



2024

CITY OF CHANHASSEN
STANDARD SPECIFICATIONS
AND
DETAIL PLATES

CERTIFIED BY THE CHANHASSEN CITY ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

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February 26, 2024
Date

CITY OF CHANHASSEN
STANDARD SPECIFICATIONS REVISIONS
Rev. 2024

GENERAL CONDITIONS

- Section 1.07 Part 1--Added Contractor Verification of Compliance and Responsible Contractor Verification of Compliance to the list of Contract Documents.
- Section 7.02 2nd Paragraph--Added- “In addition to the aforementioned construction hours, on October 31st operations must cease by 3:00 p.m. (no construction activities are allowed on Sundays).”
- Section 9.19 Part 1B1--added for clarification “Only the curb box swing tie applicable for the lot it is servicing shall be shown on the tie card.”

STREETS

- Section 1.03 2nd Paragraph-- Language added—Review full paragraph.
- Section 3.01 Section revised and addition of Part B--Review entire section.
- Section 4.10 Part A—Additional numbered point added—Review all.
- Section 4.11 Part A-1c—Language changed "The upper section shall weigh 3 lbs/ft" to “The upper section shall weigh 2.5 lbs/ft”
- Section 4.14 Part A-2—Language added “Sod shall be from vendors on the “Approved/Qualified Products List”
Part A-5—Language changed “topsoil which does not meet MnDOT Specification No. 3877...” to “topsoil which does not meet City specifications for topsoil material...”
Part A-10—Language added “Watering may occur on Sunday’s if written approval is provided by the City Engineer or their designee.”
Part D-- Section revised--Review entire section.

WATER MAIN

- Section 2.04 1st paragraph and Part B--Wording changed for clarification “corresponding to a working pressure of 150 PSI for PVC type 1120 pipe” changed to “corresponding to a working pressure of 200 PSI for PVC type 1120 pipe.”
- Section 2.06 Section revised--Review entire section.
- Section 2.11 Review manufacturer parts.
- Section 2.12 Review manufacturer parts.
- Section 2.13 Last paragraph-- Language added—Review full paragraph.

Section 6.08 Part A: Language added for clarification "...SDR 11.0, with coextruded blue dual stripes."

Section 14.03 Section revised: Review entire section.

SANITARY AND STORM

Section 2.11 Wording changed for clarification throughout this section from "Standard plate to Detail plate"

Section 2.12 1st paragraph: Language added—Review full paragraph.

Section 2.19 Wording changed for clarification throughout this section from "Standard plate to Detail plate"

Section 7.02 Wording changed for clarification throughout this section from "Standard plate to Detail plate"
Part A, 2nd Paragraph--Added: Televising inspections in accordance with Section 19.00 shall be conducted after the deflection is checked."
Part A, last Paragraph—Wording changed for clarification "performed if applicable" changed to "performed at the direction of the City Engineer."

Section 8.03 Wording changed for clarification throughout this section from "Standard plate to Detail plate"

Section 10.01 Wording changed for clarification throughout this section from "Standard plate to Detail plate"

Section 11.05 1st paragraph: Language added—Review full paragraph.
3rd paragraph—Wording changed for clarification "performed if applicable" changed to "performed at the direction of the City Engineer."

Section 12.03 Wording changed for clarification throughout this section from "Standard plate to Detail plate"

Section 12.05 Section revised: Review entire section.

Section 12.09 2nd paragraph: Removed "Detail Plate #2104A"

Section 12.10 Language added—"If debris enters the sanitary system, the system shall be adequately cleaned, jetted, and televised within 48-hours to the satisfaction of the Engineer at no cost to the Owner."

Section 17.08 Wording changed for clarification throughout this section from "Standard plate to Detail plate"

Section 19 Language added—"...leak testing and deflection testing have been completed and accepted...."

Section 19.03 Language added--"... in certified PACP format, and a PACP compliant database on a digital hard drive..."

Section 20.03 Part A--Language added—Review full paragraph.

SANITARY SEWER REHABILITATION

Review All for 2024

TRACE WIRE

Section 2.0 Installation: 7th bullet point-Italicized portion –added language to the end of the statement.
Testing: --Review all.
Products: --Review all.

