses, automated or otherwise, shall be of adequate capacity and size to handle all flows without sewage backup into property. The Contractor shall be solely responsible for cleanup, repair, property damage costs, and claims resulting from failure of the bypass system.

The Contractor shall (as an incidental part of the project) contact all property residents (that are at the property at the time of construction/service interruption) along any sanitary sewer project where the property residents have the potential to discharge sanitary sewer into the construction area due to an open service line in the trench or other means. The Contractor shall inform the residents not to discharge sanitary sewer during the time(s) when the resident's sewer service is not connected to the City of Huron sanitary sewer system. The Contractor shall inform the resident of the estimated time that the service will not be functional and inform them **immediately** (by door hanger if not home) when their service can be used.

The Contractor shall also install (as an incidental part of the project) door hangers (furnished by the City) on each affected property residents door. The door hanger shall indicate the time of when the property will not be allowed to discharge sewage to the sanitary sewer system and a phone number for answering questions.

The Contractor shall submit a detailed temporary bypass plan in writing to the Engineer for approval before or at the preconstruction meeting. The Contractor shall also provide the Engineer a detailed drawing showing the location of temporary bypasses for each line segment(s) around which flows are being bypassed.

The Contractor shall submit the specifications for all pumping equipment to the Engineer for approval when requested. The submittal shall include the following information:

- The size (pumps and piping), quantity, capacity, and location of all pumping equipment.
- The pump manufacturer's pump performance curves.
- A list of all backup pumping equipment to be held in reserve on the job site shall also be submitted.

The pumps and bypass lines shall be of adequate capacity and size to handle all flows. The Contractor shall demonstrate that the pumping system is in good working order and is sufficiently sized to successfully handle flows by performing a test run prior to beginning the work. The Contractor shall cease temporary bypassing operations and return flows to the new and/or existing sewer when directed by the Engineer. All temporary bypass pumping operations shall be manned continuously during operation.

When bypassing trunk sanitary sewer lines 24 inches in diameter and greater, flow meters shall be installed on the discharge line piping to constantly and accurately read instantaneous and cumulative flow.

All pumps used for bypassing shall be fully automatic self-priming units that do not require the use of foot valves in the priming system. All pumps used must be constructed to allow dry running for extended periods of time to accommodate the cyclical discharge of wastewater flows.

Manholes that are used for the pump suction and discharge points shall be adequately protected to prevent storm water from entering the manholes.

3.3.9 INSTALLATION OF PIPE

Sewer pipe shall not be installed in frozen ground or in water, and no water will be allowed to run into or through the pipe.

Pipe shall be carefully installed to line and grade in accordance with line and grade stakes set by the Engineer so that the finished sewer will present a uniform bore. Any noticeable variations from true alignment or grade will be cause for rejection of the work.

All pipe shall be installed upgrade with spigot ends pointing in the direction of flow. The bottom of the trench shall be freed of all rocks and stones and shall be hand shaped and bedded with bedding material as hereafter specified, and the pipe shall be in firm contact with the bedding material for its entire length. At each joint of bell and spigot pipe, a hole shall be dug of sufficient size so that the weight of the pipe will rest on the barrel of the pipe and not on the bells, and the bell hole shall not be compacted. All pipe must be properly fitted together. A suitable stopper shall be kept in the end of the pipe so as to prevent any dirt or water from entering during the progress of the work at all times. Any dirt, loose material, or cement mortar which may accumulate in the pipe shall be removed as the work progresses. The backfilling around and to a depth of 1 foot over the pipe shall be completed and thoroughly hand

tamped as the pipe installation progresses as hereafter specified in bedding and backfill requirements. Whenever pipe is installed in rock trenches it shall be bedded to at least a 4-inch depth, and then shall be covered to a depth of at least 1 foot with bedding material or granular material.

Standard length pipe shall be utilized for all installations. Shorter lengths will only be allowed for use at manhole terminations and service line tie-ins to service connections. A full standard length pipe shall be used upstream of all manholes.

3.3.10 SANITARY SEWER SPOT REPAIR

Sanitary sewer spot repair shall be done in accordance with the specifications and details for each individual repair.

3.4 SANITARY SEWER PIPE JOINTS

3.4.1 JOINTS IN PVC SANITARY SEWER PIPE

All PVC Sewer Pipe shall be jointed utilizing elastomeric gaskets as referenced in ASTM D3034 and ASTM F679 and meeting the requirements of ASTM D3212. All pipe, fittings, and joints shall be installed in full compliance with the recommended practices of the pipe manufacturer and as specified in the latest revision of ASTM D2321. The joint surfaces (external and internal) shall be wiped free of all foreign materials, and the spigot end shall be centered on grade into the bell end and the joint shall be properly seated in accordance with the manufacturer's recommendations. Any pipe that is field cut shall have a square end with beveled edge equal to a factory cut and all field repairs shall be performed per manufacturer's recommendations.

3.4.2 JOINTS IN DUCTILE IRON PIPE (DIP)

All Ductile Iron pipe shall be jointed utilizing a push-on type joint in accordance with the requirements of AWWA C111. All pipe, fittings, and joints shall be installed in full compliance with the recommended practices of the pipe manufacturer and the latest revision of the ANSI/AWWA C600 standard.

When making joints, the gasket and gasket seal inside the socket shall be wiped clean before the gasket is inserted. A film on lubricant shall be applied to the gasket and the outside of the spigot end of the pipe. The spigot shall then be positioned inside the socket and pushed home. Lubricant other than that furnished with the pipe shall not be acceptable.

3.5 WYE BRANCHES

“Wye” branches for house connections, multiple dwellings, and commercial connections shall be built into the sewers at such points as shown on the drawings, as the Engineer shall designate and approved by the City Engineer. It will be the Contractor’s responsibility to keep accurate records of the location of each wye and stubout measurement and give the information to the Engineer or Inspector at the end of each day for City projects and at the end of each phase for subdivision projects or as requested by the Engineer or Inspector. All wye locations shall be recorded on the grade sheets by the Engineer where necessary, and all grade sheets shall be turned in to the City Engineering Office for subdivision projects. Stubout locations shall be recorded on a permit drawing for all CIP projects.

All measurements shall be: (1) Provided on a plat drawing in new subdivision work areas; (2) legible; (3) measured from the property line for stubouts (ex: 20’ SNPL); (4) measured from the downstream manhole for wye locations (ex: y-79’); (5) given to the inspector within 30 days of the installation of the pipe (deflection test will not be accepted by the City until after the wye and stubout measurements have been submitted in proper format). **Measurements not properly submitted will be rejected.**

All wyes which are not to be immediately connected shall be closed with a watertight cap or plug. **All** wyes and stubouts shall be marked with a marker (see detail in Standard Plates) to help relocate it and prevent breakage when excavating. All stubouts shall be capped and sealed, and the Contractor shall be responsible for the measurement(s) recorded on the permits.

3.6 MANHOLES

3.6.1 GENERAL

All manholes shall be constructed to meet the requirements of the latest revision of ASTM C478, “Precast Reinforced Concrete Manhole Sections,” and all related ASTM Specifications. All manholes shall be waterproof.

All manholes are to be built to the dimensions shown in the plans, special information, detail plates, or cut sheets furnished by the Engineer. All manhole sections shall be numbered and/or measured by the Contractor prior to installation to assure that the finished manhole will be to the grade specified on the grade sheet as there may be variations between plan sheet depths and the final depths shown on the grade sheet.

Construction of all cast-in-place manholes shall conform to the South Dakota Department of Transportation “Standard Specifications for Roads and Bridges” and Standard Plates, unless otherwise indicated.

3.6.2 BASE AND SECTIONS

Where precast concrete sections are used, the base section shall be cast with proper cutouts to accommodate the required sewer pipes. Precast sections shall be connected together using a specified gasket material and shall be in place on all manhole joints to assure watertight joints. All lift holes on the interior and exterior of the manhole sections shall be filled with nonshrink grout. Where installation of lift hole plugs is required, they shall be installed into the center of the manhole wall. The area on either side of the lift hole plug shall be filled with nonshrink grout.

All manholes shall be constructed of precast base, barrel, and cone sections. The joints between sections shall be of watertight construction utilizing a specified gasket material.

All manholes that are constructed, unless otherwise specified, shall be built with the base and bottom barrel section being precast together in one integral concrete pour. Such will provide for no joint between the base and barrel section ensuring a watertight seal. This section shall be constructed to meet the Specifications of the latest revision of ASTM C478 and the manhole details in the Standard Plates.

Manholes shall not be constructed at the manufacturer or in the field with piping installed in the manhole boots prior to setting the manhole in the trench. This type of installation will be cause for rejection of the work.

3.6.3 BENCH AND INVERT

All inverts shall be formed to the diameter of the incoming and outgoing pipe diameter up to the pipe centerline and vertical beyond that point. The invert shall be formed to a depth of one-half to two-thirds the pipe diameter. The forming of the bench and invert shall allow for the City sewer television camera with skids to be installed in the invert and into any pipe connection into the manhole. (Camera dimensions vary for individual pipe sizes televised. The dimensions are available from the City Water Reclamation Division of the Public Works department.) Where lateral connections are required into the manhole, a gradual change in the direction of the manhole invert for each lateral shall be formed. Sharp angles without gradual changes in direction will not be allowed. Flat bottomed manholes will not be allowed. Such work will be cause for rejection of the work. The City Standard Plates for the manhole bench and invert construction illustrates the construction for a typical manhole.

Where hand formed and reconstructed manhole bench and inverts are determined necessary by the Engineer, they shall be constructed with concrete. The manhole invert shall be shaped and finished in a glass smooth-like finish (a steel trowel will give this finish). The bench shall have a broomed finish.

3.6.4 ADJUST MANHOLE

There shall be at least one 2-inch adjusting ring, and a maximum of 14 inches of adjustment used on each manhole. Unless otherwise specified, the manhole cover shall be set approximately 6 inches below the finished street elevation by the sewer contractor to be raised to finished grade elevation by the contractor prior to paving.

Plastic adjusting rings may be used in lieu of concrete adjusting rings. The plastic adjusting rings shall be installed as recommended by the manufacturer. No shims or other leveling devices, other than leveling rings provided by the manufacturer, will be permitted with use of the plastic adjusting rings. The annular space between the adjusting rings shall be sealed using an approved butyl rubber sealant. The first plastic adjusting ring on existing manholes may require leveling with concrete mortar, and therefore the first plastic ring may be set in mortar.

The installation for concrete adjusting rings shall be in accordance with the Standard Specifications for Roads and Bridges produced by the SDDOT unless otherwise specified. The manhole frame and adjusting rings where concrete adjusting rings are used shall be set in a full bed of mortar to the elevation set by the Engineer as shown on the grade sheet. The mortar shall be tuck-pointed between rings and shall not be applied to the inside diameter surface of the adjusting rings. Smearing of mortar on the inside of the adjusting rings will be cause for rejection of the work.

3.6.5 MANHOLE EXTERNAL FRAME SEAL

Manhole external frame seals shall be used on all new concrete surfacing street projects and on existing concrete surfacing street projects where the manholes are adjusted to the corbel section. Manhole external frame seals shall also be required for all manholes located outside of the street ROW area, in unpaved areas, and where specified. The manhole external frame seal shall extend onto the casting and the cone section a minimum of 2 inches. Manhole external frame seals shall be installed in accordance with the manufacturer's recommendations.

3.6.6 FRAME AND COVER

Manhole frame and covers shall be installed in accordance with the Standard Plates or as specified.

Manhole frames that are installed onto plastic adjusting rings shall be installed using the manufacturer's recommended sealant between the frame and adjusting rings to form a watertight seal.

Manhole frames that are installed onto concrete adjusting rings shall be installed in a full bed of mortar to form a watertight seal. Manhole frames shall be set on a butyl rubber sealant where the manhole is located in an unpaved area.

Bolt-down-type manhole frames and covers shall be installed on the corbel section without adjusting rings and bolted to the corbel section as shown in the Standard Plates to form a watertight seal, unless otherwise indicated.

Manhole frames offset by more than 2 inches from the adjusting rings or corbel section will be rejected.

Manhole frames and covers shall be set to the grade specified on the grade sheet and plans.

Manhole frame and covers in permanent gravel surfaced streets shall be vertically installed so that the manhole rim is set 6 to 8 inches below the finished street grade.

Manhole frame and covers placed on the manhole riser prior to final surfacing shall be bolted to the corbel section with a continuous band of butyl rubber rope gasket between the frame and the corbel section.

3.6.7 MANHOLE BOOTS

The precast base-barrel section shall also contain watertight gaskets, adaptors, or sealers to ensure a leak-proof connection between the manhole and the sewer pipes entering the manhole. Such connections shall be flexible and/or pliable enough to allow for deflection from shifting or settling of the manholes and to accommodate the pipe on grade. The connections shall also be capable of adapting to the various sizes and types of sewer pipe that may be used. The manhole boot shall be a PSX gasket, as manufactured by the Press Seal Gasket Corporation, or approved equal. When futures are specified, a short pipe length with a cap shall be installed and sealed. This section of pipe will need to be removed and replaced when the pipe is extended from the manhole.

3.6.8 DROP MANHOLES

Drop manholes will be permitted only when approved or specified by the Engineer. Where changes in elevation within the manhole are not sufficient for a drop section, the manhole invert shall be filleted so that a smooth channel is formed from the end of the drop pipe throughout the length of the drop. Connections to a drop manhole will require ASTM D2241 Class 200 psi pipe to be laid through the excavation area.

The drop manhole shall be constructed in accordance with the manufacturer recommendations and as shown on the Standard Plates. A V-notch shall be cut into the flow line of the incoming pipe end. The V-notch is to provide improved flow control.

3.6.9 MANHOLE MARKERS

Manhole markers shall be installed for all manholes outside of the street ROW that are not in paved areas unless otherwise indicated. Manhole markers shall be installed as detailed on the Standard Plates.

3.6.10 MANHOLE RECONSTRUCTION

Any manhole that cannot be adjusted within the 14-inch height limit of the bid item for adjusting manholes shall be reconstructed. When an existing manhole is lower than the proposed finished grade elevation, the manhole shall be required to be reconstructed by:

Removal of the cone section and adding the appropriate height of barrel section(s) to increase the manhole height to a level that the manhole can be adjusted using the appropriate height of adjusting rings.

When an existing manhole is higher than the proposed finished grade elevation, the manhole shall be required to be reconstructed by:

Removal of the cone and barrel section(s) and installing the appropriate height of barrel section to decrease the manhole height to a level that the manhole can be adjusted using the appropriate height of adjusting rings.

3.6.11 MANHOLE LINERS

3.6.11.1 General

The work shall include furnishing all labor, materials, equipment, and incidentals required to install manhole sheet liner with studded backside in concrete manholes, concrete structures, and appurtenances to effectively protect the exposed concrete surfaces from corrosion in those areas shown on the drawings or specified. The liner shall be continuous and free of pinholes at the joints and in the liner itself.

All work for and in connection with the installation of the lining, field seaming, and welding of joints shall be done in strict conformity with all applicable instructions and recommendations of the liner manufacturer unless otherwise specified.

Installation of the lining and the welding of all joints shall be done in strict accordance with the manufacturer's instructions and recommendations and the details and methods indicated on approved shop drawings by an experienced and qualified installer acceptable to the manufacturer and the Engineer. Lining welders shall be trained and certified by the lining manufacturer prior to the start of welding. All pipe joints and other lined areas where welding is performed shall be numbered and initialed by the welder. The Contractor shall record on a daily basis at the end of each working day the identification of the joint areas and the welder who performed the work.

Coverage of the lining shall not be less than the minimum specified or as shown on the Plans. Manholes and concrete structures shall be fully lined on the interior, including man-way openings, unless otherwise shown or specified.

When needed, the lining shall be held snugly in place against inner forms by means of steel banding straps or other means recommended by the manufacturer. Banding straps must be located in the interstitial space between studs to prevent crushing or tilting of the embedment studs.

If liner is extended for the purpose of joint overlap, embedment studs shall terminate not more than 1/2 inch from the end of the inside surface of the pipe section. Joint flaps shall extend approximately 4 inches beyond the end of the inside surface.

Concrete poured against lining shall be vibrated in a careful manner so as to protect the lining and produce a dense, homogenous concrete, securely anchoring the locking studs into the concrete.

Forms shall be properly cleaned and prepared to remove any abrasive areas that may damage the liner when removing forms. In removing forms, care should be taken to protect the lining from damage. Sharp instruments shall not be used to pry forms from lined surfaces. When forms are removed, any nails that remain in the lining shall be pulled, without tearing the lining, and the resulting holes clearly marked. Form tie holes shall be marked before ties are broken off and all areas of abrasion or damage shall be marked.

Hot joint compounds, such as coal tar, shall not be poured or applied to the lining. Solvents or adhesives shall not be used in fusion of material in any manner.

The Contractor shall take all necessary measures to prevent damage to installed lining from equipment and materials used in or taken through the work area and shall immediately repair any damage.

All welding shall be performed in accordance with the published directives and procedures of the manufacturer and by welders certified by the manufacturer. Completion of welding shall provide a one-piece monolithic concrete protective liner system that will provide excellent resistance to hydrogen sulfide attack and will not pull off the wall in the event that infiltration occurs.

3.6.11.2 Submittals

Submit to the Engineer for review, as provided in the General Conditions, complete shop drawings showing liner materials and typical installation details of all liner work and details of materials of construction and installation. The shop drawings shall include manufacturer's detailed drawings, directions, and specifications for construction and all special and typical installations.

Included with shipment of liner, submit certified test reports that the liner and material were manufactured in accordance with standards specified herein.

3.6.11.3 Joints in Lining for Concrete Structures

No lining of joints shall be made until after the trench has been backfilled and the joints pressure tested. Lining at joints shall be free of all mortar and other foreign material and shall be clean and dry before joint are made.

Field joints in the lining shall be of the following types used as prescribed:

- a. Strip Type: The joint shall be made with a separate 4-inch-wide joint strip and two welding strips. The 4-inch joint strip shall be centered over the joint, and then extrusion welded to the liner. The width of the space between adjacent sheets shall not exceed 1 inch. The 4-inch joint strip shall lap over each sheet a minimum of 1.5 inch. It may be used at any transverse or longitudinal joint.
- b. Lap Type: The joint shall be made by lapping sheets not less than 1 inch. The upstream sheet shall overlap the one downstream. The lap shall be tack-welded into place, and then welded with an extrusion bead over the adjoined materials.
- c. Butt Type: Butt-type welds will not be allowed for field welding of joints.

All welding is to be in strict conformance with the instruction of the liner manufacturer. Welding shall fuse both sheets together to provide a continuous joint equal in corrosion resistance and permeability to the liner plate.

3.6.11.4 INSTALLATION

3.6.11.4.1 General

Field seaming involves bonding of adjacent panels using approved thermal methods such as extrusion welding. Testing and verification of the resulting welds will be required.

3.6.11.4.2 Trial Seams

a. General

Prior to any field welding of lined surface, trial seams shall be performed to ensure that the technician and method is adequate. Trial seams shall be performed on materials from the current project, a minimum of 3 feet in length. Trial weld seams shall then be tested to ensure equipment settings are sufficient to produce quality welds. Testing shall consist of both nondestructive and destructive methods.

b. Nondestructive Seam Testing

Nondestructive testing shall consist of spark testing. Spark testing of the finished seams is required; a copper wire may be set into the weld joint prior to welding. This will allow for spark testing for the welded seam for determination of the presence of possible leaks in the weld. This process is not necessary but may provide an alternative method for nondestructive testing of the welds. Spark testing can be performed with approved instrumentation when set at approximately 20,000 to 35,000 volts depending upon apparatus. Any defects found should be marked and repaired according to approved repair methods.

Repairs of pinholes and defective areas shall be performed by extruding a bead of molten plastic over the surface, or if too large, a patch shall be utilized. Once complete, retest using the spark tester when applicable.

c. Destructive Seam Testing

When job requirements mandate destructive seam testing of trial seams, an appropriate number of samples should be determined by the Engineer. Weld seams should then be tested for shear strength according to standard industry guidelines. When proper welding techniques are followed, the weld shall exhibit approximately 80 percent of the parent tensile yield strength in shear when tested in accordance to ASTM D 4437.

3.6.11.4.3 Field Seams

a. Nondestructive Seam Testing

Nondestructive testing shall consist of spark testing. Spark testing allows for the welded seam to be tested for determination of the presence of possible leaks in the weld. Spark testing may be

performed over the entire surface of the weld and liner sheet. Spark testing shall be performed with approved instrumentation set at approximately 20,000 to 35,000 volts depending upon apparatus. Any defects found shall be marked and repaired according to approved repair methods. The spark testing device shall be equipped with an audible alarm indicator for signaling any defects.

Repairs of pinholes and defective areas shall be performed by extruding a bead of molten plastic over the surface, or if too large, a patch shall be utilized. Once complete, retest using the spark tester when applicable.

3.6.12 MANHOLE CONSTRUCTION PLATE MARKER

The manhole construction plate markers shall be used on all City of Huron bid projects or where designated. Manhole construction plate markers will be required on development projects where designated by the City. Manhole construction plate markers shall be installed on existing manholes immediately after construction surfacing removals have been completed and on new manholes immediately after installation. The markers, on asphalt streets, shall remain on the manhole until after the first lift of asphalt is installed (with exception to when any internal manhole construction work may need to be performed). The markers on concrete streets shall remain on the manhole until concrete paving occurs. The Contractor shall ensure that all manholes are secured, protected, and watertight at the end of each work day. Under no circumstances shall an uncompleted or completed manhole be left uncovered, unprotected, or not watertight overnight.

3.6.13 MANHOLE BENCH AND INVERT RECONSTRUCT

Manhole bench and invert reconstruct shall be done in accordance with the specifications and details for each individual repair.

3.7 CONNECTIONS TO EXISTING MANHOLES

Wherever new sewers connect with existing sewer manholes or structures, the Contractor shall cut the necessary openings into the existing manholes and make the connections thereto in a neat and workmanlike manner. The connections shall be made so as to make the joints around the entering sewers watertight and an approved smooth channeled flow line shall be

constructed. All existing cast-in-place, precast, and block-type manholes shall be core drilled, and manhole boots shall be installed for the pipe connection.

Where existing manholes are constructed of brick, cobblestone, or other materials determined by the Engineer that cannot be core drilled, pipes shall be grouted into the manhole wall with nonshrink grout and a water seal. The water seal shall be placed continuously around the pipe to form a seal. The water seal shall be a butyl rubber rope type material.

All manhole bench and inverts shall be reconstructed as a part of the connection to the existing manhole. The manhole bench and invert reconstruct shall be paid for under the bid item for Manhole Bench and Invert Reconstruct.

3.8 CONNECTIONS TO EXISTING SANITARY SEWER PIPES

Pipe couplings shall be used where it is necessary to connect two spigot ends of the same diameter pipe together and where bell and spigot connections are not possible.

3.9 STUBS AND FUTURES FROM MANHOLES FOR FUTURE EXTENSIONS

Futures from manholes shall be defined as piping and plugs that extend longer than one standard 13-foot section of pipe. Stubs from manholes shall be defined as piping and plugs/caps that extend less than a 5-foot section of pipe. Stubs and futures from a manhole shall be installed to the grade staked and/or specified. Futures shall be plugged with a suitable watertight plug at a bell end section of pipe.

Stubs can be plugged at the bell end section of pipe or capped on a plain end section of pipe. Connecting onto stubs will not be allowed. Stubs must be removed from the existing manhole when connections to the manhole are installed and a full section of pipe must be installed. Stubs shall not extend more than 5 feet and no less than 3 feet in length from the manhole unless otherwise specified.

3.10 SERVICE CONNECTIONS

In all new sanitary sewer mains, prefabricated wyes shall be installed at all service stubout locations and sealed with an approved watertight cap or plug. Wyes with the same branch pipe diameter as the main line sewer will not be permitted.

Any future taps of the existing main shall be made by the City where the sewer main is clay or PVC truss pipe material. Taps on existing pipes shall be made by tapping the line and using a saddle to connect the service pipe to the main line. Cutting out a section of main line pipe and installing a wye and couplings will not be permitted.

3.11 BEDDING, BACKFILL, AND COMPACTION

3.11.1 GENERAL

Installation of PVC pipe, including bedding and backfill of the pipe, shall conform to the latest revision of ASTM D2321 "Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe," and the specifications and Standard Plates of the City of Huron.

All bedding and backfill areas shall be subject to compaction testing by nuclear or standard methods according to the latest applicable ASTM Specifications. In addition to the construction and testing procedures outlined in other sections of the specifications, the Contractor shall be required to install the pipe in such a manner so that the diametric deflection of the pipe shall not exceed 5 percent (see pipe testing section) and the materials surrounding the pipe shall be compacted to the required Standard Proctor Densities outlined in D2321. The areas requiring compaction shall include the bedding, initial backfill, and final backfill areas, as defined in the following sections. The Engineer may take random compaction

tests of the material. If any of these tests indicate that the material has not been compacted to the required density, the Contractor shall recompact said material at no additional cost to the Owner, and the Engineer shall then have the right to take additional compaction tests to assure that this or other material is compacted to the proper density without any additional cost to the Owner.