LANDSCAPE

Section 2.02 Part A. Soil Amendments - 1. MnDOT -3877 –added “(as modified by Chanhassen Street Construction Specifications Section 4.14D)”

STANDARD DETAIL PLATE REVISIONS

- 1004: Added Drawing Comment- “Secure Tracer Wire to the Plastic Wrap with Tape.”
Update to Drawing- “Strap and Stainless-Steel Band Replaced with Field Weld...”
- 1005: Added Drawing Comment- “Do Not install Riser Rod.”
- 1006: Added Drawing Comment- “Do Not install Riser Rod.”
- 1010: Added Drawing Comment/Note 2.- “Pressure Gauges Shall be Stainless-Steel...”
- 1012: New Detail Plate- D.I.P. Conductivity
- 1013: New Detail Plate- Sacrificial Anode Bag Installation
- 2001: Updated Drawing Comments/Notes- Review All
- 2002: Added Drawing Comments/Notes- Review All
- 2101: Updated Drawing Comments/Notes 4 & 5- Step Installation
- 2104: Added Drawing Comments/Note 14- Soil Compaction
- 2110: Added Drawing Comments/Note 1- Adjusting Rings
- 3100: Updated Drawing Comments- Manhole Steps & Precast Base
- 3101: Added Drawing Comments/Note 4- Drantile Installation
- 3102: Updated Drawing Comments/Note 4- Manhole Steps, Precast Base & Tracer Wire
Access Box -Drantile Installation
- 3103: Updated Drawing Comments- Reference to Detail Plate 2110
- 3106: Updated Drawing Comments- “Long Epoxy Coated Rebar”
Added Comment 1- Drantile Installation
- 3109B: Updated Drawing Comments- Manhole Steps
Added Notes 1-3
- 3110: Updated Drawing Comments/Notes- Manhole Steps
- 5200: Updated Drawing Comments/Note 6- Aggregate Base
Added Drawing Comments/Note 8- Small Utilities
- 5201: Updated Drawing Comments/Note 6- Aggregate Base
Added Drawing Comments/Note 8- Small Utilities
- 5202: Updated Drawing Comments/Note 6- Aggregate Base
Added Drawing Comments/Note 7- Small Utilities

5203: Added Drawing Comments/Notes- Review All

5205B: Updated Drawing Comments- Minimum Radius

5208: Detail Plate 5208 Split to Create New Plates 5208A & 5208B- Review All

5209: Detail Plate 5209 Split to Create New Plates 5209A & 5209B- Review All

5217: Updated Drawing Comments/Note 1- Street Maintenance Foreman-contact info.

5221: Updated Drawing Comments- Sketch Section

5232: Updated Drawing Comments/Notes- Perforated Pipe

5233: Updated Drawing Comments- Manhole Connection Detail

5235: Updated Drawing Comments/Notes- Review All

5236: Updated Drawing Comments/Notes- Incorporated Updates from Plate 5235

5240: Added Drawing Comments- 4' Min Base to Back of Curb

5244: Added Drawing Comments- Sign Insert

5302A: Added Drawing Comments/Note 3- Sediment Trap

5302B: Updated Drawing Comments/Notes- Review All

5302C: Updated Drawing Comments/Notes- Review All

5302D: Updated All Notes- Review All

5302E: Restructured Plates 5302A-D leaving Blank Plate for E-reserved for future use

5503: Added Drawing Comments/ Note 6- Review All

5506: Added Drawing Comments/Notes- Review All

5508: Added Drawing Comments/Notes- Review All

GENERAL CONDITIONS

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SECTION 1.00 - DEFINITIONS

- 1.01 GENERAL: For the purposes of the Contract Documents and any documents or instruments dealing with the construction, operations governed by these documents, the terms defined in this section have the meanings given them.
- 1.02 ADDENDUM: A supplement to the proposal form as originally issued or printed, covering additions, corrections, or changes in the bidding conditions for the advertised work, that is issued by the Contracting Authority to prospective bidders prior to the date set for opening of proposals.
- 1.03 BID: The written offer or copy thereof of a bidder to perform the work described by the Contract Documents when made out and submitted on the prescribed bid form properly signed and guaranteed.
- 1.04 BIDDER: An individual, firm, partnership or corporation, or combination thereof, submitting a bid for the work contemplated and acting directly or through a duly authorized representative.
- 1.05 CALENDAR DAY: Every day shown on the calendar.
- 1.06 CHANGE ORDER: A written order to the Contractor authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the contract price or time of completion.
- 1.07 CONTRACT: The written agreement between the Contracting Authority and the Contractor setting forth their obligations, including, but not limited to, the performance of the work, the furnishing of labor and materials, the basis of payment, and other requirements contained in the Contract Documents.

The Contract Documents consist of the following:

- (1) Legal and Procedural Documents
 - (a) Advertisement for Bids
 - (b) Information for Bidders
 - (c) Bid
 - (d) Proposal Guaranty
 - (e) Contract
 - (f) Performance Bond
 - (g) Payment Bond
 - (h) Affidavit of Non-Collusion
 - (i) Contractor Verification of Compliance
 - (j) Responsible Contractor Verification Of Compliance
 - (k) Certificate of Insurance
 - (l) Notice of Award
 - (m) Notice to Proceed
- (2) Special Provisions

- (3) Specifications
- (4) General Conditions
- (5) Plans
- (6) Addenda
- (7) Supplemental Agreements & Change Orders

- 1.08 PERFORMANCE BOND: The Contractor's Performance Bond required by the Contract Documents.
- 1.09 PAYMENT BOND: The Contractor's Payment Bond required by the Contract Documents.
- 1.10 CONTRACT PRICE: The total moneys payable to the Contractor under the terms and conditions of the Contract Documents.
- 1.11 CONTRACTOR: The person, firm or corporation with whom the Owner has executed the contract agreement.
- 1.12 DRUG AND ALCOHOL TESTING: Refers to the Federal Highway Administration (FHWA) drug use and alcohol testing rules published February 15, 1994, which apply to persons required to have a commercial driver's license(CDL).
- 1.13 CITY ENGINEER: The City of Chanhassen's employee in charge of overseeing all capital projects and engineering matters.
- 1.14 ENGINEER: The duly authorized engineering representative of the Owner, acting directly or through his/her designated representatives who have been delegated the responsibility for engineering project administration.
- 1.15 FIELD ORDER: A written order affecting a change in the work not involving an adjustment in the contract price or an extension of the contract time, issued by the Engineer to the Contractor during construction.
- 1.16 GOVERNMENTAL AGENCY: A governmental unit other than the Owner having jurisdiction of the premises.
- 1.17 INSPECTOR: An authorized representative of the Engineer, assigned to make any or all necessary inspections of the work performed and the materials furnished by the Contractor.
- 1.18 LABORATORY: The testing laboratory of the Owner or any other testing laboratory which may be designated by the Owner.
- 1.19 NOTICE OF AWARD: The written notice of the acceptance of the bid issued by the Owner to the successful bidder.

- 1.20 NOTICE TO PROCEED: The written notice issued by the Owner to the Contractor authorizing him to proceed with the work and establishing the date of commencement of the work.
- 1.21 OWNER: A private, public or quasi-public body or authority, corporation, association, partnership, or individual for whom the work is to be performed.
- 1.22 PLANS: The official drawings, plans, profiles, typical cross sections and supplemental drawings, or reproductions thereof, prepared by the Engineer, which show the location, character, dimensions and details of work to be performed. All such drawings, as listed elsewhere in the Contract Documents, are a part of the plans whether attached to the Contract Documents or separate therefrom.
- 1.23 PROJECT: The undertaking to be performed as provided in the Contract Documents.
- 1.24 PROPOSAL FORM: The approved form on which the contracting authority requires bids to be prepared and submitted for the work.
- 1.25 PROPOSAL GUARANTY: The security furnished with a bid to guarantee that the bidder will enter into the Contract if the bid is accepted.
- 1.26 SHOP DRAWINGS: All drawings, diagrams, framework plans, falsework plans, erection plans, illustrations, brochures, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier or distributor, which illustrate how specific portions of the work shall be fabricated or installed.
- 1.27 SPECIAL PROVISIONS: Contract requirements specific to the project which are not otherwise thoroughly or satisfactorily detailed and set forth in the detail specifications or plans.
- 1.28 SPECIFICATIONS: The directions, provisions, and requirements contained herein, together with all written agreements made or to be made pertaining to the method and manner of performing the work, or to the quantities and qualities of materials to be furnished under the contract.
- 1.29 SUBCONTRACTOR: An individual, firm, or corporation to whom the contractor sublets part of the Contract.
- 1.30 SUBSTANTIAL COMPLETION: That date as certified by the Engineer when the construction of the project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the project or specified part can be utilized for the purposes for which it is intended.
- 1.31 SUPPLEMENTAL GENERAL CONDITIONS: Modifications to generate conditions required by a local, state or federal agency for participation in the project and approved by the agency in writing prior to inclusion in the Contract Documents.