The City will pay for the first density tests taken at a given location. If the first test fails, the Contractor shall recompact the area and a second density test will be taken. If the second test passes, the City will pay for the second test. If the second test fails, the contractor shall pay for the second test and any test taken thereafter until a passing test is obtained. This procedure will be applied to each test location.

Material for all areas of backfilling is to be free of rock, frozen materials, and hard clay. Care shall be taken in placing backfill over the crown of the pipe to avoid damage to the pipe.

3.11.2 BEDDING OF PIPE

The trench base shall be undercut a minimum of 4 inches or one-fourth of the outside diameter of the pipe barrel (whichever is larger) below the grade line of the pipe and uniformly backfilled with bedding material to the grade-line of pipe. After the pipe has been installed on top of the first layer of bedding material, the haunching area shall be backfilled with bedding material up to the "spring-line"

(halfway) on the pipe (bedding material shall be used to the top of the pipe for all pipes with a diameter of 12 inches or less). The bedding material shall be "shovel-sliced" or hand tamped around and under the haunches of the pipe to assure adequate and uniform support along the bottom of the pipe. Care shall be taken to prevent dislodging and misalignment of the pipe and to provide adequate bell hole for the pipe.

All sewer service lines shall be installed with bedding material from 2 inches below the pipe to the top of the pipe.

When the foundation material is not suitable to provide a uniform base for the pipe, the trench shall be undercut to sufficient depth to build an acceptable base. Such areas shall be backfilled with trench stabilization and/or geotextile fabric material to build a uniform foundation. The trench stabilization material shall be brought up to the bottom of the bedding material specified for the pipe and the bedding material shall be used up to the spring line (bedding material shall be used to the top of the pipe for all pipes with a diameter of 12 inches or less).

3.11.3 INITIAL BACKFILLING OF PIPE TRENCH

All sewer pipe installed in an open trench shall be initial backfilled to at least 12 inches above the top of the pipe. The initial backfill shall be placed evenly so as not to disturb the grade or line of the pipe. Above the bedding area the pipe shall be backfilled with acceptable native material (Class I, II, and III as described in ASTM D2321), approved by the Engineer, or with granular material to a minimum of 90 percent Standard Proctor Density to 12 inches above the top of the pipe.

Where no suitable backfill material is available, the initial backfilling shall be constructed with granular material.

3.11.4 FINAL BACKFILLING OF TRENCH TO GRADE

All final backfill material shall consist of approved excavation material, granular material, or as otherwise specified. Sand may be used if approved by the Engineer. The final backfill shall be placed in layers and compacted by suitable and approved compaction methods in a manner approved by the Engineer to at least 95 percent Standard Proctor Density, or as otherwise specified.

Excess material not required for final backfilling shall be removed by the Contractor or otherwise disposed of as ordered by the Engineer.

If the material encountered in the trench excavations is unsuitable to be used as final backfill material, it shall be replaced with other suitable material available at the project site or with granular material, as approved by the Engineer. In final backfill areas below pavement, the Engineer may direct the Contractor to use native material a specified distance below the pavement elevation to ensure a consistent material is utilized under the pavement section.

At least 36 inches of cover shall be placed over the top of the pipe before the trench is wheel-loaded, and 48 inches of cover shall be placed over the top of the pipe before the trench is hydro-hammered for compaction.

3.12 SURFACE RESTORATION

3.12.1 GENERAL

Unless stated specifically to the contrary in the Special Provisions, the Contractor shall replace all surface material and shall restore paving, curbing, sidewalks, gutters fences, trees, sod, topsoil, and other items disturbed to a condition equal to that before the work began, furnishing all labor, materials, and equipment necessary to do this work. Traveled streets shall be kept open and maintained by the Contractor after backfilling and before surfacing or final inspection. The cost of all such work shall be absorbed in the unit price bid for pipe installation unless otherwise specified in the Special Provisions or Bid Proposal.

3.12.2 USE AND REPAIR OF STREET

The Contractor shall carry on the work in such a manner as to interfere as little as possible with the use of the street for public travel and as specified in the Special Provisions.

Wherever any paved gutters, pavements, graveled highways or street crossings, or other improvements are interfered with or removed, they must be replaced by the Contractor and left in as good condition as previously. The Contractor shall also remove all surplus material leaving the streets clean and in good order.

No more than 300 feet of trench will be opened at any one time in advance of the complete construction of the sewers and the backfilling shall follow up the installation of the sewers.

All street repairs and cleaning shall be promptly done as the work progresses. The Contractor shall not obstruct any street gutters, but shall provide for the passage of surface water along the same at all times.

It shall be the Contractor's responsibility to protect all sanitary sewer pipes, manholes, and trenches from extraneous water and storm water entering the sanitary sewer system at all times during construction.

3.12.3 CONCRETE PAVEMENT REMOVAL AND REPLACEMENT The

surface of all concrete pavements shall be sawed with a concrete saw to the full pavement depth. The width of pavement removed shall be 12 inches wider than the trench excavation to provide a shoulder on all sides. Where within 2 feet of existing joint, concrete shall be removed to the joint.

The Contractor shall place a 6-inch gravel cushion unless otherwise specified and replace the concrete pavement to the same thickness as the original pavement, with a minimum thickness of 6 inches. The concrete shall be Class M6 as specified by SDDOT and shall be finished the same as the existing pavement.

The cost of pavement removal, replacement, and sawing of the concrete shall be included in the unit price bid for pipe unless otherwise provided for in the Bid Proposal or specified in the Special Provisions.

All concrete pavement shall be removed and replaced in accordance with the Supplemental Standard Specifications and Standard Plates.

3.12.4 ASPHALT PAVEMENT REMOVAL AND REPLACEMENT Where

streets are asphalt surfaced, the Contractor shall cut the asphalt surfacing to a minimum depth of 4 inches by an approved method to a width of 12 inches wider than the trench excavation.

When asphalt surfacing has a concrete base, the asphalt shall be cut in the previously described manner and the concrete base removed with a pneumatic or mechanical type hammer or by similar means.

Unless otherwise specified, the Contractor shall place a 6-inch gravel cushion under the concrete base; replace the concrete base with a minimum of 6 inches of Class M6 concrete; and then place a minimum of 2 inches of asphalt surfacing meeting City Standards and Standard Specifications on top of the concrete base, or as otherwise specified in the Special Provisions.

On all excavations in asphalt surfaces without concrete base, there shall be a minimum of 6 inches aggregate base course and a

minimum of 4-inch asphalt mat or the thickness of the existing mat whichever is the greater.

All asphalt surfacing shall be replaced and rolled in accordance with the Standard Specifications and Supplemental Standard Specifications.

All street surfacing cuts, asphalt or concrete, shall be in a straight line parallel to the existing curb and gutter or perpendicular to the centerline of the street. No jagged, skewed, or irregular cuts will be allowed. All asphalt cuts shall be in an approved manner and not ripped out with the bucket. Such work lifts the remaining mat away from the base material and shall be cause for widening the street cut and increasing the amount of surfacing replaced at the Contractor's expense.

3.13 REMOVAL AND ABANDONING SEWER PIPE AND MANHOLES

3.13.1 REMOVAL OF PIPE AND MANHOLES

This work shall consist of removal and disposal of pipe and manholes which are not designated or permitted to remain and which are not removed and disposed of under other items in the contract. Removals shall be in accordance with the Standard Specifications. Manholes that are to be removed shall be entirely removed and disposed of unless otherwise indicated.

3.13.2 ABANDONING OF PIPE AND MANHOLES

Abandon sanitary sewer pipe that is to remain in-place shall be entirely filled with K-crete unless otherwise indicated. Manholes that are to be abandon in-place shall be abandon by removing the top

3 feet below finish grade elevation, seal off any incoming piping with K-crete, install a 2-inch minimum diameter hole in the base section of the manhole, and fill the manhole with sand.

3.14 PIPE INSULATION

Pipe insulation shall be required on all sanitary sewer pipe installations where the cover depth to finished grade elevation is 5 feet or less above the pipe. The insulation work shall be in accordance with the Special Provisions, drawings, and manufacturer's recommendations.

3.15 JACKING, BORING, AND TUNNELING

It shall be the responsibility of the Contractor to maintain the alignment and grade specified. The jacking, boring, and tunneling specifications shall be in accordance with the standard plates, drawings, and Special Provisions.

3.16 SANITARY SEWER SERVICES

3.16.1 GENERAL

Glued connections will only be allowed at the connection between the SDR 35 and the Schedule 40 PVC pipe at the building. 45-degree bends shall not be located closer than 3 feet from each other.

3.16.2 CLEANOUTS

Cleanouts shall be used only on service lines in approved locations. Cleanouts used for service lines shall be covered at finished grade with a Neenah R1976 frame and cover except for cleanouts located adjacent (within 5 feet) to the structure it services. The cleanout shall be constructed as shown on the Standard Plates.

Cleanouts must be located within 5 feet of all commercial buildings. At least one cleanout shall be provided for all commercial buildings. The size of the cleanout piping shall be in accordance with the South Dakota Utility Contractor Handbook.

3.16.3 COUPLINGS

Couplings, on new construction, will not be allowed unless the building sewer stubout exists before the service from the property line to the building is installed. If couplings are determined to be necessary, only one coupling for each service line will be allowed on new construction.

3.16.4 COMMON TRENCH FOR SERVICE LINES

All sewer service lines within public street right-of-way shall be installed at least 10 feet horizontally from any existing or proposed water service line. Any variation to this requirement is subject to the approval of the City Engineer. On private property, a sewer service line may be laid in the same trench with a water service line. In such a case, the elevation of the crown of the sewer service line shall be at least 12 inches below the invert of the water service line. The water service will be allowed to be benched or additional pipe bedding material may be used to create the separation between water and sanitary sewer services. The sewer service line and water service line shall not have less than 1-foot horizontal distance between the piping.

Whenever sewer service lines must cross under water service lines, the sewer service line shall be laid at such an elevation that the crown of the sewer service line is at least 12 inches below the invert of the water service line.

3.16.5 RECONNECT SEWER SERVICE *(Reconnecting sewer service lines where new main line sewer pipe is installed to replace existing main line sewer.)*

All new service lines to be connected into the new sewer main line pipe shall be made with an approved wye connection. A tap and tapping saddle will only be allowed where determined necessary by the Engineer. A coupling will be allowed for connecting the new service line to the existing service line.

3.16.6 CAPS AND PLUGS

Existing clay service lines that are to be abandoned shall be capped with nonshrink grout placed continuously for a 1-foot distance into the pipe.

New PVC service lines that are to be plugged shall be plugged at a bell end section of pipe.

3.16.7 SANITARY SEWER SERVICE PIPE LINING REPAIRS.

3.16.7.1 GENERAL

Bypass Pumping: The Contractor shall furnish, install, and operate pumps, plugs, conduits, and other equipment to divert the flow of sewage around the lined pipe line for which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during a wet weather event. If pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to City of Huron noise ordinance standards.

Cleaning: The Contractor shall thoroughly clean the sewer pipe that is to be relined prior to installation of the repair liner pipe. The cleaning shall constitute removal of all debris, solids, roots, and other deposits in the sewer line that could prevent installation of the liner pipe. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, the Contractor shall make a point repair excavation to remove the repair or obstruction.

Pre-inspection and Measuring of Service Connections, bends, etc.: The Contractor shall inspect the sewer pipe immediately before the installation of the liner to assure that the pipe is clean and existing pipe conditions are acceptable for the liner installation. The Contractor shall also create a log as well as videotape documentation with exact measurements of each service connection in the sewer pipe,

in order to reopen the service connections after the installation by means of a robotic cutter for CIPP lining or excavation and a wye connection for sliplining repair projects. The service connection log shall at a minimum state the exact distance from a designated point to the middle of each service connection and where the connection is located along the service line (i.e., 9 o'clock, etc.).

Post inspection: The Contractor shall videotape the service line repairs for CIPP projects and submit a copy to the property owner and the City of Huron Inspector for review. All measurements for the repairs shall be provided to the Inspector at the time of inspection.

3.16.7.2 SANITARY SEWER SERVICE SLIPLINING

Sliplining of sanitary sewer service lines shall be performed by pulling or pushing liner pipe into existing sewers by use of mechanical or hydraulic equipment. Once in place, the liner pipe shall be connected at one or more ends with a coupling to the existing pipe. Annular spaces between the liner pipe and existing pipe shall be sealed at the ends with a chemical seal or nonshrink grout. The liner pipe shall not obstruct the City main line sanitary sewer. Pipes protruding into the City main line sewer will be required to be cut off flush or back from the main line sewer.

3.16.7.3 CURED IN-PLACE SANITARY SEWER SERVICE PIPE LINING

The following documents (latest additions) shall be a part of this specification.

ASTM F1216. Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

ASTM F2019. Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pull-in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP).

ASTM F1743. Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pull in and inflate and Curing of a Resin-Impregnated Tube.

ASTM D638. Standard Test Method for Tensile Properties of Plastics.

ASTM D790. Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

ASTM D792. Standard Test Methods for Density and Specific Gravity of Plastics by displacement.

ASTM D5813. Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe. NASSCO. Specification Guidelines.

The installation of the CIPP shall be in accordance with the manufacturer's recommendations and ASTM F1216, ASTM F2019, or ASTM F1743. The resin shall be distributed into the tube in strict conformance with the ASTM and NASSCO standards. After installation of the liner is completed, the Contractor shall cure, cool down, and finish the liner in accordance with the ASTM standards. When required, the Contractor shall reinstate all connections to their original diameter. The CIPP shall provide a smooth bore interior throughout the length and a uniform wall thickness. The CIPP shall be wrinkle-free. The CIPP shall not obstruct the City main line sanitary sewer.

3.17 INSPECTION AND TESTING

3.17.1 GENERAL

The Engineer shall have access at all times to all parts of the job, and the Contractor must furnish such personnel, facilities, equipment, tools, and materials as are necessary to make whatever tests and inspection that are deemed necessary.

3.17.2 PIPE MATERIAL TESTING

The Engineer may require a test of specimens not to exceed 5 percent of the quantity of pipe to be furnished in order to prove the acceptability of the pipe. The manufacturer shall provide an approved testing stand near the site of the plant.

3.17.3 PIPE INSPECTION

Prior to being lowered into the trench, each pipe shall be carefully inspected by the Contractor and those not meeting the specified requirements shall be removed from the site immediately. Rejections may be made for any of the reasons as stated in the specifications for each specific type of pipe. Pipe having minor

flaws not serious enough to cause rejection shall be installed so as to bring such flaws in the top half of the sewer. Pipe shall be protected during handling against impact, shocks, and free fall.

3.17.4 TELEVISION INSPECTION

The City will perform an inspection of the completed sewer line within the two-year warranty period through the use of a television camera. The expense of the initial television inspection and one additional reinspection will be borne entirely by the City. If defective workmanship of material or construction is noted, the deficiency shall be corrected by the Contractor at no expense to the City. The City will perform additional television inspections to review if the repairs were made properly and in accordance with the specifications. The expense of any additional television inspections beyond the initial inspection and one additional reinspection will be borne entirely by the Contractor.

The Contractor shall be responsible for all related costs, including concrete or asphalt resurfacing, if the street has been surfaced. The Contractor shall be required to repair all areas of infiltration and other deficiencies.

3.17.5 CLEANING

The Contractor shall be responsible for all work necessary to make the sewer acceptable for usage including removal of all mud, silt, rocks, or blockages that might hinder the flow and make said sewer unacceptable for final acceptance and usage. Also included is all work necessary in the manholes and all cleanup work required prior to final acceptance.

The City will not be responsible for cleaning lines prior to televising the sewer. In the event that the line is not acceptable for televising, due to the Contractor's operations, the Contractor will be notified. It will be the Contractor's responsibility to make arrangements to clean the sewer and make it acceptable for the television work.

3.17.6 BACKFILL DENSITY TEST

The Contractor shall expose the compacted soil layers, as required by the Engineer, to enable the Engineer to perform density tests. The cost of exposing the soil layers for testing shall be incidental to the pipe and/or manhole installation.

3.17.7 PIPE AND MANHOLE LEAKAGE FIELD TESTING—GENERAL

All manholes and piping shall be tested and inspected for leakage by the Contractor. In addition to the testing and inspection for leakage in the manhole, the Contractor shall perform manhole vacuum tests when the ground water table elevation is lower than 2 feet above the top of the pipe. Exfiltration testing with water will only be allowed where specifically specified.

Piping shall be tested using one of two methods: infiltration test or pipe exfiltration test (low pressure air test). The pipe infiltration test shall be used when the ground water table elevation is greater than 2 feet above the top of the pipe as determined by the Engineer. The pipe exfiltration test (water test or low pressure air test) shall be used when the ground water table elevation is less than 2 feet above the top of the pipe as determined by the Engineer. Exfiltration testing of the pipe with water will only be allowed where specifically specified.

After each section of sanitary sewer between manholes has been completely installed and backfilled, the line and manholes shall be inspected by the Contractor for leakage. All visual leakage at individual joints or other parts of the sewer and/or leakage in excess of that specified shall be repaired by the Contractor at the Contractor's expense before the sewer is accepted. The repair of leaks may require the removal and replacement of manhole sections and pipe sections. The gasket shall be the sole element depended upon to make the joint leak proof. The use of grout to repair leaks will not be allowed. The actual method of correction shall be approved by the Engineer prior to performing the repair.

When existing sanitary sewers which have service connections are being reconstructed or replaced (example: street reconstruction projects), the leakage test requirements may be waived or other testing methods substituted, subject to the approval of the City Engineer.

The Contractor shall notify the Engineer 24 hours prior to performing the test to enable the Engineer to be present during the testing operations. All data will be recorded and evaluated by the Engineer. All lined manholes and pipe shall be tested prior to welding the joints.

3.17.8 INFILTRATION TEST

This test shall be performed by the Contractor using a V-notched weir in the downstream manhole of a line segment to measure the upstream sewer leakage. The test shall be maintained for not less than 24 hours before the measurement is performed. The test shall

be performed one line segment at a time (a line segment shall be defined as the line from one manhole to the next adjacent manhole). The V-notched weir shall have volumetric calibrations (gallons/24 hours) and shall be easy to read.

The Engineer may waive the use of the V-notched weir if the Engineer determines that the leakage flow is obvious or nonexistent through visual inspection. The maximum allowable infiltration or exfiltration for any new sanitary sewer section, including all manholes, shall be 50 gallons per inch of diameter per mile of pipe per day. All visible leakage at individual locations (including the amounts less than the 50 gallons per inch of diameter per mile of pipe per day) as determined by the Engineer shall still be the Contractors responsibility to repair. Payment for the infiltration test will be incidental to the pipe and manhole installation.

3.17.9 PIPE EXFILTRATION (WATER) TEST

The low pressure air test shall be used for the exfiltration test unless otherwise specified. The pipe exfiltration (water) test shall only be allowed where specified.

The pipe exfiltration (water) test shall be performed by sectionalizing the test so that interior pressure in pipe does not exceed 5 feet of water pressure. The test will be performed by the Contractor as follows:

1. Place watertight bulkhead in inlet of the upstream and downstream manholes of sewer to be tested.
2. Fill section of sewer and upstream manhole with water until the elevation of water in the upstream manhole is 2 feet higher than the top of the pipe in the line being tested or 2 feet above the existing ground water in the trench—whichever is the higher.
3. Allow the water to stabilize for one-half hour, then fill the manhole with water to the original level and begin the test.
4. The amount of water lost in the manhole during one hour will be measured and used to determine the exfiltration. The maximum allowable drop in vertical water height in the manhole shall be 1/4 inch for all diameter manholes. If the water level in the manhole drops below the allowable drop amount, the Contractor shall repair the leak and retest.

3.17.10 PIPE EXFILTRATION (LOW PRESSURE AIR) TEST

The pipe exfiltration (low pressure air) test shall be performed in accordance with ASTM F1417 standards. The following procedure is summarized from ASTM F1417 and shall be followed in conjunction with ASTM F1417 unless modified by the Engineer. Repair of leaks may require the removal and replacement of manhole sections. The use of grout to repair leaks will not be allowed.

Procedure

1. Clean the section of sewer line to be tested by flushing or other means prior to conducting the low-pressure air test. This cleaning serves to eliminate debris and produce the most consistent results.
2. Isolate the section of sewer line to be tested by inflatable stoppers or other suitable test plugs.
3. Plug or cap the ends of all branches, laterals, tees, wyes, and stubs to be included in the test to prevent air leakage. All plugs and caps shall be securely braced to prevent blow-out. One of the plugs or caps should have an inlet tap, or other provision for connecting a hose to a portable air control source.
4. Connect the air hose to the inlet tap and portable air control source. The air equipment shall consist of necessary valves and pressure gauges to control an oil-free air source and the rate at which air flows into the test section to enable monitoring of the air pressure within the test section.
5. Add air slowly to the test section until the pressure inside the pipe reaches 4.0 psig.
6. After the pressure of 4.0 psig is obtained, regulate the air supply so that the pressure is maintained between 3.5 to 4.0 psig for at least 2 minutes depending on air/ground temperature conditions. The air temperature should stabilize in equilibrium with the temperature of the pipe walls. The pressure will normally drop slightly until equilibrium is obtained; however, a minimum of 3.5 psig is required.
7. Determine the rate of air loss by the time-pressure drop method.
8. Time-Pressure Drop Method—Air is slowly introduced into the section of pipe to be tested, until the air pressure is raised to approximately 4.0 psi and the test pipe section is stabilized as in

8.1. Disconnect the air supply and decrease the pressure to 3.5 psi before starting the test. Determine the time required for the pressure to drop from 3.5 psi to 2.5 psi, and compare this interval to the required time to decide if the rate of air loss is within the allowable. Minimum holding times required by pipe diameter are shown in Table 3.17.10 and are also listed in ASTM 1417.

9. Upon completion of the test, open the bleeder valve and allow all air to escape. Plugs should not be removed until all air pressure in the test section has been reduced to atmospheric pressure.

Table No. 3.17.10 below indicates the minimum test period durations, length of test section for minimum test durations, and the formula to calculate the testing time when the test section length exceeds the length for minimum test time (in accordance with ASTM F1417). Repair of leaks may require the removal and replacement of pipe sections. The use of grout to repair leaks will not be allowed.

The Engineer may reduce the testing time to one-half the testing time if the pressure drop is less than 0.5 psi for the first one-half the test period listed in Table 3.17.10.

Table No. 3.17.10

Nominal Pipe Diameter, in.	Minimum Time, min:s	Length for Minimum Time, ft.	Time for Longer Length,
4	3:46	597	0.380 L
6	5:40	398	0.854 L
8	7:34	298	1.520 L
10	9:26	239	2.374 L
12	11:20	199	3.418 L
15	14:10	159	5.342 L
18	17:00	133	7.692 L
21	19:50	114	10.470 L
24	22:40	99	13.674 L
27	25:30	88	17.306 L
30	28:20	80	21.366 L
33	31:10	72	25.852 L
36	34:00	66	30.768 L

3.17.11 MANHOLE EXFILTRATION TEST

The manhole vacuum test shall be used for testing manholes for leakage defects. The manhole water exfiltration test shall only be allowed where specified.

To perform this test, the inlet and outlet of the manhole shall be plugged and the manhole filled with water to a depth equal to that used for the sanitary line water test, or in the case when the air test was run on the line, a minimum depth of 2 feet above the top of the sewer line or 2 feet above the existing ground water—whichever is the higher. Allow the water to stabilize for one-half hour and refill the manhole to the original elevation. Mark the initial depth of the water, and after one hour record the drop in the water level in the manhole. The maximum allowable drop in vertical water height in the manhole shall be 1/4 inch for all diameter sizes of manholes. If the water level in the manhole drops below the allowable drop amount, the Contractor shall repair the leak and retest.

3.17.12 MANHOLE VACUUM TEST

The manhole vacuum test shall be performed in accordance with ASTM C1244. The following procedure is summarized from ASTM C1244 and shall be followed in conjunction with ASTM C1244 unless modified by the Engineer. The vacuum test shall include testing the top of the manhole, excluding the adjusting rings and manhole frame and cover. Testing will be allowed after backfilling has occurred or as specified in the Special Provisions. Manhole vacuum tester assembly and vacuum pumps shall be as manufactured by Cherne Industries, Inc. or approved equal. Repair of leaks may require the removal and replacement of manhole sections. The use of grout to repair leaks will not be allowed.

Procedure

1. All lift holes shall be plugged.
2. All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.
3. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.
4. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of mercury.

5. The manhole shall pass if the time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury meets or exceeds the values indicated in Table 3.17.12.
6. If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall then be retested until a satisfactory test is obtained.

Table 3.17.12
Minimum Test Times for
Various Manhole Diameters in Seconds

Depth, (ft)	Diameter, in.		
	48	60	72
Time, in seconds			
8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

3.17.13 PIPE DEFLECTION TEST

Deflection tests shall be performed by the Contractor on all PVC sewers. Deflection tests shall be conducted after the final backfill has been in place at least 30 days. Deflection tests shall be conducted no more than 45 days after the final backfill has been in place. Deflection tests shall be made using a deflection gauge (mandrel) device or other approved method. The diameter of the deflection gauge device shall be 95 percent of the undeflected inside diameter of the flexible pipe. The Contractor shall be required to install the pipe in such a manner so that the diametric deflection of the pipe shall not exceed 5 percent. All pipes exceeding the 5 percent deflection within the two-year warranty period shall be relaid or replaced by the Contractor at no additional cost to the Owner.