- 1.32 SUPPLIER: Any person, or organization who supplies materials or equipment for the work, including that fabricated to a special design, but who does not perform labor at the site.
- 1.33 SURETY: The person, firm, or corporation who executes the proposal guaranty or the contract bond.
- 1.34 TIME OF COMPLETION: The date set in Contract Documents for completion of the work; or number of working or calendar days after notice to proceed set out in Contract Documents (See also Section 8.07 of the General Conditions).
- 1.35 WORK: The furnishing of all labor, materials, equipment, and other incidentals necessary or convenient to the successful completion of the project and the carrying out of all duties and obligations imposed by the contract upon the Contractor.
- 1.36 WORKING DAYS: Any day, excluding Saturday, Sunday or State recognized Legal Holidays, when weather conditions or the results of weather conditions will allow the Contractor to pursue, for two hours between 8:00 a.m. and 4:30 p.m. with the normal working force, any item or items of work which would be in progress at that time.

SECTION 2.00 - BIDDING REQUIREMENTS AND CONDITIONS

2.01 QUALIFICATIONS OF BIDDERS

If requested, bidders must present satisfactory evidence that they are familiar with the class of work specified, and that they are provided with the necessary capital, tools, machinery and other equipment necessary to conduct the work and complete the improvement within the time specified in the proposal, in a good and workmanlike manner and to the entire satisfaction of the Owner.

The Owner will review the qualifications and experience of bidders after bids are opened and before a contract is awarded, to determine if the bidder is "responsible." A "responsible" bidder is a bidder qualified to do the work. This will be determined by assessing the bidder's skill, resources, experience, successful performance of similar contracts (on time and on budget), and all other matters bearing upon the likelihood that the contract will be successfully completed. In all cases where a bidder is unknown or where there are any questions about the qualifications of the bidder, the following information may be required of the apparent low bidder:

- A. Identify all similar public projects in which you were the contractor. If you have had more than five such contracts, list only the last five contracts, and as to each contract identified, provide the following information:

Project Description: Date:

Contact Person at City/County/State:

Were change orders in excess of 5% requested? If yes, explain the circumstances.

Were liquidated damages assessed? If yes, explain the circumstances. Was the project completed on schedule? If no, explain the circumstances.

- B. Describe all construction arbitration claims and any construction or project litigation in which you have been a party in the last five years.
- C. Identify all public projects you have had with the City of Chanhassen in the last five years.
- D. In the last five years, has a bonding company ever refused to issue you a performance bond? If yes, explain the circumstances.
- E. In the last five years, have any claims been filed against a performance or payment bond that you have provided a public entity? If yes, explain the circumstances.
- F. In the last five years, has your firm or any of its owners or employees been fined by a federal or state agency for a contract or workplace matter (such as wage or hour or safety violations), or debarred under Part 29, Title 49 CFR or any other law from submitting bids on public projects? If yes, explain the circumstances.

- G. In the last five years, has your firm or any of its owners or employees been charged or convicted of a crime involving the awarding, bidding or performance of a government contract? If yes, provide full details.

The bidder agrees that they are fully responsible to the Owner for the acts and omissions of any proposed subcontractors and of persons either directly or indirectly employed by them, as they are for the acts and omissions of persons directly employed by them.

Failure on the part of any bidder to carry out previous contracts satisfactorily, or lack of experience or equipment necessary for the satisfactory completion of the project, may be deemed sufficient cause for disqualification.

2.02 CONTRACT DOCUMENT INTERPRETATIONS

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and the Contractor shall be responsible for familiarizing themselves with all permits, bond and other requirements for the work to be performed.

All work shall be performed in accordance with the most recent version of the City of Chanhassen Standard Specifications and Detail Plates. In the event a work item is not addressed in the Chanhassen Standard Specifications and Detail Plates, the most recent version of the Minnesota Department of Transportation Standard Specifications shall govern. Whenever reference is made to the Minnesota Department of Transportation Standard Specifications, the word "Owner" shall be substituted for "State" and "Department" where appropriate and the word "Engineer" is understood to refer to the engineer for the Owner.

The City of Chanhassen Standard Plates included as part of these Specifications take precedence over the Minnesota Department of Transportation Standard Plates in all instances of conflict.

If any person contemplating the submitting of a bid for a proposed contract is in doubt as to the true meaning of any part of the plans, specifications or other proposed Contract Documents, they may submit to the Engineer a written request for an interpretation thereof at least three days prior to the scheduled bid opening. The persons submitting the request will be responsible for prompt delivery to the Engineer. Any interpretation of the proposed documents shall be made by addendum, duly numbered and dated. A copy of such addendum will be posted to QuestCDN, and each bidder shall acknowledge receipt of that addendum on their proposal form. Such addendum will be attached to all documents issued after the date of the addendum and shall remain a part thereof. The Owner and Engineer will not be responsible for any other explanation or interpretation.

The Owner reserves the right to modify the plans, specifications, special provisions, or proposal at any time prior to bids being opened, in accordance with the procedures for issuance of an addendum.

All proposals shall be made and received with the express understanding that the Bidder accepts the terms and conditions contained in these instructions and the plans and specifications, forms of contract and bond, and any other Contract Documents referred to herein.

If, after the bids have been delivered to the Owner, any difference of opinion shall arise as to the true intent or meaning of any part of the specifications, the decision of the Engineer shall be final, conclusive, and binding on all parties.

2.03 INTERPRETATION OF QUANTITIES IN BID SCHEDULE

The schedule of quantities is approximate only and is assumed solely for the purpose of comparing bids. The quantities on which payment will be made to the Contractor are to be determined by measurements of the work actually performed by the Contractor as specified in the Contract Documents.

2.04 SITE INVESTIGATION

Each bidder must satisfy themselves and form their own opinions by personal examination of the location and ground of the proposed work, and by such other means as they may desire, as to the actual conditions and requirements of the work, including the materials to be excavated; must make their own interpretations and satisfy themselves by their own investigations and research regarding all conditions affecting the work to be done and the labor and materials needed, and shall make their sole reliance thereon. Any information or data furnished by the Owner or its representatives is for the convenience of any bidder and is not guaranteed. The bidder shall thoroughly examine and familiarize themselves with the Drawings, Special Provisions, and all other Contract Documents. The Contractor, by the execution of the contract, shall accept all responsibility for having examined the site and acquainted themselves with the conditions there existing and the conditions of the contract. The Owner will be justified in rejecting any claim based upon the Contractor's lack of proper examination of the site conditions and legal obligations of the contract after execution of the contract.

2.05 SUBMISSION OF PROPOSAL

Sealed bids will be received by the Owner up to the date and hour as specified in the Advertisement for Bids at the office of the Owner or as otherwise specified. Bids received after the time specified shall be returned unopened.

All bids must be in ink upon the bid form included in the Specifications with a given price for each item and aggregate amount for the work, and must be signed and acknowledged by the bidder in accordance with the directions on the bid form. If a separate proposal form is provided, this separate form is to be submitted, not the form bound into the specification book. In order to ensure consideration, the bid shall be enclosed in a sealed envelope addressed to the Owner and clearly marked as to the time and date of bid opening, the name of the project, and name and address of bidder.

2.06 PROPOSAL GUARANTY

Each bid shall be accompanied by a Proposal Guaranty in the form of a money order, certified check or bid bond, payable to the order of the owner in an amount not less than five percent (5%) of the total amount of the bid. No bid will be considered unless accompanied by the Proposal Guaranty.