4.0 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 REMOVAL OF SEWER PIPE

The removal of sewer pipe shall be measured as lineal foot of pipe removed. The removal footage shall be rounded up to the nearest 1-foot increment.

The removal of a sewer pipe shall be paid for at the contract unit price for each foot of sewer removed. Payment for removal of sewer pipe shall be full compensation for excavation, removal, and disposal of the pipe, and all appurtenances necessary for the proper removal of the pipe.

4.2 REMOVAL OF SEWER MANHOLE

The removal of sewer manhole shall be measured as a unit for each manhole removed.

The removal of a sewer manhole shall be paid for at the contract unit price for each sewer manhole removed. Payment for removal of sewer manhole shall be full compensation for removal and disposal of the manhole, frame and covers, boots, and all appurtenances necessary for the proper removal of the manhole.

4.3 ABANDONING OF SEWER PIPE

The abandoning of sewer pipe shall be measured as cubic yards of K-Crete fill in the pipe. K-Crete shall be measured to the nearest 0.1 cubic yard.

The abandoning of sewer pipe shall be paid for at the contract unit price per cubic yard for K-Crete. Payment for K-Crete shall be full compensation for abandoning the pipe, filling the pipe with K-Crete, excavation for allowing insertion holes for filling the K-Crete into the pipe, backfilling to finished grade elevation, and all appurtenances necessary for properly abandoning the sewer pipe.

4.4 ABANDONING OF MANHOLE

The abandoning of a manhole shall be measured as a unit for each manhole abandoned.

The abandoning of a manhole shall be paid for at the contract unit price for each manhole abandon. Payment for abandoning of sewer manholes shall be full compensation for abandoning the manhole, breaking the manhole down to the required height, constructing a hole in the manhole base section, filling the manhole with sand, backfilling to finished grade, and all appurtenances necessary for properly abandoning the manhole.

4.5 ROCK EXCAVATION

The removal of rock shall be measured as cubic yards of rock removed. The cubic yards removed shall be rounded to the nearest 0.1 increment. All rock excavation shall be under one classification. The classification shall include solid ledge rock in its natural location that requires systematic quarrying, drilling, and/or blasting for its removal and also boulders that exceed 1 cu yd in volume.

Pay lines for computing rock excavation shall be described as follows for trench widths:

Pipe Size	Trench Width Pay Limits
Pipe equal to or less than 24 inches in diameter	4 feet
Pipe greater than 24 inches in diameter	The outside pipe diameter plus 24 inches

Pay lines for computing depth of the rock excavation shall be described as the distance from top of rock to 12 inches below the pipe invert elevation. The top of the rock profile will be measured and determined by the Engineer and used to determine the rock quantities.

The accepted quantities of rock excavation shall be paid for at the contract unit price per cubic yard. Payment for rock excavation shall be full compensation for permits, excavation, blasting, removal, and proper disposal of the rock offsite, and all appurtenances necessary for the proper removal of the rock. Furnishing and installing suitable fill material to replace the rock removed (except in locations where bedding material is required) will be paid for with the Granular Material bid item.

4.6 GRANULAR MATERIAL

The furnishing and installing of granular material shall be measured as tons of granular material to the nearest 0.1 ton.

The accepted quantities of furnished and installed granular material will be paid for at the contract unit price per ton. Payment for granular material will be full compensation for furnishing and installing of granular material and all appurtenances necessary for the proper installation of it.

4.7 TRENCH STABILIZATION MATERIAL

The furnishing and installing of trench stabilization material shall be measured as cubic yards of trench stabilization material to the nearest 0.1 ton.

The accepted quantities of furnished and installed trench stabilization material will be paid for at the contract unit price per ton. Payment for trench stabilization material will be full compensation for furnishing and installing of trench stabilization material, excavation, removal, and disposal of unstable soils, and all appurtenances necessary for the proper installation of it.

4.8 GEOTEXTILE FABRIC

The furnishing and installing of geotextile fabric material shall be measured as square yards of geotextile fabric material to the nearest 1 sq yd.

The accepted quantities of furnished and installed geotextile fabric will be paid for at the contract unit price per square yard. Payment for geotextile fabric will be full compensation for furnishing and installing of geotextile fabric and all appurtenances necessary for the proper installation of it.

4.9 K-CRETE

The furnishing and installing of K-Crete shall be measured as cubic yards of K-Crete to the nearest 0.1 cu yd.

The furnishing and installing of K-Crete will be paid for at the contract unit price for K-Crete. Payment for K-Crete will be full compensation for furnishing and installing of K-Crete and all appurtenances necessary for the proper installation of it.

4.10 ADJUST MANHOLE

The furnishing and installing of manhole adjustments shall be measured as a unit for the manhole adjustment at each manhole.

The furnishing and installing of adjusting rings shall be paid for at the contract unit price for each manhole adjustment. Payment for adjust manhole will be full compensation for furnishing and installing of the manhole adjusting rings, sealant, mortar, and all appurtenances necessary for the proper installation of the manhole adjusting rings. Payment for adjust manhole will also be full compensation for replacement of all or a portion of the existing adjusting rings if necessary or required. Manhole adjustments will be paid for at new and existing manholes where necessary.

4.11 MANHOLE RECONSTRUCTION

The work of reconstructing manholes shall be measured by each respective manhole reconstruction unless otherwise indicated.

The work of reconstructing manholes shall be paid for at the contract unit price for each manhole reconstruction unless otherwise noted. Payment for reconstructing manholes will be full compensation for furnishing and installing of the manhole sections, gaskets, manhole sealant, and all

appurtenances necessary for the proper installation of the manhole reconstruction.

4.12 MANHOLE FRAME AND COVER

The furnishing and installing of manhole frame and covers shall be measured as a unit for each type of manhole frame and cover installation.

The furnishing and installing of frame and covers shall be paid for at the contract unit price for each type of manhole frame and cover. Payment for manhole frame and covers will be full compensation for furnishing and installing of the manhole frame and covers, sealant, mortar, and all appurtenances necessary for the proper installation of the manhole frame and cover.

4.13 MANHOLE EXTERNAL FRAME SEAL

The furnishing and installing of manhole frame seal shall be measured as a unit for each manhole frame seal installation at a manhole.

The furnishing and installing of the manhole frame seal shall be paid for at the contract unit price for each manhole frame seal. Payment for manhole frame seal will be full compensation for furnishing and installing of the complete manhole frame seal and all appurtenances necessary for the proper installation of the manhole frame seal for the manhole. Payment will be made for a complete frame seal system and not be made for individual extensions unless otherwise specified.

4.14 MANHOLE RESTORATION

The work of manhole restoration shall be measured by each respective manhole restoration unless otherwise indicated.

The work of manhole restoration shall be paid for at the contract unit price for each manhole restoration unless otherwise noted. Payment for manhole restoration shall be full compensation for restoring the manhole with the specified methods and materials and all appurtenances necessary for the proper restoration of the manhole.

4.15 STYROFOAM INSULATION

Styrofoam insulation shall be measured by the lineal foot of the pipe length that is insulated and for different sizes of insulation. The measured length shall be rounded up to the nearest 1-foot increment.

The furnishing and installing of Styrofoam insulation shall be paid for at the contract unit price per lineal foot for the sizes furnished and accepted of Styrofoam insulation. Payment for Styrofoam insulation will be full compensation for furnishing and installing of the Styrofoam insulation and all appurtenances necessary for the proper installation of it.

4.16 SANITARY SEWER PIPE

Sanitary sewer pipe shall be measured by the lineal foot of the respective type, classes, and sizes of pipe at 2-foot depth increments. Sanitary sewer pipe depths will be measured from the plan finished grade elevation to the pipe invert unless the constructed grade elevation differs. Piping shall be measured from end to end with no deduction for length through manholes. Where two or more pipes of different size enter a manhole, each pipe will be measured to the center of the manhole. The measured length shall be rounded up to the nearest 1-foot increment.

The furnishing and installing of sanitary sewer pipe shall be paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and accepted. Payment for sanitary sewer pipe will be full compensation for furnishing and installing of the sanitary sewer pipe, gaskets, trench dewatering (unless otherwise specified), excavation, backfilling, and all appurtenances necessary for the proper installation of the sanitary sewer pipe.

4.17 BEDDING MATERIAL

Pipe bedding material shall be measured by the lineal foot of the respective type and sizes of pipe. Bedding material shall be measured from pipe end to end with no deduction for length through manholes. Where two or more pipes of different size enter a manhole, bedding material for each pipe will be measured to the center of the manhole. The measured length shall be rounded up to the nearest 1-foot increment.

The furnishing and installing of pipe bedding material shall be paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and accepted. Payment for pipe bedding material will be full compensation for furnishing and installing of the pipe bedding material and all appurtenances necessary for the proper installation of it.

4.18 SANITARY SEWER SERVICE PIPE

Sanitary sewer service pipe shall be measured by the lineal foot of the respective type, classes, and sizes of pipe. The measured length shall be rounded up to the nearest 1-foot increment. Unless otherwise shown on the plans, couplings, bends, or other fittings will be included in the length of measurement.

The furnishing and installing of sanitary sewer service pipe shall be paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and accepted. Payment for sanitary sewer service pipe will be full compensation for furnishing and installing of the sanitary sewer service pipe, gaskets, bedding material, trench dewatering (unless otherwise specified), and all appurtenances necessary for the proper installation of the sanitary sewer service pipe.

4.19 SEWER WYE/TAP

Sanitary sewer wyes and taps shall be measured by each unit of the respective type and size of pipe.

The furnishing and installing of sanitary sewer wyes and taps shall be paid for at the contract unit price per each for the types and sizes furnished and accepted. Payment for sanitary sewer wyes and taps will be full compensation for furnishing and installing of the sanitary sewer wyes and taps, gaskets, bands, cutting of pipe openings, and all appurtenances necessary for the proper installation of the sanitary sewer wyes and taps.

4.20 SEWER COUPLINGS

Sanitary sewer couplings shall be measured by each unit of the respective type and size of pipe.

The furnishing and installing of sanitary sewer couplings shall be paid for at the contract unit price per each for the types and sizes furnished and accepted. Payment for sanitary sewer couplings will be full compensation for furnishing and installing of the sanitary sewer couplings, bands, pipe, and all appurtenances necessary for the proper installation of the sanitary sewer couplings.

4.21 SEWER CAPS/PLUGS

Sanitary sewer caps/plugs shall be measured by each unit of the respective type and size of pipe.

The furnishing and installing of sanitary sewer caps/plugs shall be paid for at the contract unit price per each for the types and sizes furnished and accepted. Payment for sanitary sewer caps/plugs will be full compensation for furnishing and installing of the sanitary sewer caps/plugs and all appurtenances necessary for the proper installation of the sanitary sewer caps/plugs.

4.22 SEWER SERVICE CLEANOUT ASSEMBLY

The furnishing and installing of clean-outs shall be measured as a unit for each clean-out assembly for the designated pipe size.

The furnishing and installing of clean-outs shall be paid for at the contract unit price for each sewer clean-out assembly unless otherwise noted. Payment for the sewer clean-out assembly will be full compensation for furnishing and installing of the piping, fittings, protective covers, manhole covers, and all appurtenances necessary for the proper installation of the cleanout.

4.23 MANHOLE

Manholes shall be measured as each unit, by inside nominal diameter, and at 2-foot depth increments. Manhole depths will be measured from the top of the rim to the lowest pipe invert.

The furnishing and installing of manholes shall be paid for at the contract unit price per each for the types and sizes furnished and accepted. Payment for manholes will be full compensation for furnishing and installing of the manhole sections, gaskets or butyl rubber rope sealant, futures (pipe, plugs and/or caps), and all appurtenances necessary for the proper installation of the manhole.

4.24 LINED MANHOLE

Lined manholes shall be measured as each unit, by inside nominal diameter, and at 2-foot depth increments. Lined manhole depths will be measured from the rim to the lowest pipe invert.

The furnishing and installing of lined manholes shall be paid for at the contract unit price per each for the types and sizes furnished and accepted. Payment for lined manholes will be full compensation for furnishing and installing of the lined manhole sections, gaskets or butyl rubber rope sealant, lining, welding lining, testing lining, and all appurtenances necessary for the proper installation of the lined manhole.

4.25 DROP MANHOLE

The furnishing and installing of drop manhole sections shall be measured as a unit for each separate drop manhole installation. Each manhole drop section will be described in the bid item description by the location and by the footage difference between the vertical drop length as measured from the incoming pipe invert to the lowest outgoing pipe invert elevation in the manhole.

The furnishing and installing of each manhole drop section shall be paid for at the contract unit price for each drop section. Payment will be full compensation for furnishing of the pipe and fittings, drop manhole assembly, clamping brackets, stainless steel, setting of the drop section in concrete in the bottom of the manhole, and all appurtenances necessary for the proper installation of the drop manhole section.

4.26 MANHOLE BOOTS

Manhole boots shall be measured by each unit of the respective size of pipe. The furnishing and installing of manhole boots shall be paid for at the contract unit price per each for the sizes furnished and accepted. Payment for manhole boots will be full compensation for furnishing and installing of

the manhole boots onto the manhole and pipe, bands, and all appurtenances necessary for the proper installation of the sanitary sewer couplings.

4.27 SEWER SERVICE RISER PIPE

Sewer service riser pipe shall be measured by the lineal foot of the respective type, classes, and sizes of pipe. The measured length shall be rounded up to the nearest 1-foot increment.

The furnishing and installing of sewer service riser pipe shall be paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and accepted. Payment for sewer service riser pipe will be full compensation for furnishing and installing of the sanitary sewer service pipe, gaskets, bedding material, bends, caps/plugs, trench dewatering (unless otherwise specified), and all appurtenances necessary for the proper installation of the sewer service riser pipe.

4.28 RECONNECT SEWER SERVICE

(Reconnecting Sewer Service lines where new main line sewer pipe is installed to replace existing main line sewer.)

Bid item, "Sewer Wye/Tap" (for each specified size), shall be used for payment for the furnishing and installing of the wye or tap and tapping saddle. The wye or tap and tapping saddle size shall be indicated on the drawings and in the bid form. Bid item, "Reconnect Sewer Service," shall be used for payment for furnishing and installing pipe, fittings, couplings necessary for performing the service reconnection. All services shall be installed to the curb line along the street and connected to the existing service line unless otherwise noted. The pipe for extending services from the main line sewer to the curb line shall be furnished and installed and paid for under bid item "4-inch Sanitary Sewer Service," bid item "6-inch Sanitary Sewer Service," or as specified.

4.29 CONNECTION INTO EXISTING MANHOLE

Connections into existing manholes shall be measured by each unit connection.

The furnishing and installing of connections into existing manholes shall be paid for at the contract unit price per each furnished and accepted. Payment for connections into existing manholes will be full compensation for furnishing and installing of the pipe into the manhole, core drilling of the manhole, manhole boot(s), grout, water seal, and all appurtenances necessary for the proper installation of the connection into existing manhole.

4.30 MANHOLE EXFILTRATION/VACUUM TEST

Manhole exfiltration/vacuum test shall be measured by each acceptable unit test.

The manhole exfiltration/vacuum test shall be paid for at the contract unit price per each furnished and accepted. Payment for manhole exfiltration/vacuum test will be full compensation for testing of the manhole and all appurtenances necessary for the proper manhole exfiltration/vacuum testing.

4.31 SANITARY SEWER EXFILTRATION TEST

Sanitary sewer exfiltration test shall be measured by lineal foot of pipe tested that is acceptable and shall be measured from end to end with no deduction for length through manholes. Service line testing shall be measured as incidental to the main line testing. The lineal footage shall not include the length of connected sanitary sewer service pipes. The measured length shall be rounded up to the nearest 1-foot increment.

The sanitary sewer exfiltration test shall be paid for at the contract unit price per lineal foot furnished and accepted. Payment for sanitary sewer exfiltration test will be full compensation for testing of the pipe and all appurtenances necessary for the proper sanitary sewer exfiltration testing.

4.32 PVC SEWER PIPE DEFLECTION TEST

PVC sewer pipe deflection test shall be measured by lineal foot of pipe tested that is acceptable. The lineal footage shall not include the length of connected sanitary sewer service pipes. The measured length shall be rounded up to the nearest 1-foot increment.

The PVC sewer deflection test shall be paid for at the contract unit price per lineal foot furnished and accepted. Payment for PVC sewer deflection test will be full compensation for testing of the pipe and all appurtenances necessary for the proper PVC sewer deflection test.

4.33 TRENCH DEWATERING

Trench dewatering shall be measured lump sum where trench dewatering is necessary and as indicated on the Bid Proposal. If trench dewatering is not indicated on the bid form and is necessary, measurement shall be incidental to the pipe and manhole installation. Service line dewatering shall be measured as incidental to the main line dewatering where main line sewer is installed in conjunction with service lines.

Payment for trench dewatering will be for lump sum price unless otherwise noted on the drawings or Special Provisions and/or Bid Proposal. If trench dewatering is not indicated on the bid form and is necessary, payment for trench dewatering shall be incidental to the pipe and manhole installation

unless otherwise noted. Payment for trench dewatering will be full compensation for furnishing, installing, maintaining of the trench dewatering, and all appurtenances necessary for the proper operation of trench dewatering.

4.34 SANITARY SEWER TEMPORARY BYPASS

Sanitary sewer temporary bypass shall be measured by lump sum for the work.

The furnishing, installing, operating, and maintaining of sanitary sewer temporary bypass shall be paid for at the contract lump sum price for the sanitary sewer temporary bypass furnished and accepted. Payment for sanitary sewer temporary bypass will be full compensation for furnishing, installing, operating, and maintaining of the sanitary sewer temporary bypass system and all appurtenances necessary for the proper operation of sanitary sewer temporary bypass. Payment for sanitary sewer temporary bypass will be included with the payment for the price per lineal foot of pipe or manholes unless otherwise noted on the drawings or Special Provisions.

4.35 MANHOLE MARKERS

Manhole markers shall be measured by each unit furnished and installed. The furnishing and installing of manhole markers shall be paid for at the contract unit price per each furnished and accepted. Payment for manhole markers will be full compensation for furnishing and installing of the manhole markers, concrete, and all appurtenances necessary for the proper installation of the manhole markers.

4.36 JACKING, BORING, AND TUNNELING

The basis of measurement shall be by the lineal foot for casing pipe, linear foot for carrier pipe, each for end seals, each for casing spacers, and each for boring obstructions. The measured length of carrier and casing pipe shall be rounded up to the nearest 1-foot increment.

The furnishing and installing of casing pipe and carrier pipe shall be paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and accepted. The furnishing and installing of end seals and casing spacers shall be paid for at the contract unit price per each for the types and sizes furnished and accepted.

Payment for casing pipe will be full compensation for furnishing and installing of the casing pipe by boring, jacking or tunneling, excavation and backfilling of bore pits, welding, trench dewatering (unless otherwise specified), and all appurtenances necessary for the proper installation of the casing pipe.

Payment for carrier pipe will be full compensation for furnishing and installing of the carrier pipe, gaskets, grouting of the annular pipe space (unless otherwise specified), and all appurtenances necessary for the proper installation of the carrier pipe.

Payment for the end seals and casing spacers will be full compensation for furnishing and installing of the end seals and all appurtenances necessary for the proper installation of the end seals and casing spacers.

Payment for boring obstruction will be full compensation for the labor, equipment, and materials needed for removal of the obstruction. Payment for boring obstructions will be paid only for boring operations with mechanical equipment. If the project work is performed by a hand-mining operation, all such obstructions will be considered part of the normal operation and will not be paid for as a boring obstruction.

A boring obstruction shall be defined as any rock, boulder, etc., or similar material, which is encountered during the excavation that cannot be removed by the boring machine and requires shutdown of the equipment for removal. The Contractor shall be aware that all quantities are estimates and that there may be no obstructions or could be a large number of obstructions on the project. The Contractor will only be paid for obstructions encountered and reported to and verified by the Engineer. The bid item quantities are not guaranteed items.

4.37 MANHOLE CONSTRUCTION PLATE MARKER

Manhole construction plate markers shall be measured by each unit furnished and installed. The project quantity for manhole construction plate markers shall be measured for each location the manhole construction plate markers are used. Measurement will be made twice at locations where new manholes are installed at existing manhole locations. Only one measurement will be made at existing manhole reconstruction locations.

The furnishing and installing of manhole construction plate markers shall be paid for at the contract unit price per each furnished and accepted. Payment for manhole construction plate markers will be full compensation for furnishing, installing, and removal of the manhole construction plate marker and all appurtenances necessary for the proper installation of the manhole construction plate marker.

4.38 MANHOLE BENCH AND INVERT RECONSTRUCT

Manhole bench and invert reconstruct shall be measured by each unit furnished and installed.

The furnishing and installing of manhole bench and invert reconstruct shall be paid for at the contract unit price per each furnished and accepted. Payment for manhole bench and invert reconstruct will be full compensation

for furnishing, installing, and removal of the manhole bench and invert, and all appurtenances necessary for the proper installation of the manhole bench and invert.

4.39 SANITARY SEWER SPOT REPAIR

Sanitary sewer spot repair shall be measured by each unit furnished and installed.

The furnishing and installing of the sanitary sewer spot repair shall be paid for at the contract unit price per each furnished and accepted. Payment for sanitary sewer spot repair will be full compensation for furnishing, installing, and removal of the defective pipe section, and all appurtenances necessary for the proper installation of the sanitary sewer spot repair.

4.40 SANITARY SEWER PIPE LINING REPAIRS

Sanitary sewer pipe lining repairs shall be measured by each unit furnished and installed.

The furnishing and installing of the sanitary sewer pipe lining repairs shall be paid for at the contract unit price per each furnished and accepted. Payment for sanitary sewer pipe lining repairs will be full compensation for furnishing and installing the liner pipe, pipe cleaning, pre- and post-inspections, and all appurtenances necessary for the proper installation of the sanitary sewer pipe lining repair.

4.41 SANITARY SEWER FORCE MAIN TRACER WIRE

Sanitary sewer force main tracer wire shall be measured by lineal foot of wire furnished and installed. The measured length shall be rounded up to the nearest 1-foot increment.

The sanitary sewer force main tracer wire shall be paid for at the contract unit price per lineal foot furnished and installed. Payment for sanitary sewer force main tracer wire will be full compensation for furnishing, installing, and all appurtenances necessary for the proper installation of the sanitary sewer force main tracer wire.

4.42 SANITARY SEWER FORCE MAIN TRACER WIRE TERMINAL BOX

Sanitary sewer force main tracer wire terminal boxes shall be measured by each unit furnished and installed.

The furnishing and installing of the sanitary sewer force main tracer wire terminal box shall be paid for at the contract unit price per each furnished and accepted. Payment for sanitary sewer force main tracer wire terminal box will be full compensation for furnishing, installing, and all appurtenances necessary for the proper installation of the sanitary sewer force main tracer wire terminal box.

City of Huron

Supplemental Standard Specifications

for

Storm Sewer Construction

Section 200

Adopted: January 1, 2015

City of Huron
Public Works/Engineering
239 Wisconsin Ave SW
P.O. Box 1369
Huron, SD 57350-1369

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SECTION 200
CITY OF HURON
SUPPLEMENTAL STANDARD SPECIFICATIONS
FOR STORM SEWER CONSTRUCTION

1.0 GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all the necessary labor, materials, equipment, tools and supplies that are necessary to install a complete storm sewer system, as shown on the plans and/or called for in these specifications or its addenda. It is the intent of these specifications to install a complete system or job.

1.2 TERM OF WARRANTY

See Section 500 for warranty construction activity.

1.3 PAYMENT

Payment to the Contractor shall be made in accordance with the General Conditions.

1.4 FINAL ACCEPTANCE

Acceptance of the work shall be in accordance with the General Conditions.

1.5 REFERENCES

- A. Standard Specifications for Road and Bridges produced by SDDOT.
- B. American Society of Testing Materials.
- C. Polyvinyl Chloride (PVC) Pipe.

All pipe for storm sewer piping shall conform insofar as appropriate, to the City of Huron Supplemental Standard Specifications for Sanitary Sewer, Section 100

2.0 MATERIALS

2.1 STORM SEWER PIPE

- 2.1.1 Reinforced Concrete Pipe: Reinforced concrete storm sewer pipe shall conform to the Standard Specifications for Road and Bridges produced by SDDOT and ASTM C-76.
- 2.1.2 Corrugated Metal Pipe: Corrugated metal pipe shall conform to the Standard Specifications for Road and Bridges produced by SDDOT and AASHTO M36 or M196. Corrugated metal pipe is only allowed in specified locations or rural roadway sections.
- 2.1.3 Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: PVC pipe 15 inches in diameter or smaller shall meet the requirements of ASTM D-3034, Type PSM, SDR 35 minimum; PVC pipe 18 inches through 30 inches in diameter shall meet the requirements of ASTM F 679, minimum wall thickness T-1. The pipe shall be made of PVC plastic having a cell classification of 12454 B or 12454 C or 12364 C or 13364 B.