In case alternate bids are called for, one Proposal Guaranty in the amount of five percent (5%) of the total amount of the highest bid alternative will be sufficient for all bids.

As soon as the bids have been tabulated, all Proposal Guarantees shall be returned to the bidders, except those of the three lowest responsible bidders, which shall be returned after the agreement is executed and the required bonds and insurance received, approved, and accepted by the Owner.

2.07 AFFIDAVIT OF NON-COLLUSION

Each bidder shall submit with his/her proposal, an affidavit of non-collusion, signed by one of the officers of the firm and notarized. The Affidavit to be used is bound into these Contract Documents. A sample affidavit is included in the attachments.

2.08 WITHDRAWAL OF PROPOSALS

Any bid may be withdrawn or modified prior to the schedule time for the opening of bids or authorized postponement thereof.

After the time set for opening of the bids, no bidder may, without the consent of the Owner, withdraw their bid or claim extra compensation or damages for any error or omission made by said bidder in preparing their bid, for a period of 60 days. Bid guarantees may be held by the Owner for said 60 days until all of the bids submitted have been canvassed, a contract awarded and executed, and the required bonds and insurance furnished and approved. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the bidder.

SECTION 3.00 - AWARD AND EXECUTION OF CONTRACT

3.01 EVALUATION OF PROPOSALS

The bids from each responsible bidder will be considered on the basis of the amounts as shown on the bid form, and awarded to the lowest bidder determined by correctly adding the products resulting from correctly multiplying the quantities stated by the unit prices bid therefore, and as otherwise described in the Special Provisions when alternate bids are included in the proposal form.

The prices are to include the furnishing of all materials; all labor and services necessary or proper for the completion of work, except such as may be otherwise expressly provided in the Contract Documents.

The Owner reserves the right to reject any or all bids or to accept the bid deemed in the best interest of the Owner. Without limiting the generality of the foregoing, any bid which is incomplete, obscure, or irregular may be rejected; any bid having erasures or corrections in the price sheet may be rejected; any bid which omits an amount on any one or more items in the price sheet may be rejected; any bid in which unit prices are obviously unbalanced may be rejected; any bid accompanied by an insufficient or irregular bid bond may be rejected; any bid which omits acknowledgment of the receipt of addenda may be rejected.

The Owner may make such investigations as deemed necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Agreement and to complete the work contemplated therein. All bids shall be subject to review and approval of the Owner.

3.02 CONTRACT AWARD AND EXECUTION

Following acceptance of the bid by the Owner, a "Notice of Award" letter will be mailed to the Contractor together with the prepared contract agreements for signature and return. The Notice of Award letter will specify that the Contractor also submit affidavits or copies of insurance coverage, a payment bond and a performance bond. No contract will be executed until the required affidavits and bonds are submitted and have been approved as to form by the Owner.

The performance bond and payment bond shall each be in the amount of 100 percent of the contract price with a corporate surety approved by the Owner. Attorneys-in-fact who sign bid bonds or performance bonds must file with each bond a certified and effective dated copy of their power of attorney.

For purposes of the agreement, affidavit of insurance, the payment bond, and performance bond, the contract amount is the bid amount accepted by the Owner. The final amount of the contract shall be determined by summation of multiplying and summing the resulting product of the final measured quantities of the various items actually constructed and installed by the unit prices stated therefore, in the manner prescribed in the specification.

The party to whom the contract is awarded will be required to execute the Agreement, obtain the affidavits, the payment bond, and the performance bond, and return them to the Engineer within 10 calendar days from the date when Notice of Award is delivered to the bidder. In case of failure of the bidder to complete these items, the Owner may at their option consider the bidder in default, in which case the bid guaranty accompanying the proposal shall become the property of the Owner.