Storm sewer pipes and bends installed at a depth of greater than 14 feet shall be SDR 26. All other bends shall be SDR 35 minimum.

Polyvinyl chloride (PVC) is allowed only in specified locations.

- 2.1.4 Corrugated Polyethylene Pipe, Smooth Wall (Corrugated Polyethylene Pipe, Type S): Polyethylene pipe shall conform to requirements of the Standard Specifications for Road and Bridges produced by SDDOT, 12 inches to 30 inches diameter, and AASHTO M294.

2.2 PIPE JOINT MATERIALS

- 2.2.1 Reinforced Concrete Pipe: If concrete pipe tongue and groove joints are tight and true, as determined by the Engineer, they need not be grouted; but when such joints are open and/or skewed, they shall be mortared both inside and outside. The specified joints shall be jointed with cement mortar composed of one (1) part Portland cement and two (2) parts of sand and enough water to make a workable mixture, unless otherwise stipulated on the plans or by the Special Information. All lift holes in RCP Storm Sewer shall be plugged with a concrete mortar plug and sealant or with a flexible butyl lift hole patch. All RCP storm sewer pipe joints shall be sealed with mastic material or butyl rope.
- 2.2.2 Corrugated Metal Pipe: Corrugated metal pipe shall be jointed using either one or two-piece corrugated coupling bands of same diameter

and gauge as the pipe unless otherwise shown on the plans or specified.

2.2.3 Polyethylene Pipe, Type S: Polyethylene Pipe, Type S, shall have separate manufacturer coupling bands or the pipe will be manufactured with a bell and spigot joint system.

2.2.4 Polyvinyl Chloride Sewer Pipe: PVC Sewer Pipe shall have a flexible elastomeric seal (O ring or rubber sealing joint), and conform to the latest revisions of ASTM D3212. Solvent cement joints shall not be allowed for pipe and fittings.

Polyvinyl Chloride (PVC) Pipe, AWWA C905. PVC AWWA C905 Pipe joints shall conform to the same standards as PVC Sewer Pipe.

2.3 STRUCTURES

Curb-type drop inlets and junction boxes shall be constructed in accordance with the standard Huronplates or as detailed on the construction drawings.

2.3.1 Structure Adjusting Rings.

2.3.1.1 Bricks and Blocks: Bricks, blocks, or shimming devices will not be allowed for use in adjusting manholes.

2.3.1.2 Concrete adjusting rings: Concrete adjusting rings shall be in accordance with ASTM C478. The inside diameter of the ring shall be 24 inches.

2.3.1.3 Sealant: Butyl Rubber Sealant in trowelable form shall be used. EZ-STIK #3 as manufactured by Pre-seal Gasket Corporation or approved equal. The material must meet or exceed the requirements of Federal Specification TT-S-001657, ASTM C-990 and AASHTO M-198.

2.3.1.4 Plastic Adjusting rings: The adjusting rings shall be injection molded HDPE as manufactured by Ladtech, Inc. or approved equal. The adjusting rings shall be manufactured from polyethylene plastic as identified in ASTM D-1248 (Standard Specification for Polyethylene Plastic Molding and Extrusion Materials). Material properties shall be tested and qualified for usage in accordance with the ASTM Test Methods referenced in ASTM D-1248. The plastic adjusting rings shall be manufactured utilizing the injection molding process as defined by SPE (Society of Plastic Engineers). The adjusting rings shall be tested to assure compliance with

impact and loading requirements in accordance with the AASHTO Standard Specification for Highway Bridges. The adjusting rings shall meet and exceed the static load requirements of AASHTO highway Bridge Specification HS-25 (21,280 lbs). The rings must withstand 1,000,000 plus full load cycles of 10 seconds or less duration. The rings must perform without failure to a minimum of 150 percent of these load values. The adjusting rings shall be sized to conform to the standard 24-inch manhole opening.

- 2.3.1.5 Mortar: Mortar shall be Standard Portland Cement Type I, hydrated lime, and clean, sharp, well-graded sand, free from foreign materials. The minimum design compressive strength shall be no less than 4000 psi.

2.3.2 Bedding Material

Bedding material shall meet the requirements as stated on the City of Huron Standard Plates.

On-site material may be used if approved by the Engineer.

2.3.3 Select Backfill Material

Select backfill material shall meet the requirements stated on the City of Huron Standard Plates.

On-site material may be used if approved by the Engineer.

3.0 CONSTRUCTION REQUIREMENTS

3.1 ALIGNMENT AND GRADE

The Engineer will furnish all the necessary line and grade stakes, benchmarks, or other necessary control. It is the responsibility of the Contractor to return all grade sheets prior to completion, final acceptance, and payment for the project. It is the responsibility of the Contractor to protect these stakes, and any replacement of stakes shall be at the expense of the Contractor. The Contractor shall carry line and grade into the trench by means of an approved laser beam system. At no time shall the Contractor or his employees change the grade without approval of the Engineer. If underground interference is encountered at the assigned grade, the Contractor shall notify the Engineer and wait until he has determined the revised grade for the sewer. The Contractor shall periodically check the grade from the grade stake to pipe invert.

3.2 UNDERGROUND INTERFERENCE

The location of underground public or private utilities may be shown on the plans, as reported by the various utility companies and the City, but this does not relieve the Contractor of the responsibility of determining the accuracy or completeness of said locations. The Contractor shall determine the location of all underground ducts, conduits, pipes, cables, or structures which will be affected by the work, and shall take steps necessary to support and protect said structures by any means suitable to the owners of the structure involved and the Engineer. When necessary, the Contractor shall conduct operations as to permit access to the work site and provide time for utility work to be accomplished during the progress of the work.

Portions of utilities, which are found to interfere with the line and grade of the sewer, will be relocated, altered, or reconstructed by the owners, or the Engineer may order changes in the work to avoid interference. Such changes will be considered to be extra work and will be paid for through a change order. When the plans or specifications provide for the Contractor to alter, relocate, or reconstruct a utility, all costs for such work shall be included in the bid for the items of work necessitating such work unless a separate bid item is provided. Temporary or permanent relocation or alteration of utilities requested by the Contractor for the Contractor's convenience shall be the Contractor's responsibility, and the Contractor shall make all arrangements and bear all costs. In those instances where utility relocation or reconstruction is impractical, the Engineer may order a deviation from line and grade.

The Contractor shall be responsible for notifying the various utility companies if the Contractor's work will expose, affect, or endanger any existing utility. All cost of investigation and any necessary protection, support, removal, or relocation of said structures shall be included in the contract bid price for installing pipe or structures. The Contractor shall not begin construction until all utility companies have been contacted and their respective underground utilities have been located and marked.

The bid item "locating utilities" will be used to locate storm sewer connection services only if the service location marked exceeds the actual service location by 4 feet in either direction and additional excavation is required. The bid item "verify utilities" will be used only when it is necessary to excavate down to the utility to determine if any vertical and/or horizontal conflicts exist between existing utilities and the proposed new sewer to be installed as shown on the plans. All costs of other exploratory investigation/excavation necessary for determining the location and depth of utilities shall be included in the contract bid price for installing pipe.

3.3 EXCAVATION

Excavation shall be classed as either earth or rock excavation. Rock excavation shall consist of solid rock lying in its natural bed, which requires fracturing for its removal, and boulders of one yard or more in volume. All other material shall be classed as earth excavation.

3.4 EARTH EXCAVATION

All sewers shall be built in open cut, except that where conditions warrant, the Engineer may permit the use of short tunnels.

Unless specified in the Special Provisions, earth excavation costs are included in the cost of placing the pipe.

The width of the trench shall comply with City of Huron Standard Plates.

3.5 SHEETING AND BRACING

If City, State, or Federal regulations dictate the necessity of sheeting, bracing, or pulling a trench box or shield, the cost of such sheeting, unless a special price is called for in the contract form, shall be included in the contract bid price for installing pipe.

3.6 EXCAVATION BELOW PIPE GRADE

If required, trench excavation below pipe grade shall be backfilled with bedding material approved by the Engineer and thoroughly tamped to provide a uniform and continuous bearing and support for the pipe.

3.7 EXCAVATION IN UNSTABLE OR UNSUITABLE SOIL

The Contractor shall notify the Engineer when material considered unstable for the pipe foundation is encountered and where additional support, stabilization and undercutting of the pipe trench are necessary. If the Contractor can not assure a product in accordance with the specifications, the Contractor may request the use of trench stabilization material and/or geotextile fabric where the trench base is not structurally adequate or otherwise unstable to provide a uniform stable pipe foundation and requires additional undercutting for placement of trench stabilization material and/or geotextile fabric.

The undercutting and use of trench stabilization material and/or geotextile fabric shall only be approved for use in extreme conditions where it is obviously necessary. Approval for the limits of the payment lines for use of trench stabilization material and geotextile fabric must be obtained from the Engineer, prior to installation. If trench stabilization material and/or geotextile fabric is necessary to stabilize the trench foundation, they shall be installed

by the Contractor at the unit bid prices for those respective items.

If geotextile fabric is used, it should be placed on the neutral soils and extended up the trench sidewalls to a level of at least the mid-point of the pipe. Placement of the fabric should then be followed by placement of the stabilization material.

The Contractor will be fully responsible for constructing the storm sewer on a stable base and any defects resulting from improperly preparing the pipe foundation shall be the Contractor's responsibility.

The Contractor will be required to furnish weigh tickets for trench stabilization material on a daily basis.

Pipe bedding material will always be required in addition to trench stabilization material where trench stabilization material is used.

3.8 ROCK EXCAVATION

All rock excavation shall be under one classification. It shall include solid ledge rock in its natural location that requires systematic quarrying, drilling, and/or blasting for its removal and also boulders that exceed one-cubic yard in volume.

When rock is encountered in the trench, it shall be stripped of earth and the Engineer shall be notified by the Contractor and given ample time to make a profile before removal operation begins.

Rock excavation will be to the trench limits of these Supplemental Standard Specifications, Section 4.3, for the specified pipe.

Procedures for rock removal operations shall be subject to the approval of the Engineer. The use of explosives shall be limited to the magnitude of the charge that will not cause damage to the adjoining property through shock vibrations or other stress loadings. Also, the Contractor shall provide adequate blanket protection to assure that there will not be fragments of rock or other debris flying through the air when discharging explosives. The Contractor shall employ personnel certified Huron to execute blasting operations.

The entire rock removal operations shall be the responsibility of the Contractor, including payment, for any damages caused by his operations. Adequate insurance protection, in addition to the standard liability insurance required, shall be purchased by the Contractor for payment of any damages that may be caused by the use of explosives.

Explosive permits must be obtained from the City of Huron Fire Department as per City Ordinance.

3.9 DEWATERING

Pipe jointing shall be accomplished in a relatively dry trench condition. No joints may be connected under water. If ground water is encountered, the Contractor shall dewater the trench with suitable pumps and equipment. The cost of dewatering, unless a bid item is called for on the proposal, shall be absorbed in the contract bid price for installing pipe.

Water resulting from dewatering operation shall be disposed in a manner approved by the Engineer and South Dakota Department of Environmental and Natural Resources. It shall not be pumped onto private property without the property owner's approval. Any damage to property, either public or private, shall be rectified to the satisfaction of the owner and the City. All applicable permits must be obtained by the Contractor before the dewatering operation begins.

3.10 INSTALLATION OF PIPE

Sewer pipe shall not be installed in frozen ground or in water, and no water will be allowed to run into or through the pipe until the joints have been sealed and structure bases are adequately hardened.

Pipe shall be carefully installed to line and grade in accordance with line and grade stakes set by the Engineer so that the finished sewer will present a uniform bore. Any noticeable variations from true alignment or grade will be cause for rejection of the work.

All pipe shall be installed upgrade with spigot ends pointing in the direction of flow. The bottom of the trench shall be freed of all rocks and stones and shall be hand shaped and bedded with bedding material as specified and the pipe shall be in firm contact with the bedding material or earthen surface for its entire length. At each joint of bell and spigot pipe, a hole shall be dug of sufficient size so that the weight of the pipe will rest on the barrel of the pipe and not on the bells, and the bell hole shall not be compacted. All pipe must be properly fitted together as no chipping of bell or spigot will be allowed. A suitable stopper shall be kept in the end of the pipe so as to prevent any dirt or water from entering during the progress of the work at all times. Any dirt, loose material, or cement mortar which may accumulate in the pipe shall be removed as the work progresses by means of a swab. The backfilling around the pipe shall be completed as per City of Huron Standard Plates. Whenever pipe is installed in rock trenches, it shall be bedded in select material of at least 12-inch depth.

3.11 PIPE JOINTS

Sewer pipe installed on a curve shall adhere to the manufacturer's

recommendations depending upon the curve radius.

3.11.1 RCP Storm Sewer Pipe. All RCP storm sewer pipe shall be sealed with mastic material or butyl rope. Seating of pipe shall conform to manufacturer's recommendations.

3.11.2 Corrugated Metal Storm Sewer Pipe. All bands attaching corrugated metal pipes shall be drawn firmly together with bolts and shall firmly clamp each pipe to prevent separation of the pipe, as per manufacturer's recommendations.

3.11.3 PVC Storm Sewer Pipe. All PVC Sewer Pipe shall be jointed utilizing elastomeric gaskets as referenced in ASTM D3034 and ASTM F679 and meeting the requirements of ASTM D3212. All pipe, fittings, and joints shall be installed in full compliance with the recommended practices of the pipe manufacturer and as specified in the latest revision of ASTM D2321. The joint surfaces (external and internal) shall be wiped free of all foreign materials, and the spigot end shall be centered on grade into the bell end and the joint shall be properly seated in accordance with the manufacturer's recommendations. Any pipe that is field cut shall have a square end with beveled edge equal to a factory cut and all field repairs shall be performed per manufacturer's recommendations.

3.11.4 Corrugated Polyethylene Pipe, Type S.

All bands attaching polyethylene pipes shall be drawn firmly together and clamped per manufacturer's specifications to prevent separation of the pipe. If a bell and spigot pipe is used, the pipe shall be drawn together and seated per manufacturer's specifications.

3.12 ADJUST STRUCTURE

There shall be at least one two-inch adjusting ring, and a maximum of 14 inches of adjusting rings used on each junction box. Unless otherwise specified, the structure cover shall be set approximately 6 inches below the finished street elevation by the contractor, to be raised to finished grade elevation by the contractor prior to paving.

The installation for concrete adjusting rings shall be in accordance with the Standard Specifications for Roads and Bridges produced by the SDDOT unless otherwise specified. The structure frame and adjusting rings where concrete adjusting rings are used shall be set in a full bed of mortar to the elevation set by the Engineer as shown on the grade sheet. The mortar shall be tuck pointed between rings and shall not be applied to the inside diameter surface of the adjusting rings. Smearing of mortar on the inside of the adjusting rings will be cause for rejection of the work.

Plastic adjusting rings may be used in lieu of concrete adjusting rings. The plastic adjusting rings shall be installed as recommended by the manufacturer. No shims or other leveling devices, other than leveling rings provided by the manufacturer, will be permitted with use of the plastic adjusting rings. The annular space between the adjusting rings shall be sealed using an approved butyl rubber sealant. The first plastic adjusting ring on existing manholes may require leveling with concrete mortar and therefore the first plastic ring may be set in mortar.

3.13 FRAME AND COVER

Structure frame and covers shall be installed in accordance with the City of Huron Standard Plates or as specified.

3.14 CONNECTIONS TO EXISTING SEWERS

Wherever new storm sewers connect with existing storm sewers, the Contractor shall without extra compensation cut the necessary openings in the existing structures and make the connections thereto in a neat and workmanlike manner. The connections shall be made so as to make the joints around the entering storm sewers watertight.

The connection shall be constructed as not to obstruct the flow area of the main line storm sewer pipe.

3.15 STUBS FROM STRUCTURES FOR FUTURE EXTENSIONS

Futures from a structure shall be installed to the staked elevation. The extension shall be plugged as specified.

3.16 BEDDING AND BACKFILL

Bedding and backfill shall be performed as shown in the standard detail drawing.

3.17 USE AND REPAIR OF STREET

The Contractor shall carry on the work in such a manner as to interfere as little as possible with the use of the street for public travel, and as specified in the Special Provisions.

Wherever any paved gutters, pavements, graveled highways or street crossings or other improvements are interfered with or removed, they must be replaced by the Contractor or left in as good condition as previously existed. The Contractor shall also remove all surplus material leaving the streets clean and in good order.

No more than three hundred feet (300') of trench will be opened at any one time in advance of the complete construction of the sewers and the backfilling shall follow up the installation of the sewers.

All street repairs and cleaning shall be promptly performed as the work progresses. The Contractor shall not obstruct any street gutters but shall provide for the passage of surface water along the same at all times.

3.18 JACKING, BORING, AND TUNNELING

It shall be the responsibility of the Contractor to maintain the alignment and grade specified. The jacking, boring, and tunneling specifications are available upon request at the City Engineer's Office or shall be in accordance with the drawings and Special Provisions.

3.19 INSPECTION AND TESTING

3.19.1 General.

The Engineer shall have access at all times to all parts of the job and the Contractor must furnish such personnel, facilities, equipment, tools, and materials as are necessary to make whatever tests and inspection that are deemed necessary.

3.19.2 Pipe Testing.

The Engineer may require a test of specimens not to exceed five (5) percent of the quantity of pipe to be furnished in order to prove the acceptability of the pipe. The manufacturer shall provide an approved testing stand near the site of the plant.

3.19.3 Pipe Inspection.

Prior to being lowered into the trench, each pipe shall be carefully inspected by the Contractor and those not meeting the specified requirements shall be removed from the site immediately. Rejections may be made for any of the reasons as stated in the specifications for each specific type of pipe. Pipe having minor flaws not serious enough to cause rejection shall be installed so as to bring such flaws in the top half of the sewer. Pipe shall be protected during handling against impact, shocks, and free fall.

3.19.4 Television Inspection.

The City will perform an inspection of the completed sewer line within the two (2) year warranty period through the use of a television camera. The expense of the initial television inspection and one additional reinspection will be borne entirely by the City. If

defective workmanship of material or construction is noted, the deficiency shall be corrected by the Contractor at no expense to the City. The City will perform additional television inspections to review if the repairs were made properly and in accordance with the specifications. The expense of any additional television inspections beyond the initial inspection and one additional reinspection will be borne entirely by the Contractor.

The Contractor shall be responsible for all related costs, including concrete or asphalt resurfacing if the street has been surfaced. The Contractor shall be required to repair all areas of deficiencies.

3.19.5 Cleaning.

The Contractor shall be responsible for all work necessary to make the sewer acceptable for usage including removal of all mud, silt, rocks, or blockages that might hinder the flow and make said sewer unacceptable for final acceptance and usage. Also included is all work necessary in the structures and all cleanup work required prior to final acceptance. Structures will have all concrete forms removed prior to final acceptance.

In the event that the line is not acceptable for televising, due to the Contractor's operations, the Contractor will be notified. It will be the Contractor's responsibility to make arrangements to clean the sewer and make it acceptable for the television work.

3.19.6 Backfill Density Test.

The Contractor shall expose the compacted soil layers, as required by the Engineer, to enable the Engineer to perform density tests. The cost of exposing the soil layers for testing shall be incidental to the pipe and/or structure construction.

3.19.7 Quality Control and Submittals

Retesting of work required because of nonconformance to the specified requirements shall be performed by an independent firm based on the instructions of the Engineer. Payment for retesting performed during the contract period and during the warranty period will be charged to and will be the responsibility of the Contractor.

As required, shop drawings and data shall be submitted for, but not be limited to, the following items:

Structures, pipe, pipe fittings, bedding material, stabilization material, granular material, and any other pertinent information

concerning construction materials that the Engineer deems necessary for the review of the materials used on the project in accordance with the specifications and drawings.

The Contractor shall submit three copies to the Engineer. The Contractor shall obtain shop drawing approval before any of the work related to that material is performed.

3.20 PIPE DEFLECTION

3.20.1 Pipe Deflection Test, Corrugated Polyethylene Pipe, Type S.

At the discretion of the Engineer, deflection testing will be performed by the Contractor. For pipe diameters through and including 24 inches in diameter, deflection testing is to be performed using a mandrel with at least five points approved by the Engineer. The diameter of the mandrel shall be as shown in the table below. The mandrel must be pulled through by hand without the use of excessive force. Pipe through which the mandrel does not pass shall be examined more closely to determine the reason for non-passage. For pipe diameters 30 inches and above, pipe diameters may be physically measured by a means approved by the Engineer. Deflection testing shall be performed no earlier than thirty days after installation or upon completion of construction of the roadway or the development area to the final grading elevation, whichever occurs first. Pipe that is determined to be over deflected shall be removed and reinstalled if the pipe is not damaged, or replaced with acceptable pipe. All pipe exceeding the 5 percent deflection within the two-year warranty period shall be reinstalled or replaced by the Contractor at no additional cost to the Owner.

DEFLECTION TABLE

PIPE DIAMETER (Inches)	MANDREL DIAMETER (Inches)
12	11.01
15	13.77
18	16.52
24	22.02
MINIMUM DIAMETER (Inches)	
30	27.53

3.20.2 Polyvinyl Chloride (PVC) Pipe Deflection Test.

At the discretion of the Engineer, deflection testing will be performed by the Contractor.

Deflection tests shall be conducted after the final backfill has been in place at least 30 days. Deflection tests shall be made using a deflection gauge (mandrel) device or other approved method. The diameter of the deflection gauge device shall be 95 percent of the undeflected inside diameter of the flexible pipe. The Contractor shall be required to install the pipe in such a manner so that the diametric deflection of the pipe shall not exceed 5 percent. All pipe exceeding the 5 percent deflection within the two-year warranty period shall be reinstalled or replaced by the Contractor at no additional cost to the Owner.

4.0 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 REMOVAL OF STORM SEWER PIPE

The removal of sewer pipe shall be measured as lineal foot of pipe removed. The removal footage shall be rounded up to the nearest one-foot increment.

The removal of a sewer pipe shall be paid for at the contract unit price for each foot of sewer removed. Payment for removal of sewer pipe shall be full compensation for excavation, removal and disposal of the pipe and all appurtenances necessary for the proper removal of the pipe.

4.2 REMOVAL OF STORM SEWER STRUCTURE

The removal of a structure shall be measured as a unit for each structure removed.

The removal of a structure shall be paid for at the contract unit price for each structure removed. Payment for removal of a structure shall be full compensation for removal and disposal of the structure, frame and covers, and all appurtenances necessary for the proper removal of the structure.

4.3 ROCK EXCAVATION

The removal of rock shall be measured as cubic yards of rock removed. The cubic yards removed shall be rounded to the nearest 0.1 increment. All rock excavation shall be under one classification. The classification shall include solid ledge rock in its natural location that requires systematic quarrying, drilling, and /or blasting for its removal and also boulders that exceed one cubic yard in volume.

Pay lines for computing rock excavation shall be described as follows for trench widths:

Pipe Size	Trench Width Pay Limits
Pipe equal to or less than 24 inches in diameter	4 feet
Pipe greater than 24 inches in diameter	The outside pipe dia. plus 24 inches

Pay lines for computing depth of the rock excavation shall be described as the distance from top of rock to 12 inches below the pipe invert elevation. The top of the rock profile will be measured and determined by the Engineer and used to determine the rock quantities.

The accepted quantities of rock excavation shall be paid for at the contract unit price per cubic yard. Payment for rock excavation shall be full compensation for permits, excavation, blasting, removal and proper disposal of the rock offsite, and all appurtenances necessary for the proper removal of the rock. Furnishing and installing suitable fill material to replace the rock removed (except in locations where bedding material is required) will be paid for with the Granular Material bid item.

4.4 SELECT BACKFILL MATERIAL

Select backfill material shall be measured and paid by the lineal foot. Material shall be measured from pipe end to end with no deduction for length through the structure. The measured length shall be rounded up to the nearest one-foot increment.

Payment for select material will be full compensation for furnishing and installing of the material and all appurtenances necessary for the proper installation of the select material.

4.5 ADJUST STRUCTURE

The furnishing and installing of structure adjustments shall be measured as a unit for the structure adjustment at each structure.

The furnishing and installing of adjusting rings shall be paid for at the contract unit price for each structure adjustment. Payment for adjust structure will be full compensation for furnishing and installing of the structure adjusting rings, sealant, mortar, and all appurtenances necessary for the proper installation of the structure adjusting rings. Structure adjustments will be paid for existing structures.

4.6 STORM SEWER PIPE

Storm sewer pipe shall be measured by the lineal foot of respective type, class, and size of pipe to the nearest foot.

4.7 BEDDING MATERIAL

Pipe bedding material shall be measured and paid by the lineal foot. Huron Bedding material shall be measured from pipe end to end with no deduction for length through the structure. The measured length shall be rounded up to the nearest one-foot increment.

Payment for pipe bedding material will be full compensation for furnishing and installing of the pipe bedding material and all appurtenances necessary for the proper installation of the bedding material.

4.8 STRUCTURES

Structures shall be measured and paid for at the contract unit price of reinforcement steel, concrete, and castings.

4.9 JACKING, BORING, AND TUNNELING, POLYVINYL CHLORIDE (PVC) AND POLYETHYLENE

The basis of measurement shall be by the lineal foot for casing pipe, linear foot for carrier pipe, each for end seals, each for casing spacers, and each for boring obstructions. The measured length of carrier and casing pipe shall be rounded up to the nearest one-foot increment.

The furnishing and installing of casing pipe and carrier pipe shall be paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and accepted. The furnishing and installing of end seals and casing spacers shall be paid for at the contract unit price per each for the types and sizes furnished and accepted.

Payment for casing pipe will be full compensation for furnishing and installing of the casing pipe by boring, jacking or tunneling; excavation and backfilling of bore pits, welding, trench dewatering (unless otherwise specified) and all appurtenances necessary for the proper installation of the casing pipe.

Payment for carrier pipe will be full compensation for furnishing and installing of the carrier pipe, gaskets, grouting of the annular pipe space (unless otherwise specified) and all appurtenances necessary for the proper installation of the carrier pipe.

Payment for the end seals and casing spacers will be full compensation for furnishing and installing of the end seals and all appurtenances necessary for the proper installation of the end seals and casing spacers.

Payment for boring obstruction will be full compensation for the labor, equipment, and materials needed for removal of the obstruction. Payment for boring obstructions will be paid only for boring operations with mechanical equipment. If the project work is performed by a hand-mining operation, all such obstructions will be considered part of the normal operation and will not be paid for as a boring obstruction.

A boring obstruction shall be defined as any rock, boulder, etc., or similar material, which is encountered during the excavation that can not be removed by the boring machine and requires shut-down of the equipment for removal. The Contractor shall be aware that all quantities are estimates and that there may be no obstructions or could be a large number of obstructions on the project. The Contractor will only be paid for obstructions encountered and reported to and verified by the Engineer. The bid item quantities are not guaranteed items.

4.10 JACKING, BORING, & TUNNELING, REINFORCE CONCRETE PIPE

The furnishing and installing pipe shall be measured and paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and accepted.

Payment for pipe will be full compensation for furnishing and installing of the pipe by boring, jacking or tunneling; excavation and backfilling of bore pits, welding, trench dewatering (unless otherwise specified) and all appurtenances necessary for the proper installation of the casing pipe.

Payment for boring obstruction will be full compensation for the labor, equipment, and materials needed for removal of the obstruction. Payment for boring obstructions will be paid only for boring operations with mechanical equipment. If the project work is performed by a hand-mining operation, all such obstructions will be considered part of the normal operation and will not be paid for as a boring obstruction.

A boring obstruction shall be defined as any rock, boulder, etc., or similar material, which is encountered during the excavation that can not be removed by the boring machine and requires shut-down of the equipment for removal. The Contractor shall be aware that all quantities are estimates and that there may be no obstructions or could be a large number of obstructions on the project. The Contractor will only be paid for obstructions encountered and reported to and verified by the Engineer. The bid item quantities are not guaranteed items.

City of Huron Supplemental Standard
Specifications for
Water Main Construction
Section 300

Adopted: January 29, 2014
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Revised: March 25, 2024

City of Huron
Public Works/Engineering
239 Wisconsin St SW
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Section 300 City of Huron Supplemental Standard Specifications for Water Main Construction

1.0 GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all the necessary labor, materials, equipment, tools, and supplies that are necessary to install a complete water main system, as shown on the plans and/or called for in these specifications or its addenda. It is the intent of these specifications to install a complete system or job.

1.2 TERM OF WARRANTY

Reference Section 500—Warranty for Construction Activity.

1.3 QUALITY CONTROL AND SUBMITTALS

Retesting of work required because of nonconformance to the specified requirements shall be performed by the same independent firm on the instructions of the Engineer. Payment for retesting performed during the contract period and during the warranty period will be charged to and will be the responsibility of the Contractor.

The Contractor or Supplier may submit appropriate documentation to the Engineer for any materials not listed in these specifications. This documentation must be provided no later than five days prior to bid opening.

Shop drawings and data shall be submitted for, but not be limited to, the following items:

Fire hydrants, pipe, pipe fittings, bedding material, stabilization material, granular material, and any other pertinent information concerning construction materials that the Engineer deems necessary for the review of the materials used on the project in accordance with the specifications and drawings.

The Contractor shall submit the number of copies that the contract requires and that the Engineer may retain. The Contractor shall obtain shop drawing approval before any of the work related to that material is performed.

All water distribution materials shall meet NSF/ANSI Standard 61—Drinking Water System Components, Health Effects and NSF/ANSI 372.

1.4 MISCELLANEOUS CONSTRUCTION REQUIREMENTS

For City-funded projects, the Engineer will stake all water main alignment and inspect all water main installation. All fittings, valves, hydrant extensions, etc., will be left open until inspected and measured by the Engineer. When necessary, the Engineer will provide grade stakes for alignment. The Contractor shall carry line and grade into the trench by means of approved survey methods. At no time shall the Contractor or his employees change the grade without approval of the Engineer. If underground interference is encountered at the assigned grade, the Contractor shall notify the Engineer for alternate alignment. The Contractor shall furnish help when requested to stake and measure water main.

The Engineer or his/her representatives shall have access at all times to all parts of the job. The Contractor must furnish such personnel, facilities, equipment, tools, materials and appurtenances as needed to make whatever tests and inspections that are deemed necessary.

1.5 BIDS

Unless a lump sum is called for, bids shall be received on a unit price basis.

The unit price bid per lineal foot for water main shall include the complete construction with the tracer wire system and other items as specified, including trench dewatering when necessary. The lineal footage will be determined by measuring from the center of one fitting or valve to the center of the next fitting or valve. When PVC pipe is used, the price bid shall include the cost of encasing the fittings in polyethylene. When ductile iron pipe is used, the price bid shall include the cost of encasing the fittings and the pipe in polyethylene.

1.6 MEASUREMENT AND PAYMENT

Method of measurement and basis of payment shall be as noted in Methods of Measurement and Payment section, unless otherwise stated in the bid or plan documents. Payments to the Contractor shall be made in accordance with the General Conditions.

1.7 ACCEPTANCE

Acceptance of the work shall be in accordance with the General Conditions.

1.8 REFERENCES

The most up to date and current revisions or editions shall be used for all references listed below.

- A. NSF/ANSI 14 – Standard for Plastics Piping System Components and Related Materials.
- B. NSF/ANSI 61 – Standard for Drinking Water System Components, Health Effects.
- C. NSF/ANSI 372 – Method of Measurement to Comply with NSF 61.
- D. ANSI/AWWA C104 – Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
- E. ANSI/AWWA C105—Polyethylene Encasement for Ductile-Iron Pipe Systems.
- F. ANSI/AWWA C110 –Ductile–Iron and Gray-Iron Fittings.

G. ANSI/AWWA C111—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
H. ANSI/AWWA C150 – Thickness Design of Ductile-Iron Pipe.
I. ANSI/AWWA C151—Ductile-Iron Pipe, Centrifugally Cast.
J. ANSI/AWWA C153 – Ductile Iron Compact Fittings.
K. AWWA C502 – Dry-Barrel Fire Hydrants.
L. AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service.
M. AWWA C515 – Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
N. AWWA C550 – Protective Interior Coatings for Valves and Hydrants.
O. AWWA C600 —Installation of Ductile-Iron Water Mains and Their Appurtenances.
P. AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
Q. AWWA C651 – Disinfecting Water Mains.
R. AWWA C800 – Standard for Underground Service Line Valves and Fittings.
S. AWWA C900 —Standard Specification for Polyvinyl Chloride (PVC) Water Transmission Pipe (Nominal Diameters 4–36-inches).
T. AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, ¾ In. (19 mm) Through 3 IN. (76 mm), for Water Service.
U. AWWA M41 – Ductile-Iron Pipe and Fittings.
V. ASTM A48 – Standard Specification for Gray Iron Castings.
W. ASTM A674 - Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids
X. ASTM A518 – Standard Specification for Corrosion-Resistant High Silicon Iron Castings.
Y. ASTM A536 – Standard Specification for Ductile Iron Castings.
Z. ASTM B-3 - Standard Specification for Soft or Annealed Copper Wire.
AA. ASTM B88 – Standard Specification for Seamless Copper Water Tube.
BB. ASTM C272 - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
CC. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
DD. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
EE. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
FF. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
GG. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
HH. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
II. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
JJ. ASTM F2657 - Standard Test Method for Outdoor Weathering Exposure of Crosslinked Polyethylene (PEX) Tubing.
KK. ISO 8179-1 – Ductile Iron Pipes, Fittings, Accessories and Their Joints – External Zinc-Based Coating.
LL. NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances
MM. South Dakota Department of Transportation Standard Specifications for Roads and Bridges.
NN. City of Sioux Falls Supplemental Specification for Sanitary Sewer. Related

Specification Sections include but are not necessarily limited to:

- A. City of Huron Special Provisions for Trenchless Construction
- B. City of Huron Special Provisions for Cured-In-Place-Pipe

2.0 MATERIALS

2.1 WATER MAIN PIPE

Water main pipe 4 inches in diameter and greater shall be Ductile Iron or Poly Vinyl Chloride (PVC) with a gasket joint. PVC pipe shall have a minimum sustained working pressure of 235-pounds per square inch (psi) (or project requirements, whichever is greater) with a minimum cover of 6-feet. Ductile Iron Pipe shall be designed for a minimum 150-psi (or project requirements, whichever is greater) rated working pressure with a minimum cover of 6 feet. Pipe classes shall be as follows:

Pipe Size (Inches)	Ductile Iron Pressure Class	PVC
4	350	C900 DR 18
6	350	C900 DR 18
8	350	C900 DR 18
10	350	C900 DR 18
12	350	C900 DR 18
16	250	C900 DR 18
20	250	C900 DR 18
24	200	C900 DR 18

HDPE pipe for boring – DIPS OD, PE4710/DR11 or PE3608/DR9

PVC pipe for boring – Certa-Lok C900 Restrained Joint Pipe, ASTM D1784 (pipe) ASTM D3139 (pipe joint), DR18 235 psi, with couplings, O-rings, and splines.

Where PVC restrained joint pipe is shown on the plans (other than boring), pipe shall be furnished with boltless, flexible, push-on restrained joints such as Diamond Lok, JM Eagle, Certa Lok, RieberLok or prebid Engineer-approved equal.

All ductile iron pipe shall be manufactured in full conformance with the most current edition of AWWA C150 and C151 standards. All ductile iron pipe shall meet NSF/ANSI Standard 61—Drinking Water System Components, Health Effects and NSF/ANSI 61 Annex G, NSF/ANSI 372.

All PVC shall be manufactured in full conformance with the most current edition of AWWA C900 and C905 Standards. All PVC pipe shall meet NSF/ANSI Standard 61— Drinking Water System Components, Health Effects and NSF/ANSI 61 Annex G, NSF/ANSI 372.

Ductile iron pipe shall be lined with cement mortar (Portland cement) and shall be manufactured in full conformance with the most current edition of AWWA C104 standards. The thickness of linings shall be not less than the following: 1/16 inch for 6- to 12-inch pipe, 3/32 inch for 16- to 24-inch pipe and 1/8 inch for 30- to 60-inch pipe.

A plus tolerance of 1/8 inch in thickness will be permitted. Linings shall be full thickness to the end of the spigot and to the seat of the bell, or shall be tapered for a length of not

more than 2 inches. Ductile iron pipe shall be coated on the outside with bituminous coating at least one nominal mil in thickness.

Gaskets for all ductile iron pipe shall meet the requirements of the pipe manufacturer. Sealing pipe joints for all C900 pipe shall use the Rieber joining system, which has the gasket formed into the pipe during the pipe manufacturing process. All gaskets shall meet NSF/ANSI Standard 61—Drinking Water System Components, Health Effects.

Special gaskets will be required for all piping systems noted below:

- Soils contaminated with gasoline: use nitrile gaskets.
- Soils contaminated with volatile organic compounds, use fluorocarbon gaskets.

Where ductile iron restrained joint pipe is shown on the plans, pipe shall be furnished with boltless, flexible, push-on restrained joints such as Fastite Pipe with Fast Grip Gaskets or Flex-Ring by American Ductile Iron Pipe, Tyton Joint Pipe with Field-Lok or Field Lok 350 restrained joint gaskets by U.S. Pipe or prebid Engineer approved equal. Field-adaptable restrained joints may be provided for pipe 24-inches in nominal diameter and smaller through the use of Fast-Grip Gaskets by American Ductile Iron Pipe, Sure Stop 350 Gaskets by McWane, or prebid Engineer approved equal.

Where PVC restrained joint pipe is shown on the plans, pipe shall be furnished with boltless, flexible, push-on restrained joints such as Diamond Lok, JM Eagle, Certa Lok, or prebid Engineer approved equal.

2.2 TRACER WIRE

The components of the tracer wire system shall be suitable for direct bury applications. The conductor shall be 12 AWG, solid-strand, soft-drawn copper per ASTM B-3. The conductor shall be insulated with high molecular weight polyethylene. The minimum insulation thickness shall be 0.045 inches and the color shall be blue. Splices and/or connectors shall be capable of handling from two to four wires per connection and be designated at “waterproof.” Ground rods shall be a 3/8-inch diameter, 60-inch-long steel rod uniformly coated with metallically bonded electrolytic copper. Ground rod clamps shall be a high-strength, corrosion-resistant copper alloy. Water tracer wire access boxes shall be Valvco, Inc. #TWAB, Copperhead Snakepit, or approved equal.

Acceptable manufacturers of the tracer wire are Coleman Cable, Kris-Tech Wire, Copperhead, or prebid Engineer approved equal. Splice kits/connectors shall be Scotchlok™ DBY by 3M, LV 9000 by SNAPLOC™, Snakebite by Copperhead, or prebid Engineer approved equal.

2.3 POLYETHYLENE ENCASEMENT

Polyethylene encasement shall meet all the requirements for ANSI/AWWA C105/A21.5 and ASTM A674. Polyethylene shall be V-bio polyethylene encasement which shall consist of three layers of co-extruded linear low density polyethylene (LLDPE), fused into a single thickness of not less than 8-mils.

The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of antimicrobial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

Polyethylene encasement shall be installed in accordance with AWWA C600 and ANSI/AWWA C105/A21.5 and also in accordance with all recommendations and practices of the AWWA M41, Manual of Water Supply Practices – Ductile Iron Pipe and Fittings. Specifically, the wrap shall be overlapped 1 foot in each direction at joints and secured in place around the pipe, and any wrap at tap locations shall be taped tightly prior to tapping and inspected for any needed repairs following the tap.

All buried water main fittings, appurtenances and ductile iron pipe shall be encased in polyethylene encasement, meeting the requirements as listed above. Polyethylene encasement shall be incidental to the various water main bid items.

2.4 TRENCHLESS CONSTRUCTION

Refer to Special Provisions for Trenchless Construction.

2.5 WATER MAIN FITTINGS

Ductile Iron Fittings

The ductile iron fittings shall be mechanical joint, except as noted, with a minimum working pressure of 250 pounds per square inch (PSI). All fittings shall be bid complete with gaskets, mechanical joint restraints, bolts, and other appurtenances. Fittings, gaskets, glands, and cement linings shall meet NSF/ANSI Standard 61—Drinking Water System Components, Health Effects and NSF/ANSI 61 Annex G, NSF/ANSI 372. Fittings shall be manufactured in full conformance with the most current edition of AWWA C110 Standards. All fittings shall be cement lined on the interior and 1-mil nominal thickness bituminous coated on the exterior. Cement lining shall be at least 1/16 inch in thickness and shall be manufactured in full conformance with the most current edition of AWWA C104. Joints shall conform to the most current edition of the requirements of AWWA C111. Bolts shall be Stainless Steel type 304.

Acceptable manufacturers are: U.S. Pipe, American, Tyler, Star, Sigma, or prebid Engineer approved equal.

Compact Ductile Iron Fittings

The compact ductile iron fittings shall be manufactured in full conformance with the most current edition of AWWA C153. Compact ductile iron fittings shall only be allowed for fittings that are 24 inches in size and smaller. All fittings shall be cement lined on the interior and 1-mil nominal thickness bituminous coated on the exterior as specified for cast iron fittings. Fittings shall be bid with gaskets, mechanical joint restraints, bolts, and other appurtenances. Bolts shall be Stainless Steel type 304.

Acceptable manufacturers are: U.S. Pipe, American, Tyler, Star, Sigma, or prebid Engineer approved equal.

Transition Couplings

Coupling adapters/transition couplings shall be Hymax 2 or Romac Macro Hp, Hymax Grip or Romac Alpha/Alpha XL. All coupling adapters/transition couplings shall be coated with a 12-mil nominal thickness fusion bonded epoxy conforming to the requirements of the latest revision of AWWA C213 section 4.5. Bolts and nuts shall be stainless steel. Gaskets shall be chloramine resistant and meet NSF/ANSI Standard 61: Drinking Water System Components—Health Effects, NSF/ANSI 372.

2.6 MECHANICAL JOINT (MJ) RESTRAINER DEVICES

All components of the restrainer, including the gland, bolts, and restraint segments, shall be of high-strength ductile iron and shall be manufactured in full conformance with the most current edition of ASTM A536. Appropriate restrainer devices shall be supplied for the specific type of piping material being used on the project.

Restraining mechanisms shall be with wedges or full circle contact and support of the pipe wall. Restraint shall be accomplished by a series of ring or wedge segments mechanically retained inside the gland housing and designed to grip the pipe wall in an even and uniform manner. Restraining devices shall be actuated by bolts featuring twist-off heads to ensure proper installation torque is applied. Bolts shall be Stainless Steel type 304. Restrainer devices shall be coated with 12-mil fusion bonded epoxy body with fluorocarbon coated ring/wedge.

Restrainer devices shall be EBBA Iron MEGALUG with Megabond, Star Products Stargrip with Starbond, Tyler Tufgrip with Tuf-Bond, or prebid Engineer-approved equal.

2.7 VALVES

All valves supplied shall meet the requirements of NSF/ANSI Standard 61: Drinking Water System Components—Health Effects and NSF/ANSI 61 Annex G, NSF/ANSI 372. All internal and external ferrous surfaces shall have a fusion bonded epoxy coating applied electrostatically prior to assembly meeting the requirements of AWWA C550. Restrainer devices will be required on all valves.

Open left resilient-seated gate valves (4 inches to 30 inches inclusive) and tapping valves shall be manufactured in full conformance with the most current edition of AWWA C509 or C515. The valve seat shall be able to withstand 200 PSI of working pressure and the body shall withstand 400 PSI test pressure. Gate valves shall be mechanical joint meeting the requirements of AWWA C111 and tapping valves shall have a mechanical joint end and a flanged end to correspond to the branch flange of the tapping sleeve. Bolts shall be Stainless Steel type 304.

Valves shall have a ductile iron wedge encapsulated with nitrile rubber or an EPDM rubber compound. Stems shall be nonrising, bronze or stainless steel, and shall be sealed by three o-rings. Valves shall have a 2-inch ductile iron operating nut and open left (counter-clockwise). Bonnet and stuffing box bolts shall be stainless steel. Resilient seats shall be bonded or mechanically attached to the gate.

All valves shall be provided with mechanical joint restraints. Valves shall be manufactured by American, Clow, Kennedy, Waterous, and American AVK, or prebid Engineer-approved equal.

2.8 VALVE BOXES

Valve boxes are required on all valves. All valve boxes shall be cast iron in accordance with ASTM A48, shall have a minimum tensile strength of heavyweight 35,000-psi, and furnished with a standard drop cover marked "WATER".

Valve boxes shall be two or three pieces with screw type adjustment. Valve box shall be adjustable for a 4- to 6-foot trench, with a 5 ¼-inch shaft and a circular base for 8-inch valve. Covers shall have a skirt length of 1 ½-inch.

Valve box extensions shall be in lengths shown and shall be compatible with the valve box specifications.

Valve box adaptors shall be included with all valve boxes. Valve box adaptors shall be Valve Box Adaptor II by Adaptor Inc. or approved equal. Valve boxes shall be manufactured by Tyler, Star, or prebid Engineer-approved equal. Valve boxes shall be included with the valve installation and considered incidental to the various bid items.

2.9 VALVE BOX MARKERS

Valve box markers shall be a minimum of 3 ¾ inches wide and 78 inches in length. The markers shall be blue in color. The markers shall be ultraviolet resistant and stable in all weather conditions. The markers shall be Composite Composition Utility Markers as manufactured by Carsonite International or prebid Engineer approved equal. The markers shall be labeled "CAUTION WATER PIPELINE—CALL BEFORE DIGGING."

2.10 CONCRETE THRUST BLOCKS,

Poured concrete blocking shall have a compressive strength of not less than 3,000-psi. No wood shimming or bracing will be allowed in conjunction with the concrete blocks.

2.11 RESTRAIN EXISTING VALVE

The restraint shall be manufactured of ductile iron conforming to ASTM A536. The split restraint ring, incorporating a plurality of individually-actuating gripping surfaces, shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the restraint to the mechanical joint.

Existing PVC Pipe

The Restraint Ring shall be coated using MEGA-BOND® Restraint Coating System or Approved Equal. The restraint shall be the Series 2000SV as manufactured by EBAA Iron, Inc. or approved equal.

Existing Ductile Iron Pipe

The restraint devices shall be coated using MEGA-BOND® Restraint Coating System or Approved Equal. The restraint shall be the Series 1100SD, as manufactured by EBAA Iron, Inc., or approved equal.

2.12 RESTRAIN EXISTING PIPE JOINT

Where restraint is required for bell joints on existing PVC pipe, the restraints shall be manufactured of ductile iron conforming to ASTM A536. The split restraint rings, incorporating a plurality of individually - actuating gripping surfaces, shall be used to grip the pipe on either side of the bell. A sufficient number of tie bars casted from ASTM A536 shall be used to span the distance between the restraints and a sufficient number of bolts shall be used to connect each restraint to the tie bars. The restraint devices shall be coated using MEGA-BOND™ or Approved Equal. The restraint shall be the Series 1100HV, as manufactured by EBAA Iron, Inc., or approved equal.

Where restraint is required for bell joints on existing ductile iron pipe, the restraints shall be manufactured of ductile iron conforming to ASTM A536. The split restraint rings, incorporating a plurality of individually-actuating gripping surfaces, shall be used to grip the pipe on either side of the bell, and a sufficient number of rods shall be used to connect each restraint to one another. The restraint devices shall be coated using MEGA-BOND or Approved Equal. The restraint shall be the Series 1100HD, as manufactured by EBAA Iron, Inc., or approved equal.

2.13 FIRE HYDRANTS

Hydrants shall meet the requirements of NSF/ANSI Standard 61: Drinking Water System Components—Health Effects and NSF/ANSI 61 Annex G, NSF/ANSI 372. The rated working pressure shall be 250 psi and the rated test pressure shall be 500 psi. All hydrants shall be dry barrel meeting the most current requirements of AWWA C502.

The nozzle section, upper and lower barrels, and the hydrant base shall be ductile or gray iron. All hydrants shall open left and the main valve closure shall be of the compression type, opening against the pressure and closing with the pressure. The main valve opening shall not be less than 5-1/4 inches and be designed so that removal of all working parts can be accomplished without excavating.

The bronze seat shall be threaded into mating threads of bronze for easy field repair. The draining system of the hydrant shall be bronze and be positively activated by the main operating rod. All 2-1/2-inch nozzle threads shall be National Standard threads (Waterous TP7532) and 4-inch pumper nozzle threads shall be Huron thread. Huron thread is 8 threads per inch or equal to Waterous TP80430. Internal travel stop nut shall be bronze or zinc plated steel. Hydrant operating threads to be factory lubricated and sealed from the waterway with o-rings. Operating nuts shall be pentagon shaped and measure 1-1/2-inches point to flat.

Hydrants shall have a 6-inch mechanical joint inlet, and the barrel shall be sized for a trench depth of 6 feet. Hydrants shall have two 2-1/2-inch hose nozzles and one 4-inch pumper nozzle, all located on the same horizontal plane. Nozzle cap nuts shall be the same dimension and shape as the operating nuts described above, and the nozzle caps

shall be furnished with security chains. The section of the hydrant above ground shall be painted highway yellow. Hydrants shall be capable of being extended in 6-inch increments and shall be equipped with traffic features that include a breakaway flange and stem with a shaft coupling.

All buried body parts and bolts and nuts are to be 304 stainless steel in full conformance with the most current edition of ANSI/AWWA C111/A21.11.

The centerline of the nozzles shall be a minimum of 18 inches above the ground line groove. The section of the hydrant above ground shall be painted highway yellow.

All permanent fire hydrants shall be installed with fire hydrant markers at the time of installation. Each hydrant marker shall be impregnated polycarbonate material, red color with adhesive reflector, and with a flexible galvanized hinge riveted to hydrant marker. Each marker shall be hinge mounted to bonnet with bonnet bolt at 48-inch length and 3-inch width. Hydrant markers to be manufactured by Flexstake or prebid Engineer approved equal.

Open left hydrants shall be Waterous Pacer WB67-250, American Darling B84B by American Flow Control, Mueller Super Centurian A423, Clow Medallion, or prebid Engineer approved equal.