The Owner within 10 calendar days of receipt of acceptable performance and payment bonds, affidavits and Agreement signed by the bidder to whom the Agreement was awarded shall sign the Agreement and return to the bidder an executed duplicate of the Agreement. Should the Owner not execute the Agreement within such period, the bidder may by written notice withdraw their signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

A notice to proceed shall be issued within 10 calendar days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor. If the Notice to Proceed has not been issued within the 10 calendar day period or within the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

The Notice of Award letter is not an order to proceed. The Contractor will have no authority to perform work under this contract until all Contract Documents as indicated above are properly completed and placed on file at the Owner's Offices and a Notice to Proceed is issued by the Owner.

A Notice to Proceed with the work under this project will be sent to the Contractor upon satisfaction of the above-indicated requirements and after a preconstruction conference is held.

3.03 PROPOSAL ALTERNATES

When a project includes a bid alternate, all bidders are required to submit pricing for said alternate as a part of their bid. The Owner reserves the right to accept or reject any or all of the individual items included as a part of the bid alternate. The Owner-accepted bid alternate items' prices will be considered as part of the low bid determination for contract award. If all alternates are rejected, the lowest base bid submitted will be considered the low bid for purposes of contract award.

3.04 CONTRACT SECURITY & GUARANTY

The successful bidder shall be required to furnish the Owner with a performance bond and payment bond in the form required by law, each in an amount of one hundred (100%) percent of the contract amount, based on the lump sum or the anticipated quantities and unit prices, as determined by the Engineer.

The bonds shall guarantee the proper prosecution and completion of the work by the successful bidder; and shall further guarantee the prompt payment by the successful bidder or all persons or firms furnishing labor, tools, materials and supplies for the

work.

Upon completion of said work, an acceptable and separate 100% maintenance bond shall be furnished to guarantee the quality of material and workmanship of said work for a period of two years from the date of final acceptance by the City. The Contractor may not release the surety company on this 100% maintenance bond until a written release of said 100% maintenance bond is given by the Owner.

When a period of two years has elapsed after the date of the acceptance of the work by the Owner and if upon inspection by the Owner the work is found in good condition the maintenance bond shall be released.

If it is found by the inspection after two years use that some of the work and some of the materials are defective, such work or materials shall be replaced or repaired by the Contractor, and only when the Contractor has properly replaced and repaired such defective work and/or materials will the Owner then release the 100% maintenance bond. In the event that the Contractor fails to meet the time obligations of the initial maintenance bond and requests an extension of time, a \$1,000 escrow will be required to offset additional costs incurred by the Owner to administrate the maintenance bond extension.

3.05 PRECONSTRUCTION CONFERENCE

Prior to the start of any work there shall be a pre-construction conference arranged by the Engineer. Representatives of the Owner, Engineer, Developer, Contractor, Subcontractor, Project Foreman, and Utility Companies shall be notified to be present at this meeting.

The Contractor's project superintendent shall be familiar with all phases of the work to be executed and shall oversee the work during its progress. The project superintendent shall represent the Contractor, and communications and directions given to the superintendent shall be as binding as if given to the Contractor.

The Contractor's list of subcontractors and suppliers shall be submitted and reviewed along with scheduling, materials (including bituminous mix design), material sources, proposed haul routes, construction methods, desired materials substitutions, and any other information necessary for the orderly execution of the work.

The specifications and certifications for all products, materials and supplies furnished shall be submitted for review prior to the preconstruction conference.

3.06 FAILURE TO EXECUTE CONTRACT

Failure on the part of the successful bidder to execute the Contract, furnish an acceptable bond, or comply with any other requirements imposed precedent to the Contract, within the time allowed, shall be considered just cause for cancellation of the award and forfeiture of the Proposal Guaranty, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible bidder, or the work may be re-advertised or otherwise performed at the discretion of the Owner.

SECTION 4.00 - SCOPE OF WORK

4.01 ADDITIONAL INSTRUCTIONS

If the instructions and plans are not sufficiently clear to permit the Contractor to proceed with the work, the Engineer shall, upon the request of the Contractor, furnish additional written instruction, together with additional drawings as may be necessary. When such request is made by the Contractor, it must be in ample time to permit the preparation of the instructions and drawings by the Engineer before the construction of the work covered by them is undertaken. Such additional instructions and drawings shall be consistent with the Contract Documents and shall have the same force and effect as if contained in the original Contract Documents.