All fire hydrant extensions shall be manufactured by same manufacturer as the hydrant. All barrel extensions that may come into contact with water shall meet the requirements of NSF/ANSI Standard 61: Drinking Water System Components—Health Effects and NSF/ANSI 61 Annex G, NSF/ANSI 372.

2.14 NUTS AND BOLTS

Nuts and bolts for fittings, valves and fire hydrant connections shall meet the following requirements. Nuts and Bolts shall be grade 304 stainless steel manufactured in full conformance with the most current edition of ANSI/AWWA C111/A21.11.

2.15 WATER SERVICE LINES AND CONNECTIONS

SERVICE LINES: All water service piping, fittings, and insert stiffeners shall meet the NSF 14, NSF 61, Uniform Plumbing Code, and AWWA C800 requirements. Minimum pressure rating shall be 200-psi. Minimum size of water service piping shall be 1-inch. Water service piping sizes 1-inch to 2-inch between the main and curb box shall be copper or PEXa. Water service piping sizes 1-inch to 2-inch from curb stop to the backflow preventer shall be high density polyethylene (HDPE), copper, or PEXa. Tracer wire shall be included with HDPE or PEXa service lines.

Water service lines 2 inches in diameter and smaller for City projects shall be U.S. Government Type K soft copper tubing (unless noted otherwise).

Water service lines 4 inches in diameter and greater shall be ductile iron or C900 PVC pipe as specified in Section 2.1.

When boring for City projects, the service line shall be replaced from the main to the curb stop.

Service lines shall meet the following requirements:

Copper Service Line

Copper piping shall conform to and meet the requirements of AWWA C800 and ASTM B88 U.S. Government Type K Soft Copper Tubing.(no lead). Approved makes of copper are as follows: Cerro, Mueller Copper Company, Cambridge-Lee Copper, Halstead, Wolverine, or approved equal. Reconnection of services on City projects shall be copper.

Polyethylene (HDPE) Service Line

Polyethylene service lines 2 inches in diameter and smaller shall be Cross-Linked High Density Polyethylene (HDPE) Pressure Pipe and shall meet the requirements of AWWA C904-06, AWWA C901 250 PSI, SDR-7 (IPS for pipe and fittings). PE 4710 pipe compounds shall conform to ASTM D3350 and minimum cell class PE 445574C CC3.

Crosslinked Polyethylene (PEXa) Service Line

PEXa piping shall meet the AWW C904 and ASTM F876 requirements. The outside diameter shall be based on Copper Tube Sizing (CTS) sizing system.

PEXa shall be manufactured using the high-pressure peroxide method of crosslinking, shall have a co-extruded UV Shield made from UV-resistant high-density polyethylene, shall be color Blue and shall have a minimum recommended UV exposure time of 1-year when tested in accordance with ASTM F2657, or as per manufacturer's recommendations. Manufacturer shall be Rehau or approved equal.

Stainless steel or plastic insert stiffeners are required for all PEXa service piping compression style fitting connections.

Tapping Saddles

Tapping saddles may be used for dry or wet (live water main under pressure) taps. Tapping saddles shall be limited to a maximum nominal outlet diameter of 2-inch. Water services shall not be tapped off water mains 16-inches and larger unless approved by City Engineering.

Service tap saddles shall be stainless steel and have stainless steel bolts and nuts and be sized for C900 Water Main. The gasket shall be virgin NBR or Buna-N rubber; formulated for treated water. The saddle boss shall be tapped with standard iron pipe threads. Service Tap Saddles shall be "Ford FS300 series", "Smith Blair 372", "Romac 306" or approved equal.

Service Line Connections to the Water Main:

All cost for furnishing and installing service line connections or reconnections shall be included in the bid item (Reconnect Existing 1" Water Service).

Corporation Stop

Corporation stops shall be Ford Meter Box FB600, FB1000 series, or approved equal and meet the requirements as determined by AWWA C800. Inlet thread as determined by AWWA/CC taper threads. Sizing will be the same as service piping with a ball type valve. Lead is not allowed.

Curb Stops and Boxes

Curb stops shall be of the ball valve design with packed end joints and be of the Minneapolis pattern. Curb stops shall be as manufactured by AY McDonald 76100 Series, Ford B22 or B44-M Series, Ford B66-444M, or approved equal. Lead is not allowed. Curb boxes shall be of the extension type with pentagon lid style, specifically designed for the Minneapolis pattern curb boxes and of suitable length for the required depth. Curb boxes shall be as manufactured by A Y McDonald #5614, Mueller H-10300, Ford Meter Box EM Series, or approved equal.

Water Service Fittings

Service fittings 1- to 2-inches shall conform to AWWA C800 and NSF 372 requirements. Acceptable manufacturers are Ford, AY McDonald, or approved equal.

Service fittings 4-inches and larger shall conform to Section 2.5 Supplemental Specifications, Section 300 requirements.

2.16 WATER MAIN INSULATION

Water main insulation shall be an extruded polystyrene board and meet the requirements of ASTM C578, Type IV. The minimum R-value shall be 5.0 as determined by ASTM C518. The minimum compressive strength shall be 25 psi as determined by ASTM D1621. The maximum water absorption shall be 0.1 percent by volume as determined by ASTM C272. The maximum water vapor permeability shall be 1.1 perm as determined by ASTM E96.

Water main insulation shall be STYROFOAM™ Square Edge by the Dow Chemical Company, STYROFOAM™ Brand Scoreboard by the Dow Chemical Company, or prebid Engineer approved equal.

2.17 CASING PIPE SPACERS AND END SEALS

Casing spacers shall be Model SSI-8 for carrier pipes 24 inches in diameter and smaller and Model SSI-12-2 for carrier pipes 30 inches in diameter and greater as manufactured by Advance Products & Systems, Inc., Lafayette, LA, or prebid Engineer approved equal.

Casing spacers shall be constructed of circular T-304 stainless steel segments, which bolt together forming a shell around the carrier pipe. The spacers shall be designed with risers (when needed) and runners to support and center the carrier pipe within the casing pipe and maintain a minimum clearance of 1 inch between the casing pipe inside diameter (ID) and the spacer outside diameter (OD). On carrier pipes with an OD of 16

inches or less, each spacer shall have four riser/runner combinations—two on each half. On carrier pipes with an OD of 20 inches and greater, the number of riser/runner combinations shall be as recommended by the manufacturer, with four being the minimum. T-304 stainless steel bolts and nuts shall be supplied with the spacers.

The band shall be manufactured of 8-inch (SSI-8) or 12-inch (SSI-12-2) wide, 14-gauge T-304 stainless steel. The risers shall be constructed of T-304 stainless steel having a minimum length of 6 inches (SSI-8) or 10 inches (SSI-12-2). Abrasion-resistant runners, having a minimum length of 7 inches (SSI-8) or 11 inches (SSI-12-2), and a minimum width of 2 inches, shall be attached to each riser to minimize friction between the casing pipe and the carrier pipe as it is installed. Runner material shall be of glass reinforced plastic with the following minimum properties: compression strength of 25,000 psi, flexural strength of 32,000 psi, and tensile strength of 22,000 psi. The ends of all runners shall be beveled to facilitate installation over rough weld beads or the welded ends of misaligned or deformed casing pipe.

Interior surfaces of the stainless steel shell shall be lined with EPDM having a minimum thickness of 0.090 inches with a hardness of durometer "A" 85-90. Placement of the spacers shall be a maximum of one foot on each side of the bell joint and one every 6–8 feet thereafter. End seals shall be Model AW Wraparound casing end seals as manufactured by Advance Products & Systems, Inc., Lafayette, LA, or an approved equal. Full conical-shaped wraparound seals made of 1/8-inch-thick neoprene rubber shall be provided for each end of the casing pipe. T-304 stainless steel banding straps with a 100 percent nonmagnetic worm gear mechanism and pressure sensitive butyl mastic strips shall be provided to seal edges.

2.18 SELECT FILL

The material for select fill shall be minus 1 inch with not more than 10 percent passing the No. 200 sieve. The select fill will be bid per ton and will only be used on a limited basis for replacement material to aid in gaining acceptable trench compaction.

2.19 WATER MAIN BEDDING

The material for water main bedding shall be pea rock or a clean, dry sand meeting the following gradation of minus 1-inch with not more than 10 percent passing the No. 200 sieve. Water main bedding material will be used for both PVC and ductile iron water main. Water main bedding material will be incidental to the various bid items.

2.20 TRENCH STABILIZATION MATERIAL

The material for trench stabilization shall consist of 3/4-inch to 4-inch crushed angular, well-graded material. Larger material may be used if necessary to stabilize the bottom of the trench. The trench stabilization material will be used as directed by the Engineer. The use of trench stabilization material will not eliminate the need for water main bedding material.

2.21 TEMPORARY WATER SERVICE AND TEMPORARY WATER MAIN

Temporary water service and temporary water main bypass pipe and associated appurtenances that may come into contact with water shall meet the requirements of NSF/ANSI Standard 61: Drinking Water System Components—Health Effects and NSF/ANSI 61 Annex G, NSF/ANSI 372. All PVC piping systems shall be manufactured in full conformance with the most current edition of AWWA C900 Standards.

Temporary water main shall be a minimum of 2-inch diameter unless otherwise specified. Products used shall be manufactured only from water distribution pipe and couplings and shall be NSF-approved for potable water use.

Temporary water service and temporary water main bypass pipe shall be manufactured by CertainTeed—Certa-Lok Yelomine or prebid Engineer-approved equal.

3.0 CONSTRUCTION REQUIREMENTS

No valve or other control on the existing water distribution system shall be operated for any purpose by the Contractor.

All fittings, valves, hydrant extensions, etc., will be left open until inspected and measured by the Engineer. When necessary, the Engineer will provide grade stakes for alignment. The Contractor shall carry line and grade into the trench by means of approved survey methods. At no time shall the Contractor or his employees change the grade without approval of the Engineer. If underground interference is encountered at the assigned grade, the Contractor shall notify the Engineer for alternate alignment. The Contractor shall furnish help when requested to stake and measure water main.

3.1 ABANDONMENT OR REMOVAL OF WATER MAIN, FIRE HYDRANTS, VALVES, VALVE BOXES AND WATER MANHOLES

Water main, fire hydrants, valve boxes, and water manholes shall be removed at the locations shown on the plans or as directed by the Engineer. The removal and disposal of valves and fittings shall be considered incidental to the work unless noted otherwise.

Existing water main that is abandoned shall be capped/plugged at the end or filled with flowable fill.

Existing water manholes to be abandoned shall be removed below final grade by a minimum height of 4-feet unless otherwise specified on the plans.

3.2 SALVAGE WATER MAIN, VALVES, AND FIRE HYDRANTS

Water main, valves, or fire hydrants shall be salvaged at the locations shown on the plans or as directed by the Engineer. All salvaged items shall be properly disconnected and transported to the City Department and neatly stockpiled. The Water Department shall be contacted 24 hours prior to delivery of the materials.

3.3 WATER MAIN PIPE

Water main shall be installed in the locations shown on the plans or as directed by the Engineer. Ductile iron water main shall be installed in full conformance to the most current addition of AWWA C600, and PVC water main shall be installed in full conformance to the most current edition of AWWA C605.

Water main shall not be installed in frozen ground or in water, and no water will be allowed to run into or through the pipe. Before installing water main, it shall be cleaned of all foreign matter and kept clean thereafter. Open ends shall be protected at all times to prevent the entrance of dirt, trench water, animals, or foreign matter into the pipe. The bell and spigot shall be wiped clean and sufficient lubrication placed on the gasket and spigot before the pipe is pushed to the insertion line. The spigot shall not be pushed past the insertion line. The lubricant shall be approved for use with potable water.

Field cut spigot ends of push-on joints shall have a square end with beveled edge equal to a factory cut prior to being pushed into the bell. Every pipe shall be bedded uniformly throughout its length with water main bedding material. Care shall be taken to not have any part of the pipe bearing on rocks or stones.

For restrained joint pipe with “grip-” type gasket systems, the Contractor shall set the joint and engage the teeth of the gasket during installation. When installed in encasing pipes, the restrained joint pipe with “grip-” type gasket systems shall be pulled through the encasement in lieu of being pushed to ensure that the locking mechanisms are adequately retained in the socket during installation through the encasement.

Water main shall have a minimum of 6 feet of cover unless otherwise noted on the plans. If 6 feet of cover to the top of the pipe cannot be achieved or maintained, the Engineer shall be notified. If less than 4 feet of cover to the top of the pipe is expected, insulation shall be used to protect the water main from freezing. The Engineer shall determine if insulation is required if the cover depth is between 4 and 6 feet to the top of the pipe. Whenever insulation is required for water main, individual water services should be evaluated for insulation requirements. The insulation work shall be in accordance with the special provisions, drawings, and manufacturer’s recommendations.

3.4 EXTRA DEPTH WATER MAIN PIPE

Extra depth water main shall be installed in the locations shown on the plans or as directed by the Engineer. Extra depth water main is water main that is installed using the open cut method resulting in 8 feet or more of cover as measured from the top of the pipe to the finished surface elevation. Water main installed with 6 to 8 feet of cover is considered normal depth water main installation.

3.5 TRACER WIRE

Tracer wire shall be installed with PVC and ductile iron water mains. The wire shall be installed along the lower quadrant of the pipe, but the pipe shall not be laid directly on the wire. Ground rods shall be installed adjacent to connections to existing piping and in the locations specified on the plans. The tracer wire shall be brought to each fire hydrant and connected to a 60-inch ground rod that extends up to the bottom of the breakaway flange. The ground rod shall be duct taped to the fire hydrant barrel in at least four locations below the ground surface. The tracer wire shall be spliced only if approved by the Engineer. All underground splices shall be inspected by the Engineer prior to backfilling. The tracer wire system is considered incidental to the installation of the water main and its appurtenances. The Contractor shall review test methods with the Engineer and be responsible for testing the tracer wire system for conductivity. Testing for conductivity shall be completed after the service lines have been tapped. If the tracer wire system does not function as intended, the Contractor shall repair the system to the satisfaction of the Engineer.

3.6 POLYETHYLENE ENCASEMENT

All buried ductile iron water main, fittings, valves, rods, hydrants, and appurtenances shall be encased in polyethylene in full conformance with the most current edition of AWWA C105, Method A for tube-type installation with 8-mil nominal thickness. The polyethylene

shall be cut 2 feet longer than the pipe section and shall overlap the ends of the pipe by 1 foot. The polyethylene shall be gathered and lapped to provide a snug fit and shall be secured at quarter points and each end with polyethylene tape. The polyethylene shall prevent contact between the pipe and bedding material but is not intended to be a completely airtight and watertight enclosure. Damaged polyethylene shall be repaired in a workmanlike manner using polyethylene tape or shall be replaced. The polyethylene encasement is considered incidental to the installation of the water main and appurtenances.

3.7 TRENCHLESS CONSTRUCTION

Refer to Special Provision for Trenchless Construction.

3.8 WATER MAIN CONNECTIONS

Water main shall be connected to and extended by utilizing one of the following methods unless otherwise specified:

- A. Connect to Existing Water Main: The Contractor shall remove an existing plug, cap, reaction blocking or hydrant, prepare the end of the existing water main, and complete the new water main connection.
- B. Cut and Tie to Existing Water Main: The Contractor shall cut into an existing water main, prepare the end of the existing water main, and complete the new water main connection.
- C. Smith Tap: The Contractor shall excavate a trench at the water main to perform a smith tap into the existing water main. The Contractor will furnish and install the tapping sleeve, valve, and valve box and then backfill the trench.

When using methods A or B, interruption of service to surrounding properties will be minimized; the Contractor shall have all materials for the connection on site, and to the extent possible, shall have fittings assembled and tied prior to cutting the existing water main and making the connection. When necessary, pipe cutting shall be neat and completed in a workmanlike manner without damage to the pipe, interior lining, or exterior coating. Cutting shall be performed with an approved mechanical cutter, using a wheel cutter when applicable and practical. Piping systems shall be cleaned and swabbed with a bleach solution to minimize contamination. Once the connection has been completed, pressure and bacteria testing shall be conducted.

3.9 VALVES AND FITTINGS

Valves and fittings shall be installed at the locations shown on the plans or as directed by the Engineer. Valves and fittings shall be installed in accordance with the most current edition of AWWA C600 and encased in polyethylene in accordance with the most current edition of AWWA C105. Valves and fittings shall remain exposed until the Engineer has visually inspected and measured the as-built locations.

Extensions shall be used when the valve operation nut is deeper than 10-feet. Pin all extension stem connections. Center in valve box with guide bushing. The extension shall bring the operating nut to within 8-feet of the surface.

Proper concrete blocking shall be installed under all valves.

3.10 VALVES BOXES

The Contractor shall ensure that valve boxes are plumb prior to backfilling. Valve stems within valve boxes shall be clear of any debris. The Contractor is responsible for checking stems and boxes so they can be freely operated after backfilling operations, prior to paving, and at project completion.

- A. Valve Box Adjustment: The Contractor shall adjust the valve boxes to the final grade as shown on the standard plates.
- B. Valve Box Extension: The Contractor shall extend existing valve boxes if the existing box has inadequate adjustment length remaining or if extra depth water main had been installed that requires the use of an extension.
- C. Valve Box Replacement: The Contractor shall replace existing valve boxes as specified. This work includes excavating to the existing valve and removing the existing valve box. A new valve box shall be installed and the trench backfilled.
- D. Valve Box Markers: Valve markers shall be installed for all valves outside of the street right-of-way that are not in paved areas unless otherwise indicated.

3.11 CONCRETE THRUST BLOCKS

The Contractor shall brace all fittings including mechanical joint caps by means of poured concrete or precast concrete thrust blocks. Concrete shall be poured against undisturbed earth. Care shall be taken not to cover up joints, bolts, and fittings with concrete. If a concrete thrust block cannot be poured due to poor soil condition or inadequate support for blocking, restrained joints shall be utilized. The cost for blocking is considered to be incidental to the installation of the pipe, fire hydrant or valve.

3.12 RESTRAIN EXISTING VALVE

Joint restraints for valves shall be installed at the locations shown on the plans or as directed by the Engineer. Joint restraints shall be installed in accordance with the manufacturer's recommendations.

3.13 RESTRAIN EXISTING PIPE JOINT

Joint restraints shall be installed at the locations shown on the plans or as directed by the Engineer. Joint restraints shall be installed in accordance with the manufacturer's recommendations.

3.14 FIRE HYDRANTS

Fire hydrants shall be installed at the locations and elevations as shown on the plans or as directed by the Engineer and in accordance with the most current edition of AWWA C600.

The centerline of the nozzles shall be a minimum of 18 inches above the finished surface elevation but no higher than 24 inches. The bottom of the breakaway flange shall be 2 to 4 inches above the finished surface elevation. Fire hydrants shall be installed 3 to 5 feet behind the back of curb unless otherwise indicated on the plans, stand plumb, and have their nozzles parallel with or at right angles to the street centerline, with the pumper nozzle facing the street. Hydrant markers shall be affixed after each hydrant becomes operational.

Flushing hydrants installed for testing purposes shall be removed once testing has been completed. If the flushing hydrants will remain in place for the duration of a winter season, they shall be installed behind the existing or proposed curb and gutter.

Hydrant leads shall be a minimum of 6 inches in diameter and have a gate valve located as close as possible to the tee. Hydrant lead valve shall be mechanically restrained and attached to the tee. Restrainer devices will be required on all bends. Hydrants shall be set on a concrete block to prevent settlement. Concrete thrust blocks shall be installed against undisturbed soil to prevent movement of the hydrant lead.

Hydrant bases shall be backfilled with a minimum of 1/3 cubic yard of 1 1/2-inch crushed rock to facilitate drainage. The crushed rock shall extend to 6 inches above the weep hole and be covered with two layers of heavy felt paper or heavy construction plastic. Before installing the ground rod or tracer wire, the fire hydrant barrel shall be encased in polyethylene up to the ground surface. The weep holes shall not be covered by the polyethylene.

A 60-inch ground rod shall be taped to the fire hydrant barrel at a minimum of four locations and be extended to the bottom of the breakaway flange. Tracer wire shall be attached to the bottom of the ground rod.

3.15 FIRE HYDRANT EXTENSION

Fire hydrant extensions shall be installed to ensure the hydrant nozzle is at the correct elevation. The Contractor shall remove and reinstall the top section of the fire hydrant as part of this work.

3.16 NUTS AND BOLTS

Bolts shall be installed and the nuts tightened alternately to the specified torque, such as to produce equal pressure on all parts of the gland. Unless otherwise specified, the bolts shall be tightened by means of a suitable torque-limiting wrench.

3.17 WATER SERVICES

All water service disconnections, connections, or taps to the water main system shall be made by the Contractor. The Contractor must coordinate all service connections or disconnections. Where hydrostatic pressure testing cannot be performed, the leak free connection shall be visually verified by a City Representative. Service connections or disconnects are made using one of the following methods unless otherwise specified:

- A. Water Service Trench: The Contractor is responsible to excavate a trench between the new water main and the proposed curb stop location, which in most cases is located at the property line unless otherwise specified to allow installation of the tap, water service, and curb stop. The trench shall then be backfilled.
- B. Water Service Boring: Where indicated on the drawings or allowed by the Engineer, the Contractor shall bore the water service from the curb stop location to the water main to allow installation of the tap, water service, and curb stop. The excavated bore pits shall then be backfilled. Water service bores must terminate within 3 feet of the targeted location. Payment may be adjusted if this requirement is not met. If a pneumatic bore hog is used, then services must be installed starting from the curb stop and ending at the water main to ensure that the new service line connects to the existing without an offset in the line. A pneumatic bore hog may only be used for water service bores that are 65 feet in length or less due to the absence of directional control and the greater risks of drifting. A pneumatic bore hog may not be used if a "directional bore" or "directional drill" is specified or called out.

Water services shall have a minimum of 6 feet of cover unless otherwise noted on the plans. If 6 feet of cover to the top of the service cannot be achieved or maintained, the Engineer shall be notified. If less than 4 feet of cover to the top of the service pipe is expected, insulation shall be used to protect the water main from freezing. The Engineer shall determine if insulation is required if the cover depth is between 4 and 6 feet to the top of the service pipe. The insulation work shall be in accordance with the special provisions, drawings, and manufacturer's recommendations.

Water service curb stop valves and boxes shall be installed by the Contractor in accordance with the City Water Service Installation detail. Curb stops for water services shall be installed where shown on the plans or staked in the field and shall be located within City boulevards where it is practical.

Water service taps to the water main system will be made by the Contractor with the following requirements:

- A. Where the interruption of water services is prohibited, the contractor shall tap the service "live". If the service is tapped in a low pressure or no pressure situation, the tap shall be left exposed until the main pressure has been restored and a water tight connection has been verified.
- B. Service connections or taps to new or existing water main will not be permitted until the subject water main has passed the necessary disinfection

requirements. Per the City's Water Service Installation detail, service taps/saddles must be adequately supported with concrete blocking prior to backfilling and the service saddle and service line shall be bedded with sand or other such material to provide a uniform and consistent bed to 2-inches above both the spring line of the pipe and around the corporation stop.

- C. The service taps operation, installation of tapping saddles and service corporation stops shall be in accordance with the manufacturer's recommendation. Water services shall not be tapped off water mains 16-inches and larger in diameter unless approved by City Engineering.
- D. The hole drilled or cut in the main shall be equal to the stated nominal size of the threaded tap on the saddle. Effort should be made to tap the water main perpendicular to the curb stop.
- E. Holes cut in PVC water mains shall be accomplished with a ribbon-type cutter. Drills and hole saws are prohibited. Ribbon cutters shall be advanced slowly and not forced through the pipe wall. Forcing the bit will cause undue heat or fracturing of the PVC material.
- F. Holes cut in DIP water mains may be accomplished by either drilling or the use of a hole saw.
- G. The outside of the pipe shall be cleaned thoroughly of all dirt, grease, oil and other foreign matter prior to installing the saddle.
- H. Bolts shall be drawn up in an acceptable pattern and torqued to the manufacturer's specifications.
- I. Corrosion Protection: The water tap material shall be protected from corrosion by use of V-Bio Polywrap. The minimum polywrap width shall be 3 feet. The wrap shall be held firmly in place with tape. Backfilling operations shall be conducted as to not damage or displace the wrap.
- J. Ball valve corporation stop support: The ball valve corporation stop shall be supported as shown in the Water Service Installation detail.
- K. Effort should be made to tap the water main perpendicular to the curb stop.

Water service disconnect for 1- to 2-inches shall be at the corporation stop. The disconnect shall be for the City crew to turn off the corporation stop and to either pinch and fold back the service piping or disconnect the service piping from the corporation stop.

Water service disconnect for 4-inches and larger shall be at the service tee. The disconnect shall be for the Contractor to plug the service at the tee.

3.18 WATER SERVICE CURB STOP

Water service piping sized 1-inch to 2-inch shall have a curb stop installed. Water service curb stop valves and boxes shall be installed in accordance with the City Water Service Installation detail.

3.19 WATER SERVICE CURB STOP RELOCATION

Water service curb stop relocation shall include removing the valve box stem and curb stop box, installation of any water service piping needed to relocate, and a new curb stop and curb stop box. Typically, relocation will be to the property line unless otherwise required by the Engineer.

The Contractor shall verify the original curb stop is in the fully open position and water tight prior to removal of the water curb stop box. If the existing curb stop is damaged or leaking in any way, piping shall replace the damaged curb stop.

3.20 WATER SERVICE PIPING

Water service piping shall be installed in accordance with the City's Water Service Installation detail. Service lines between the water main and the curb stop need to be one continuous length of pipe, splicing of pipe is not allowed.

Unless plan documents state otherwise, all water service piping shall be installed by the City in development situations and water service piping shall be installed by the Contractor on City funded projects.

Where City crews will install the water service piping, the Contractor is responsible to excavate a trench between the new water main and the proposed curb stop location. City crews will install the water service piping from the water service tap to the water service curb stop. The Contractor shall install the curb stop valve box. The trench shall then be backfilled by the Contractor.

3.21 BEDDING, BACKFILL, AND COMPACTION

All bedding and backfill areas shall be subject to compaction testing by nuclear or standard methods according to the latest applicable ASTM Specifications D6938 for compaction and D698 for standard proctor.

The trench bedding shall be undercut a minimum of 6 inches below the grade line of the pipe and uniformly backfilled with bedding material to the grade-line of pipe. After the pipe has been installed on top of the first layer of bedding material, the haunching area shall be backfilled with bedding material up to the "spring-line" (halfway) on the pipe. The bedding material shall be placed uniformly without void space around the pipe to assure adequate and uniform support along the bottom of the pipe. Care shall be taken to prevent dislodging and misalignment of the pipe and to provide adequate bell hole for the pipe. Bedding Material shall be installed to a minimum of 6-inches above the top of the pipe and a minimum of 12-inches on both sides of the pipe. Clean, dry sand may be used for trench bedding.

After the trench bedding is installed, the trench shall then be initially backfilled with suitable material which shall consist of approved excavation material, granular material, or as otherwise specified by the Engineer. Sand may be used if approved by the Engineer. Care shall be taken in placing initial backfill over the sand bedding to avoid damage to the pipe. No less than 24 inches and no greater than 36 inches of appropriate backfill shall be placed over the top of the trench bedding before the trench is compacted. The initial backfill shall be compacted by suitable and approved compaction methods to at least 95 percent Standard Proctor Density, or as otherwise specified prior to proceeding with final backfill.

The final backfill shall be placed in 12-inch lifts and compacted by suitable and approved compaction methods in a manner approved by the Engineer to at least 95 percent Standard Proctor Density, or as otherwise specified. Excess material not required for final backfilling shall be removed by the Contractor or otherwise disposed of as ordered by the Engineer. In final backfill areas below pavement, the Engineer may direct the Contractor to use native material a specified distance below the pavement elevation to ensure a consistent material is utilized under the pavement section.

If the material encountered in the trench excavations is unsuitable to be used as initial or final backfill material, it shall be replaced with other suitable material available at the project site or with granular material, as approved by the Engineer.

Material for all stages of backfilling is to be free of rock, frozen materials, and hard clay. The Engineer may take random compaction tests of the backfill material. If any of these tests indicate that the material has not been compacted to the required density, the Engineer shall have the right to require additional compaction tests to assure that this or other material is compacted to the proper density without any additional cost to the Owner.

3.22 EXCAVATION

Trenches shall be excavated on lines furnished by the Engineer. Excavation shall be classed as either rock or earth excavation. Rock excavation shall consist of solid rock lying in its natural bed, which requires fracturing for its removal and boulders one cubic yard in volume or greater. All other materials shall be classed as earth excavation.

A. *Earth Excavation*

Water mains shall be installed using the open cut method, except that where conditions warrant, the Engineer may permit the use of short tunnels. In unstable soil, the trench shall be supported by shoring or sheeting as required to prevent caving. Sheeting shall be withdrawn after the pipe has been properly covered.

Wherever, in the opinion of the Engineer, the bottom of the trench does not afford a reliable or suitable foundation, the trench shall be excavated to such additional depth as is required and replaced with trench stabilization material. Pipe bedding material will always be required in addition to trench stabilization material.

3.23 SHEETING AND BRACING

If City, state, or federal regulations dictate the necessity of sheeting, bracing, or pulling a trench box or shield, the cost of such sheeting, unless a special price is called for in the contract proposal form, shall be included in the contract bid price for installing water main.

3.24 DEWATERING

Water main installation shall be accomplished in a relatively dry trench. Joints shall not be connected under water. If ground water is encountered, the Contractor shall dewater the trench with suitable pumps and equipment. Lowering of the groundwater level shall be by means of wells, well points, or other suitable means.

Water resulting from the dewatering operation shall be disposed of in a manner approved by the Engineer and South Dakota Department of Agriculture and Natural Resources (DANR). It shall not be pumped onto private property without the property owner's approval. Any damage to property, either public or private, shall be rectified to the satisfaction of the owner and the City. If dewatering operations are expected, construction documents shall describe methods for providing temporary erosion control devices or note that a dewatering permit has been issued by the South Dakota DANR.

When dewatering is paid for, it shall be considered as dewatering only when a manifold or pump and system of well points is installed to lower ground water such that excavation and construction can take place. The process of pumping water out of the trench with a suction hose and pump will not be considered as dewatering.

3.25 UNDERGROUND INTERFERENCE

The location of existing underground public or private utilities may be shown on the plans, as reported by the various utility companies and the City, but this does not relieve the Contractor of the responsibility of determining the accuracy or completeness of said locations.

The Contractor shall determine the location of all underground ducts, conduits, pipes, or structures, which will be affected by the work, and shall take steps necessary to support, protect, remove, or relocate said structures by any means suitable to the owners of the structure involved and the Engineer. In those instances where their relocation or reconstruction is impracticable, a deviation from line and grade may be ordered by the Engineer.

The Contractor shall be responsible for notifying the various utility companies if the Contractor's work will expose, affect, or endanger any existing utility. The Contractor shall not begin construction until all utility companies have been contacted and their respective underground utilities have been located and marked.

The bid item "Locate Utility" will be used to locate waterlines only if the service location marked exceeds the actual service location by 4 feet in either direction and additional excavation is required. The bid item "Verify Utility" will be used only when it is necessary to excavate down to the utility to determine if any vertical and/or horizontal conflicts

exist between existing utilities and the proposed new waterlines to be installed as shown on the plans. All costs of other exploratory investigation/excavation necessary for determining the location and depth of utilities shall be included in the contract bid price for installing pipe.

3.26 DISINFECTION, FLUSHING AND BACTERIOLOGICAL TESTING

The Contractor shall place sufficient chlorine tablets or chlorine powder in the water main as it is installed as required by the most current addition of AWWA C651 disinfection standards.

Once water main construction is complete, the Contractor shall request to have the pipe segment filled by City personnel. The chlorinated water shall remain in the water main for a minimum of 24 hours. Upon completion of the minimum contact time, the Contractor shall flush the water main. In order to prevent corrosion damage to the pipe lining, heavily chlorinated water shall not remain in contact with the water main for more than 72 hours. The water main shall be adequately flushed to remove all heavily chlorinated water and remaining particulates.

The Contractor will be responsible for disposal of heavily chlorinated water such that residual levels of chlorine in the discharge water do not exceed 0.05 mg/L when entering the Waters of the State.

Once flushing is complete, the Contractor will collect a water sample from an acceptable source for coliform bacteria testing. A minimum of one sample will be required for every 1,200 feet of water main installed. If the coliform bacteria test passes (coliform bacteria absent), the water main can be put into service and service lines tapped. If the coliform bacteria test fails (coliform bacteria present), the Contractor must reflush and resample. If the coliform bacteria test fails after the second attempt, the Contractor shall rechlorinate the water main by the continuous feed or slug method (liquid chlorine injection through a service tap) until the coliform bacteria test passes. If water services have been installed then they shall also be flushed and disinfected to pass the bacteriological testing.

For all projects funded through the State Revolving Fund (SRF), a minimum of two consecutive passing coliform bacteria samples are required.

This testing is considered incidental to the installation of the water main and its appurtenances.

3.27 HYDROSTATIC PRESSURE TESTING

Upon completion of the water main and water service installation, they shall be hydrostatically tested using the following guidelines:

- A. For water mains 12 inches and smaller, a pressure of 120 psi shall be maintained for a period of two hours and segments of pipe to be tested shall not exceed 1,200 lineal feet. The Engineer or his appointed representative shall observe the pressure gauge readings before acceptance of the test.

- B. For water mains larger than 12 inches, a pressure of 150 psi shall be maintained for a period of two hours and segments of pipe to be tested shall not exceed 1,200 lineal feet. The Engineer or his appointed representative shall observe the pressure gauge readings before acceptance of the test.

Procedure

Tests shall be performed only after the pipeline has been properly filled, flushed, and purged of air. If the pressure drops during testing, repressurize the pipe by pumping in potable water in sufficient quantity to bring the pressure back to the original test pressure after the two-hour test has concluded. Accurately measure the amount of water required to repressurize the system to the initial test pressure.

Test Allowance

The testing allowance shall be defined as the quantity of water that must be supplied to the pipe section being tested to maintain a pressure within 5-psi of the specified hydrostatic test pressure. No installation will be accepted if the quantity of makeup water is greater than that determined by the following formulas:

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

Where:

Q = allowable leakage, in gallons per hour

L = length of pipe section being tested, in feet

D = nominal pipe diameter, in inches

P = average test pressure, in pounds per square inch

If the average measured leakage per hour exceeds the maximum allowable leakage rate, repair and retest the water main. Repair all visible leaks regardless of the amount of leakage. No installation will be accepted without a passing hydrostatic pressure test.

Pressure testing of the water main shall include the installed water services (unless noted otherwise) and is considered incidental to the installation of the water main. All water main that cannot be hydrostatically tested such as connections to existing mains shall be tested uncovered at system pressure to observe visible leaks as directed by the Engineer.

3.28 DISINFECTION, BACTERIOLOGICAL, AND PRESSURE TEST SEQUENCING

Sequencing shall be followed by the Contractor unless an alternative sequencing plan is provided in writing by the Contractor and approved by the City prior to performing any of the required sampling or pressure testing:

- A. Once water main construction is complete, the Contractor can begin filling the water main.
- B. Upon completion of the minimum chlorine contact time, the Contractor shall begin purging air from line segment.

- C. Once air has been purged from the line segment, the line segment shall be hydrostatically tested in accordance with these specifications.
- D. The Engineer or his appointed representative shall observe the pressure gauge readings before acceptance of the test. The Contractor shall provide evidence to the Engineer or his appointed representative that the test hydrant lead valve is in the open position prior to initiating the pressure test.
- E. Should the test disclose damaged or defective materials or leakage greater than that permitted, the Contractor shall at his own expense locate and repair and/or replace any defective materials. The test shall be repeated until the leakage is within the permitted allowance.
- F. Once a passing hydrostatic test has been obtained, the water main shall be adequately flushed by the Contractor. The Contractor will be responsible for disposal of heavily chlorinated water.
- G. Once flushing is complete, the line segment shall be bacteriological tested in accordance with these specifications.

The Contractor shall furnish all pumping equipment, labor, gauges, and other appurtenances required for the pressure test. This testing is considered incidental to the installation of the water main and appurtenances.

3.29 INTERRUPTION OF SERVICE

The Contractor shall notify all customers affected by any interruption of water service at least 24 hours before the interruption of water service. Customers shall be verbally notified and provided an interruption of service notice. In the event a consumer cannot be verbally notified, the Contractor shall secure the interruption of service notice provided by City Engineering to the most frequently used entrance.

The Contractor shall initiate valve operation requests with the City of Huron Water Department at least 24-hours in advance of service interruption.

3.30 TEMPORARY WATER SERVICE AND TEMPORARY WATER MAIN

The Contractor shall coordinate with all property owners when a disruption in water service is expected. Contractor will complete connections to minimize disruptions in water service either during the day or at other suitable times that meet the needs and requirements of the property owner(s).

The Contractor must provide a 24-hour contact person who has adequate parts and equipment on hand to make necessary repairs to temporary water service in a timely manner.

Products used shall be manufactured only from water distribution pipe and couplings and shall be NSF-approved for potable water use.

Temporary water main is required to be disinfected, flushed, and sampled (a single passing bacteriological test) prior to any service connections being made. Two consecutive coliform bacteria tests shall be taken 24 hours apart when the project is SRF-funded. The temporary water main shall be tested at static main pressure for a period of two hours.

Chlorination, testing, pipe, necessary isolation valves, bends, fittings, hydrants, all necessary appurtenances, gravel ramp construction, maintenance and removal, and all other materials and labor necessary to construct the temporary water main and flush each individual service before connection to the City water system shall be considered incidental to each temporary water service.

Contractor is to submit temporary water service and water main layout, sequence of operations, and schedule material and fitting specifications to the Engineer four days prior to the project preconstruction meeting. Any changes to the proposed temporary water service layout shall be approved by the Engineer prior to the preconstruction submittal.

Gravel ramps shall be constructed over the temporary water main where necessary and at all driveway approaches and are considered incidental to the various bid items.

3.31 SURFACE RESTORATION AND CLEANUP

Unless stated specifically to the contrary in the Special Information Provisions, the Contractor shall replace all surface material and shall restore paving, curb and gutter, sidewalks, fences, trees, sod, topsoil, and other items disturbed to a condition equal to or better than that before the work began, furnishing all labor, materials, and equipment necessary to do this work. Traveled streets shall be kept open and maintained by the Contractor after backfilling and before surfacing or final inspection. The cost of all such work shall be absorbed in the unit price bid for pipe installation unless otherwise specified in the Special Information Provisions or Bid Proposal.

3.32 GENERAL

The Engineer or his/her representatives shall have access at all times to all parts of the job, and the Contractor must furnish such personnel, facilities, equipment, tools, and materials as are necessary to make whatever tests and inspections that are deemed necessary.

4.0 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 REMOVE WATER MAIN, FIRE HYDRANT, VALVE BOX, & WATER MANHOLE

The removal of water main shall be measured to the nearest lineal foot of pipe removed. No measurement will be made for the removal of short sections of abandoned water main if it must be removed to facilitate the installation of new water main or other utilities.

The removal of fire hydrants, valve boxes and water manholes shall be measured per each removed. The removal of valves shall be incidental to the removal of the water main. Disposal of water main, hydrants, valve boxes, and manholes shall also be considered incidental.

Payment for removal of water main will be at the contract unit price per foot regardless of variations in pipe size, materials or depths. Payment for the removal of fire hydrants, valve boxes and water manholes will be at the contract unit price per each and shall be full compensation for all labor, equipment, and incidentals necessary to complete the work.

4.2 ABANDON WATER MANHOLE, WATER MAIN AND VALVE

The abandonment of water manholes shall be measured as a unit for each water manhole abandoned. Abandoning water main shall be measured as a unit for each cap or plug. Usage of K-Crete shall be considered incidental unless noted otherwise.

Payment for water manhole abandonment will be at the contract unit price per each and shall include full compensation for all labor, materials, equipment, and incidentals necessary to abandon the water manhole including breaking the manhole down to the required height, furnishing and installing the sand, and backfilling to finished grade.

Payment for all caps or plugs shall be paid for at the contract unit price per each. Payment for K-Crete will be considered incidental to the abandonment bid item. Payment for water main abandonment shall be incidental to the installation of water main. Payment for valve abandonment shall be incidental to the installation of water main.

4.3 SALVAGE WATER MAIN, VALVE, VALVE BOX, AND FIRE HYDRANT

Salvage water main shall be measured per lineal foot salvaged. Valves, valve boxes and fire hydrants shall be measured per each item salvaged. Payment will be at the contract unit price per each and shall include full compensation for all labor, equipment, and incidentals necessary to complete the work including delivery costs.

4.4 WATER MAIN

Water main shall be measured to the nearest lineal foot for the respective types and sizes of water main pipe. Measurement shall be from center to center of fittings or to the end of pipe. Payment will be at the contract unit price per lineal foot and will be full compensation for all materials, labor, equipment, and incidentals necessary to complete

the installation of the water main including gaskets, polyethylene encasement, trench dewatering (unless otherwise specified), excavating and backfilling, disinfection and bacteriological testing, hydrostatic testing, thrust/reaction blocking, and tracer wire.

4.5 EXTRA DEPTH WATER MAIN

Extra depth water main shall be measured to the nearest lineal foot for the respective types and sizes of water main pipe. Measurement shall be from center to center of fittings or to the limits of the extra depth water main installed.

Payment will be at the contract unit price per lineal foot and shall include full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the water main including but not limited to gaskets, polyethylene encasement, trench dewatering (unless otherwise specified), excavating and backfilling, disinfection and bacteriological testing, hydrostatic testing, thrust/reaction blocking and tracer wire.

4.6 TRACER WIRE

No measurement or payment will be made. The tracer wire system is considered incidental to the installation of the water main and its appurtenances.

4.7 POLYETHYLENE ENCASEMENT

No measurement or payment will be made. Polyethylene encasement is considered incidental to the installation of ductile iron pipe, all fittings, valves, rods, hydrants, and appurtenances.

4.8 TRENCHLESS CONSTRUCTION

Refer to Special Provisions for Trenchless Construction.

4.9 MECHANICAL JOINT FITTINGS

Mechanical Joint (MJ) fittings shall be measured per each type and size fitting furnished and installed. Mechanical Joint (MJ) fittings include elbows, tees, reducers, crosses, slip joint plugs, and mechanical joint caps and sleeves. All fittings shall be bid complete with gaskets, bolts, and other appurtenances.

Payment will be at the contract unit price per each and will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the MJ fittings.

4.10 RESTRAINER DEVICES

Payment for restrainer devices shall be incidental to the contract unit price for the size of water main installed unless noted otherwise. Payment will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the restrainer devices.

4.11 WATER MAIN ADJUSTMENT

Water main adjustment shall be measured as a unit for each respective size of adjustment completed. The water main adjustment shall be paid for at the contract unit price per each for the size of water main adjusted.

Payment for water main adjustment shall be full compensation for excavating, dewatering of the water main and trench, additional time required for the installation of materials, backfilling, and all necessary appurtenances for proper completion of the water main adjustment. All materials required for the water main adjustment are paid for under their respective bid item. Water main adjustment is considered additional pay that is required to complete the adjustment.

4.12 CONNECT TO EXISTING WATER MAIN

Connect to existing water main shall be measured per each water main connection location. Payment will be at the contract unit price per each and will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the connection.

4.13 CUT AND TIE TO EXISTING WATER MAIN

Cut and tie to existing water main shall be measured per each water main cut and tie location. Payment will be at the contract unit price per each and will be full compensation for all materials, appurtenances, labor, equipment, and incidentals necessary to complete the connection.

4.14 EXCAVATE AND BACKFILL FOR CITY FURNISHED SMITH TAP

Measurement shall be per each location excavated and backfilled for the installation of a City-furnished smith tap valve and sleeve. Payment will be full compensation for all labor, equipment, and incidentals necessary to complete the work. Separate payment will be made for furnishing and installing the valve box.

4.15 VALVES AND VALVE BOXES

Valves and valve boxes shall be measured as a unit per each type and size of valve with valve box furnished and installed.

Payment for valves with boxes shall be at the contract unit price per each and shall be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the valve and box. The valve box shall be incidental to the valve. Payment for valves and valve boxes shall be per each and shall be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the valve.

4.16 VALVE BOX ADJUSTMENT, EXTENSION, OR REPLACEMENT

Valve box adjustments, extensions, or replacements shall be measured per each. A valve box adjustment will be measured whenever a valve box must be adjusted to final grade including all new installations, extensions, and replacements; however, valve box adjustments will only be measured once per valve per project. Payment will be at the

contract unit price per each and will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the valve box adjustment, extension, or replacement.

4.17 VALVE BOX MARKER

Valve box markers shall be measured per each marker furnished and installed. Payment will be at the contract unit price per each and will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the valve box marker.

4.18 CONCRETE THRUST BLOCKS

No measurement or payment will be made. All costs associated for blocking is considered to be incidental to the installation of the fittings and their appurtenances.

4.19 RESTRAIN EXISTING VALVE

Valve restraints shall be measured per each existing valve size, furnished and installed.

4.20 RESTRAIN EXISTING PIPE JOINT

Retainer devices shall be measured per each respective type and size of retainer device, furnished and installed.

Payment will be at the contract unit price per each joint and shall include full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the retainer devices

4.21 FIRE HYDRANT

Fire hydrants shall be measured per each unit furnished and installed. Payment will be at the contract unit price per each and will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the fire hydrant and fire hydrant marker.

4.22 REMOVE & RELOCATE FIRE HYDRANT

Fire hydrants removed and relocated shall be measured per each. Payment will be at the contract unit price per each and shall include full compensation for all materials, labor, equipment, and incidentals necessary to complete the removal and relocation of the fire hydrant.

4.23 FIRE HYDRANT EXTENSION

Fire hydrant extensions shall be measured per each size of extension furnished and installed. Measurement will only be made if the existing conditions prevented the installation of the fire hydrant at the correct elevation.

Payment will be at the contract unit price per each and will be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the fire hydrant extension.

4.24 TEMPORARY FIRE HYDRANT

Temporary fire hydrants shall be measured per each furnished, installed, and removed. Payment will be at the contract unit price per each and shall include all materials, labor, equipment, and incidentals necessary to complete the work including excavating, backfilling, gaskets, connection, and disconnection.

4.25 WATER SERVICE DISCONNECT, WATER SERVICE SETBACK, AND WATER SERVICE RECONNECT

Water service disconnects, water service setbacks, and water service reconnects shall be measured per each trench excavated and backfilled or bored. Measurement will be made only once if more than one disconnection, setback, or reconnect can be performed in one common trench. Payment will be at the contract unit price per each and will be full compensation for all labor, equipment, fittings, connections, tapping saddle, corporation stop, service tap, flushing, sterilization, and incidentals necessary to complete the work.

If the service reconnection requires less than 5 feet of new water service piping, the water service piping required for the service reconnection shall be considered incidental to the bid item "Reconnect Water Service". Water service piping necessary in excess of 5 feet shall be measured and paid under the bid item "F&I Copper Water Service".

4.26 WATER SERVICE CURB STOP

Water service curb stop shall be measured and paid per each for the respective size, furnished and installed. All fittings and connections necessary to complete the installation shall be considered incidental to the bid item.

Payment will be at the contract unit price per each and will be full compensation for all labor, materials and equipment necessary to complete the installation of the curb stop valve and valve box.

4.27 WATER SERVICE CURB STOP RELOCATION

Water curb stop relocation shall be measured and paid per each for the respective size of service. All fittings, piping and connections necessary to complete the installation shall be considered incidental to the bid item.

Payment will be at the contract unit price per each and shall include full compensation for all labor, materials and equipment necessary for the water service curb stop relocation.

4.28 WATER SERVICE PIPING

Furnish and install water service shall be measured to the nearest lineal foot of water service installed for the respective material and size of piping. All fittings and

connections necessary to complete the installation shall be considered incidental to the bid item. Measurement will normally be from the water main to the curb stop.

Payment will be at the contract unit price per foot and will be full compensation for all labor, equipment, and incidentals necessary to complete the installation of the service piping.

4.29 WATER MAIN INSULATION

Insulation for water main shall be measured to the nearest lineal foot furnished and installed. Payment will be at the contract unit price per nearest lineal foot and will be full compensation for all materials labor, equipment, and incidentals necessary to complete the installation of the insulation.

4.30 WATER MAIN AND WATER SERVICE BEDDING MATERIAL

Water main and water service bedding material shall be considered incidental to the various water main and water service bid items. Payment be full compensation for all materials, labor, equipment, and incidentals necessary to complete the installation of the water main bedding material.

4.31 TRENCH STABILIZATION MATERIAL

The furnishing and installing of trench stabilization material shall be measured as tons of trench stabilization material to the nearest 0.1 ton. The accepted quantities of furnished and installed trench stabilization material will be paid for at the contract unit price per ton. Payment for trench stabilization material will be full compensation for furnishing and installing the trench stabilization material, excavation, removal and disposal of unstable soils, and all appurtenances necessary for the proper installation of the material.

4.32 SELECT FILL FOR WATER MAIN

The furnishing and installing of select fill for water main shall be measured as tons of select fill for water main material to the nearest 0.1 ton. The accepted quantities of furnished and installed select fill for water main will be paid for at the contract unit price per ton. Payment for select fill for water main will be full compensation for furnishing and installing the select fill for water main and all necessary work for the proper installation of the material.

4.33 EARTH EXCAVATION

No measurement or payment will be made. Excavation is considered incidental to the installation of the water main and all appurtenances.

4.34 SHEETING AND BRACING

If City, state, or federal regulations dictate the necessity of sheeting, bracing, or pulling a trench box or shield, the cost of such sheeting shall be included in the contract bid price for installing water main unless otherwise stated in the plan documents.

4.35 TRENCH DEWATERING

No measurement or payment will be made. Dewatering is considered incidental to the installation, replacement or removal of the water main and its appurtenances unless stated otherwise in the plan documents.

4.36 UNDERGROUND INTERFERENCE

The bid item "Locate Utility" will be used to locate waterlines only if the service location marked exceeds the actual service location by 4-feet in either direction and additional excavation is required.

The bid item "Verify Utility" will be used only when it is necessary to excavate down to the utility to determine if any vertical and/or horizontal conflicts exist between existing utilities and the proposed new waterlines to be installed as shown on the plans.

All costs of other exploratory investigation and/or excavation necessary for determining the location and depth of utilities, protection, support, removal, or relocation of said structure shall be included in the contract bid price for installing or replacing water main and its appurtenances, unless specifically provided for in the bid items.

4.37 DISINFECTION, BACTERIOLOGICAL TESTING, HYDROSTATIC TESTING

No measurement or payment will be made. These items are considered incidental to the installation or replacement of the water main and its appurtenances.

4.38 TEMPORARY WATER SERVICE AND TEMPORARY WATER MAIN

Temporary water service shall be measured as per each furnished, installed and removed. Temporary water main shall be measured to the nearest lineal foot furnished, installed and removed. All fittings, connections, replacement parts, disinfection and flushing, pressure testing necessary to complete the temporary water service shall be considered incidental to the respective bid item.

Payment for temporary water main shall be paid for at the contract unit price and shall include full compensation for all materials, labor, equipment and incidentals for furnishing, installing and removing the bypass main piping.

Gravel ramp installation and removal shall be considered incidental to the bid items.

4.39 SURFACE RESTORATION AND CLEANUP

No measurement or payment will be made. The cost of all such work is considered incidental to the installation, replacement or removal of the water main and its appurtenances unless stated otherwise in the plan documents. Contractor shall provide all labor, materials, and equipment necessary for surface restoration and cleanup.

4.40 JACKING, BORING, AND TUNNELING

The basis of measurement shall be by the lineal foot for casing pipe and carrier pipe. The measured length of carrier pipe and casing pipe shall be rounded up to the nearest 1-foot increment.

Furnishing and installing casing pipe and carrier pipe shall be paid for at the contract unit price per lineal foot for the types, classes, and sizes furnished and installed in accordance with the specifications and accepted. Furnishing and installing end seals and casing spacers shall be considered incidental to the installation of the carrier pipe.

Payment for casing pipe will be full compensation for furnishing and installing of the casing pipe by boring, jacking or tunneling, excavating and backfilling of bore pits, welding, trench dewatering (unless otherwise specified), and all necessary appurtenances for proper installation of casing pipe.

Payment for carrier pipe will be full compensation for furnishing and installing the carrier pipe, gaskets, and all other appurtenances necessary for the proper installation of the carrier pipe.

Payment for boring pipe or service shall be measured by lineal foot as the shortest distance between the start and stop of the bore and shall be full compensation for furnishing and installing the pipe or service by boring, jacking or tunneling, excavating and backfilling of bore pits, trench dewatering (unless otherwise specified), and all necessary appurtenances for proper installation of pipe or service. The measurement shall be rounded up to the nearest 1-foot increment. Payment will not be made for bores that fail and the Contractor shall be responsible for any damages that result from the boring operation. If the pipe or services are bored as an alternate bid to open cut, then any unused bid items shall not be paid (example: curb & gutter removal/replacement, concrete cutting/removal, or asphalt surface/millings removal).

Payment for boring obstruction will be full compensation for the labor, equipment, and materials needed for removal of the obstruction. Payment for boring obstructions will be paid only for boring obstructions with mechanical equipment. If the project work is performed by a hand-mining operation, all such obstructions will be considered part of the normal operation and will not be paid for as a boring obstruction.

A boring obstruction shall be defined as any rock, boulder, etc., or similar material, which is encountered during the excavation that cannot be removed by the boring machine and requires shutdown of the equipment for removal. The Contractor shall be aware that all quantities are estimates and that there may be no obstructions or could be a large number of obstructions on the project. The Contractor will only be paid for obstructions encountered and reported to and verified by the Engineer. The bid item quantities are not guaranteed items.

Special Provision for Progress Payments

PROGRESS PAYMENTS; RETAINAGE

The Owner will pay to the Contractor in the manner and at such times as set forth in the City of Huron General Conditions, such amounts as required by the Contract Documents. The Owner may retain 10% of each progress payment until 50% of the work is to be completed. No additional amounts will be retained thereafter if work progresses satisfactorily. Upon substantial completion, the Owner will pay all amounts owing to Contractor, less twice the amount required to complete remaining items for final completion. Upon final completion and acceptance of the Work, the Owner will pay all amounts owing to the Contractor.

City of Huron Specifications for Warranty for Construction

TERM OF WARRANTY:

The Contractor shall warranty the work for any defects from the date of issuance of the final acceptance notification for a period as follows:

- A. Surfacing items including grading (subgrade and fill), base course, concrete paving, curb and gutter, driveways, sidewalks, asphalt paving, and asphalt surface treatments shall have a one-year warranty.
- B. Shrubbery and trees shall have a one-year warranty.
- C. Vegetative cover, including seeding and sod, will be inspected after the required maintenance period. If the vegetative cover is growing and healthy, there will be no warranty period. Areas lacking growth or that are unhealthy must be corrected to the satisfaction of the Engineer. Dormant seeded areas will be evaluated for growth and health in the spring.
- D. All other items shall have a two-year warranty including storm sewer, sanitary sewer, water main, traffic signal, and roadway lighting systems. Also included in this warranty period are defects caused by trench or roadway fill settlement. The Contractor shall maintain all trenches and backfill any settlement and provide and place any necessary base and/or surfacing needed due to trench settlement for the maintenance period.
- E. Warranty for City-furnished materials shall be for workmanship only unless otherwise specified. City-furnished materials shall be warranted by the product manufacturer.

The Contractor shall be notified in writing of any defects in the work during the course of the warranty period. The Contractor shall submit to the Engineer an acceptable construction schedule to correct the defects in a method approved by the Engineer at their expense within ten days of receipt of the notice. Failure to correct or undertake, with due diligence, to correct the defects within the specified time may cause the owner to make the necessary repairs and bill the Contractor up to 1 1/2 times the costs incurred. In case of an emergency, where, in the judgment of the City, delay would cause serious loss or damage, repairs may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.

The City has the right to extend the warranty period for specific portions of the work if:

- A. Defects are apparent or if the work is not performing as specified and the Engineer determines it is in the best interest of the City to monitor the performance of the work beyond the original warranty period. In these circumstances, the City and Contractor may mutually agree to extend the length of the warranty period beyond the time frames identified in this section. The Engineer will provide written notification to the Contractor indicating the specific items or portions of the work the extended warranty includes, length of time the additional warranty period should remain in effect, and reason for extending the warranty length. The Contractor shall provide written documentation acknowledging the terms and conditions of the extended warranty period. The City may also require the Contractor to supply a warranty bond for the extended warranty period. The amount of the warranty bond will be in an amount equal to the costs to repair or replace the items covered by the extended warranty.
- B. Significant repairs are made to the work during the warranty period. Additional warranty will not be required for minor repairs made during the warranty period and the additional warranty will only apply to the specific portions of the work where significant repairs have been made. The Engineer will determine if a repair is significant or minor. The Engineer will provide written notification to the Contractor indicating the specific items or portions of the work the extended warranty includes, length of time the additional warranty period will remain in effect, and reason for extending the warranty length.

THE FOLLOWING UTILITY COMPANIES ARE INVOLVED ON

PROJECT NH-CR 0037(156)125, Beadle County, PCN 06JA

The contractor shall contact the following utilities in a sufficient amount of time prior to starting work. The companies will identify their facilities, and it is the responsibility of the contractor and the company to coordinate their work to avoid damage to existing facilities and to allow for relocation of facilities as may be required for grading work:

The following utilities were determined to be involved and were formally notified on January 12th, 2024, that if their facility is located within the existing public right-of-way, any adjustment of their facility would have to be accomplished at no cost to the State, **within 90 days from receipt of the notice, unless other arrangements are made with the Area Engineer.**

- (1) Mark Wilson
Attn: Brayden Leischner
Santel Communications Coop., Inc
308 S Dumont Ave
Woonsocket, SD 57385
O: 605-796-4411
P: 605-796-8129
E: MWilson@Santel.coop
Brayden Leischner
C: 605-630-9043
E: BLEischner@Santel.coop

Santel Communications Coop., Inc. (Santel) – Santel stated they have Fiber Optic facilities within the project limits. Their fiber was placed at an approximate depth of 36" to 48". This fiber proceeds into the storm sewer alignment plans at approximately STA. 100+00 - 12'L, where it continues north, to approximately STA. 101+35 - 12'L where Santel placed a lateral with an in and out fiber crossing the storm sewer alignment to the east entering a handhole placed at approximately STA. 101+35 – 34'R. At this location Santel stated that this is close to the location of a drop inlet and intends on coordinating with the SDDOT contactor to adjust this lateral if necessary. From approximately STA. 101+35 – 12'L Santel's fiber then continues north crossing to the east side of storm sewer alignment at approximately STA. 102+00. Santel's fiber continues north running at approximately 8' R to 14' R of the storm sewer alignment to the intersection of SD Hwy 37 and 33rd Street SW where it proceeds east out of the project limits. The majority of Santel's facilities are to be protected-in-place and Brayden Leischner is the onsite contact; he can be reached at (605)-630-9043. Santel is requesting a 2 week notice prior to construction along their facilities. After Santel's review of the highway construction plans, Santel has determined that some adjustments/relocations may be necessary and Santel intends to work with the contractor at these locations. Santel's facilities are in existing public right-of-way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction.

- (2) Tyler Larson
SDN Communications, Inc.
2900 W 10th St
Sioux Falls, SD 57104
P: 605-978-7134
E: Tyler.Larson@SDNCommunications.com

SDN Communications, Inc. (SDN) – SDN has stated they have Fiber Optic facilities and multiple structures within the SDDOT project limits. These facilities were placed from 3' to 5' of depth. SDN stated that fibers were placed from approximately STA. 100+00 to STA. 151+00 - (15'R to 30'R) however, these fibers are surveyed and depicted in the SDDOT storm sewer alignment plans in the following locations:

- Approximately STA. 101+90 - 21'R to approximately STA. 102+80 - 21'R: No Conflict
- Approximately STA. 127+50 - 24'R to approximately STA. 127+90 - 24'R: No Conflict
- Approximately STA. 130+95 - 25'R to approximately STA. 132+00 - 24'R: No Conflict
- Approximately STA. 141+30 - 19'R to approximately STA. 144+60 - 19'R: Protect-in-Place
 - Note: This surveyed fiber is not the mainline fiber and crosses SD Hwy 37 west.
- Crossing SD Hwy 37 at approximately STA. 144+60: Protect-in-Place
- Approximately STA. 151+31 - 15'R to approximately STA. 151+71 - 15'R: Conflicts with new storm Sewer
- At Approximately STA. 174+20 - 21'R Vault Box Structure: No Conflict
- Crossing SD Hwy 37 STA. 174+20: Conflicts with SDDOT Storm Sewer

From approximately STA. 174+20 to STA. 178+00, SDN's fiber was placed approximately 5'R to 7'R off the SDDOT's storm sewer alignment where it crosses the storm sewer alignment and proceeds north to STA. 180+60 placed 2'L to 8'L off the SDDOT storm sewer alignment. SDN stated their facilities conflict with the new SDDOT storm sewer alignment from approximately STA. 151+00 to STA. 181+00 SDN, SDN intends to directionally drill new facilities and place them as close to SD Hwy 37's east ROW to a new vault box location in the northeast quadrant of the intersection of SD Hwy 37 and 21st Street SE, at approximately STA. 180+62 - 14'R. SDN identified a vault box structure currently in conflict at approximately STA. 180+62 - 8'L that will be removed.

Referencing SDDOT Grading Alignment from here on, SDN's fiber continues north (40'R - 50'R) from approximately STA. 13+40 passing through a vault box at approximately STA. 18+10 that will be adjusted slightly west. This fiber continues north to a vault box at approximately STA. 22+67 - 48'R. From this vault, SDN's fiber crosses SD Hwy 37 southwesterly, exiting the project limits at approximately STA. 22+30 - 72'L. SDN then has a fiber crossing SD Hwy 37 at approximately STA. 26+75 that conflicts with the new storm sewer 30' L. SDN intends to lower this fiber 2'- 3' for the entire crossing, making sure to lower this deeper at the new storm sewer crossing. Another SDN fiber enters the project limits from the west at approximately STA. 26+90 - 106'L heading east, then turning north into SD Hwy 37 west ROW, where it continues north at approximately 44'L to 49'L, where it continues out of the project limits at the End of Project or STA. 66+37.75. This fiber conflicts with the new storm sewer at approximately STA. 30+69, STA. 44+10, STA. 49+05, STA. 52+50 to 54+00, STA. 57+60, STA. 61+37, and STA. 66+25. At the prior mentioned storm sewer conflicts, SDN intends to lower the fiber under the new storm sewer elevations. Along this fiber there are vault boxes identified at the following approximate stationing's:

- STA. 36+20 – Adjust southwest to the grass area
- STA. 45+46 – No conflict
- STA. 48+36 – No conflict

- STA. 65+42 – Conflicts with new sidewalk and adjust southwest to grass area.

SDN has facilities located within the existing right-of-way which, after SDN's review of the highway construction plans, some adjustments/relocation will be necessary, and they intend to relocate their facilities by coordinating with the SDDOT construction contractor and sequence their relocation work along with SDDOT construction. As SDN's facilities are in existing public right-of-way; any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction.

(3) Rob Lord
Midcontinent Communications
2390 Lincoln Ave SW
Huron, SD 57350
O: (605) 274-2928
P: (605) 350-1459
E: Robert.Lord@Midco.com

Onsite Contact:
Eugene Mielitz
229 9TH Ave SE
Watertown, SD 57201
O: 605-520-2334
C: 605-878-0127
E: Eugene.mielitz@midco.com

Midcontinent Communications (Midco) – Midco has stated they have underground Coax and Fiber facilities ranging from 3' to 4' depths within the project limits. The first crossing of SD Hwy 37 occurs on the SDDOT storm sewer alignment at approximately STA. 159+48; this is a Coax cable inside of a 1.25" conduit. Midco is either going to directionally drill a new facility in at a lower depth in this location or they will lower this by coordinating with the SDDOT contractor during the SDDOT construction. The next SD Hwy 37 next crossing location is at approximately STA. 164+84, where Midco direct buried a fiber at an approximately 4' depth. Midco is either going to directionally drill a new facility in at a lower depth in this location or they will lower this by coordinating with the SDDOT contractor during the SDDOT construction.

Midco's final crossing occurs at approximately STA. 26+12 of the grading alignment. This is a 1.50" conduit with a fiber inside placed at an approximately 3' depth. Midco stated they intend to work with the SDDOT contractor at this location to lower their facilities during the construction process.

Midco has underground facilities located within the existing public right-of-way which, after Midco's review of the highway construction plans adjustments/relocations will be necessary. Midco's facilities are in the existing public right-of-way; any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction.

(4) Cory Moser
Lumen
15 4th Ave SW
Aberdeen, SD 57401
P: (605) 290-7886
E: Cory.Moser@Lumen.com

Lumen – Lumen stated that they have multiple facilities within the project limits including underground conduit, underground copper lines, underground fiber optic lines, pedestals and handhole structures. These communications lines were placed at approximately 3' to 4' depths. Lumen stated their facilities that are found within the Strom Sewer Alignment are as follows, all mentioned stations are to be considered approximate:

- STA. 101+00 to STA. 127+60:
 - 100-pair copper - 34'R: Protect-in-Place
 - 72 fiber - 32'R: Abandon-in-Place; Will be relocated to the west ROW
 - 48 fiber - 17'L crossing the alignment to 7'R at STA. 102+00: Abandon-in-Place: will be relocated to the west ROW.
- STA. 127+60 to STA. 127+90
 - 48 fiber, 72 fiber 11-pair copper and 400-pair copper: proceed west crossing SD Hwy 37: Lumen will abandon-in-place all four lines: a new 25-pair copper will be placed by working with the SDDOT contractor at the time of the contractor.
 - 11-pair copper proceeds east on 33rd Street SW: Not in conflict
 - Copper Pedestal at STA. 127+75 - 40'R: Protect-in-place
 - Copper Pedestal at STA. 128+00 - 40'R: Protect-in-place
- STA. 127+90 to STA. 154+20
 - 100-pair copper - 20'R - 40'R: Protect-in-Place
 - Copper line and 24 Fiber crossing at STA. 154+20: will be abandoned-in-place and relocated north to STA. 159+50 and directionally drilled in at a 16' depth to avoid new storm sewer.
 - Copper Pedestal at STA. 159+50 – 27'R: Protect-in-place
- STA. 154+20 to STA. 159+50
 - 24 fiber - 20'R, 400-pair copper - 20'R and 400-pair copper - 32'R: Lumen will Abandon-in-Place the 400-pair and 24 fiber that was placed in the same trench. The 100-pair copper will be protected-in-place.
 - Copper Pedestal at STA. 159+26: Protect-in-Place
 - At STA. 159+30 a 24 fiber and 600-pair copper proceed east 26th Street SE: Not in conflict
- STA. 159+50 to STA. 177+90
 - 100-pair copper: Protect-in-Place
 - Copper Pedestal at STA. 177+90: Protect-in-Place
 - 300-pair copper crosses west at STA.177+90 SD Hwy 37: This fiber will be abandoned-in-Place and will be relocated north to STA.179+00 where Lumen intends to redrill the crossing to avoid conflict with the Storm Sewer.
- STA. 177+90 to STA. 179+50
 - 50-pair copper and 600-pair copper: Lumen stated that these lines are to be protected-in-place, they then turn east at STA. 179+50 in the southeast quadrant of the intersection of 21st Street and SD Hwy 37 and continue out of the project limits.

Lumen stated their facilities that are found within the Grading Alignment are as follows, all mentioned stations are to be considered approximate:

- STA. 11+90 to STA. 26+67
 - STA. 11+90 - 65'L: Manhole is to be Protected-in-Place as it is not in conflict.
 - 600-pair copper, 300-pair copper, 50-pair copper, 144-fiber placed in a 6-Way concrete conduit system: Lumen intends to abandon these facilities and place new facilities 1 block east out of the project limits.
 - STA. 20+84 - 37'L: Manhole is to be abandon-in-place.
 - STA. 26+67 - 36'L: Manhole is to be abandon-in-place. From this manhole there is an 8-Way concrete conduit system, 50-pair copper, 300-pair copper, 1900-pair copper, 144-fiber, and a 24 fiber that proceed west out of the project limits. Lumen stated these facilities are to be abandon-in-place. Also, out of this manhole, Lumen stated that there are (2) 900-pair copper lines leaving southeasterly out of the manhole, crossing the alignment at STA. 26+48 and proceeding east out of the project limits; there is also 144-fiber leaving east out of this manhole crossing the alignment at STA.26+67, that proceeds east out of the project limits. Lumen stated that these facilities will be abandoned-in-place and relocated by directional drilling in new conduit at a depth out of conflict with the SDDOT construction.
- STA. 40+50
 - Lumen stated there is a 900-pair copper crossing the alignment that was surveyed in the SDDOT plans. Lumen stated that they will abandon this cable and relocate this copper line by directionally drilling in a new cable in deeper and out of conflict with the SDDOT construction plans.
- STA. 65+67
 - Lumen has identified a 2100-pair copper crossing the alignment, Lumen will coordinate with the SDDOT contractor at this location to protect the cable in place, as this line is a high-priority line for their infrastructure.

Lumen intends to relocate a portion of their facilities prior to construction and the rest by coordinating with the SDDOT contractor during the construction process. Lumen has underground telecommunication facilities located within the existing public right-of-way, which, after Lumen's review of the highway construction plans, adjustment/relocation will be necessary. Lumens facilities are in existing public right-of-way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction.

(5) Kirby Wicks
NorthWestern Energy
600 Marketstreet West
Huron SD, 57350
Phone: 605-353-7609
Kirby.wicks@northwestern.com

NorthWestern Energy (NWE) – NorthWestern has stated they have both overhead distribution electric lines and natural gas within the SDDOT Project Limits. NorthWestern has stated their facilities range from 30" to

48" depths. Starting with the SDDOT Storm Sewer pipe alignment, NorthWestern has indicated that they have a 2" PVC gas line crossing at approximately STA. 127+72 that conflicts with SDDOT construction. At this location NorthWestern intends to bore in a new 2" gas line to and avoid the new storm sewer. NorthWestern will abandon-in-place the existing pipe, once it is removed from service. From approximately STA. 151+60 to approximately STA. 151+75, NorthWestern has a gas line (2" PVC), 1 OTT (direct buried powerline), and a 12.5 kV (direct buried powerline and a 5" PVC vacant duct) crossing SD Highway 37. The 2" PVC gas line then proceeds approximately 700' north to 26th Street SE running at approximately 21' R from the storm sewer alignment and then proceeds out of the construction limits. NorthWestern has stated these facilities are not in conflict and are to be protected-in-place. At the intersection of 26th Street SE and SD Hwy 37, or approximately STA. 158+65 NorthWestern has identified a crossing primary 3-phase underground power line placed inside the 5" conduit. This powerline can be deenergized by switch gear and is to be protected-in-place.

At the intersection of 21st Street SE and SD Hwy 37 or approximately storm sewer alignment STA. 179+50 (grading alignment approximately STA. 12+38) NorthWestern has an OH 69 kV transmission powerline crossing west to east that is not in conflict with construction.

At the intersection of 18th Street SE and SD Hwy 37, now under the grade alignment at approximately STA. 26+50 NorthWestern has stated they have an OH 15 kV line. It was determined that NorthWestern's pole at approximately STA. 26+50 - 67'L is close to construction, and it was determined that the SDDOT contractor would be able to work around this pole's location. NorthWestern intends to work with the SDDOT Contractor at the intersection of Fourteenth Street SE and SD Hwy 37 to go under the storm sewer and City of Huron's facilities, where they have a main distribution 4" gas pipeline (29 psi) at approximately STA. 44+10. NorthWestern has identified a 2" Gas pipeline (29 psi) in the northeast quadrant of the intersection of Thirteenth Street and SD Hwy 37. NorthWestern has stated this pipeline is not in conflict with proposed construction. The last facility in conflict is at approximately STA. 57+10 - 53'L where an overhead power pole is in the location of the new proposed storm sewer. After communications between NorthWestern and SDDOT, NorthWestern will relocate their power pole a minimum of 18' west to approximately STA. 57+10 - 71'L.

NorthWestern has facilities located within existing right-of-way, which, after Northwestern's review of the highway construction plans, some adjustments/relocation will be necessary and intends to do some of their relocation work prior to SDDOT construction, along with locations that will be relocated during the construction process. There are a few locations that will need to be monitored throughout the SDDOT construction process. As NorthWestern's facilities are in existing public right-of-way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction.

- (6) Verizon
Greg Allen
1200 Washington Ave N.
Minneapolis, MN 55401
O: 612-619-9602
C: 612-619-9602
greg.allen@verizon.com
Jason Dimmock
C: 402-213-5879
Jason.dimmock@verizon.com

Verizon – After review of the highway construction plans, Verizon has declared no facilities present within scope of project.

- (7) Mid-Dakota Rural Water System
Paige Gesinger
O: 605-853-3159
Paige Gesinger
paige.gesinger@mdrws.com

Mid-Dakota Rural Water System (Mid-Dakota) – Mid-Dakota has an underground water pipeline at STA. 126+98 crossing SD Hwy 37 west to east. After Mid-Dakota's review of SDDOT proposed construction, they have determined they will conflict with the proposed SDDOT storm sewer construction. Mid-Dakota stated that they intend to re-bore this water line lower and out of the way of the proposed storm sewer construction. Mid-Dakota intends to do this relocation sometime in 2026. As Mid-Dakota's facilities are in existing public right-of-way, any relocation/adjustment necessary to accommodate the highway construction will be accomplished at no cost to the State and performed in coordination with the highway construction.

- (8) Brett Runge
City of Huron
P.O. Box 1369
Huron, SD 57350
C: (605) 530-9607
E: BRunge@HuronSD.com

Rob Rieger
City of Huron – Sanitary Sewer
(Stoney Run Sanitary District)
P.O. Box 1369
Huron, SD 57350
O: (605) 353-8547
rrieger@HuronSD.com

City of Huron (The City) – The City has power, water, and sanitary sewer throughout the project limits. These facilities have been discussed and disclosed to the SDDOT Road Designer. The City has stated that all conflicts with necessary relocations will be coordinated and handled throughout the SDDOT construction process.

The requirements relating to Cooperation Between Contractors, as set forth in Section 5.7 of the Standards Specifications for Roads and Bridges, 2015 edition, shall prevail throughout the limits of this project.

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**STANDARD TITLE VI / NONDISCRIMINATION ASSURANCES
APPENDIX A & E**

MARCH 1, 2016

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:
 - a. withholding payments to the contractor under the contract until the contractor complies; and/or
 - b. cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or

is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq.).

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

**SPECIAL PROVISION FOR
IMPLEMENTATION OF CLEAN AIR ACT
AND
FEDERAL WATER POLLUTION CONTROL ACT**

SEPTEMBER 1, 1997

By signing this bid, the bidder will be deemed to have stipulated as follows:

- a) That any facility to be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub. L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub. L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR, Part 15), is not listed on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
- b) That the State Transportation Department shall be promptly notified prior to contract award of the receipt by the bidder of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility to be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

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