For the purpose of avoiding delays in the preparation of such additional instructions and drawings, the Engineer and the Contractor shall jointly prepare a schedule showing the time for the commencement of the work to be included in them and the time the Contractor shall furnish the necessary shop drawings which may be necessary for their preparation. The Contractor shall do no work without proper drawings or instructions and shall replace any work not in accordance with such drawings and instructions at no additional cost.

4.02 CHANGES OR ALTERATIONS IN THE WORK

The Owner, without invalidating the contract, may order extra work or make changes by altering, adding to or deducting from the work; the contract sum being adjusted according to the respective unit bid prices. All such work shall be executed under the conditions of the original contract, except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

If the Contractor claims that any instructions by drawings or otherwise issued after the date of the contract involved extra cost under the contract, the Engineer shall be given written notice thereof within seven days, after the receipt of such instructions, and in any event before proceeding to execute the work, except emergency endangering life or property, and the procedure shall then be as provided for elsewhere herein for changes in the work. No such claim shall be valid unless so made.

In giving instructions, the Engineer shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the purposes of the work but otherwise (except in an emergency endangering life or property) no extra work or change shall be made unless in pursuance of a written order by the Engineer.

4.03 ORAL AGREEMENTS

No oral order, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the contract documents, and none of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing, signed by the parties to be bound or by the representatives of the parties authorized to enter into such a waiver or modification, and no evidence shall be introduced in any proceeding of any other waiver or modification.

4.04 INTERPRETATIONS AND CHANGE ORDERS

No oral interpretation shall be made to the Contractor as to the meaning of any of the Contract Documents or to modify any of the provisions of the Contract Documents. Every request for an interpretation shall be made in writing and addressed and forwarded to the Engineer. The Owner will not be responsible for any other explanation or interpretation of the plans and specifications.

If unforeseen conditions require a change in the dimensions of a structure, location of underground pipes, or major variations of a similar nature from the original plans, necessitating exceeding the reasonable limits defined above, or being of the nature of a substantial departure from the original plans, such change shall be covered by a change order. The change order is to set forth in complete detail the nature of the change and reasons therefore. The compensation to be paid the Contractor and whether it is an addition or a reduction with respect to the original contract costs is also to be covered in detail. Should additional or supplemental drawings be required, they will be furnished by the Engineer.

4.05 SALVAGE

Unless otherwise indicated on the plans or in the Special Provisions, all castings, pipe and any other material taken from the work shall be the property of the Contractor.

4.06 FOSSILS

If any fossils, treasure or other unusual or valuable geological formations are found in the progress of excavating, such fossils, treasure or samples of geological formations shall be carefully preserved by the Contractor and the Contractor shall restrict or suspend operations in the immediate area of the discovery and shall immediately notify the Engineer of the discovery. The suspension of work for a period not to exceed 72 hours shall be allowed without claim by the Contractor for any damages as a result thereof. These items shall become the property of the state or federal agency concerned with their preservation and study.

4.07 CLEANUP

The Contractor shall, at no cost to the Owner, clean up and remove all refuse and unused materials of any kind resulting from the work. Upon failure to do so within 72 hours after request by the Engineer, the work may be done by the Owner and cost thereof be charged to the Contractor and deducted from the final estimate.

SECTION 5.00 - CONTROL OF WORK

5.01 ENGINEER'S RESPONSIBILITY AND AUTHORITY

The Engineer is responsible for the general supervision and direction of the inspection. The Engineer will decide all questions regarding:

- Quality and acceptability of materials furnished and work performed.
- Manner of performance and rate of progress of the work.
- Interpretation of the Plans, Specifications, and Special Provisions.
- Measurement, control of quantities, and the amount of any deductions or adjustments to be made in payment.
- Acceptable fulfillment of all Contract Provisions on the part of the Contractor.

The Engineer is not responsible for the acts or omissions of the Contractor's superintendent or employees.

The Engineer shall, within a reasonable time after receiving written notification, make decisions in writing on all claims of the Owner or the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the Contract Documents.

All such decisions of the Engineer shall be final, except where time or financial considerations are involved, in which case, the decision is subject to arbitration (if less than \$10,000) as per these general conditions. Any dispute over \$10,000 shall be settled in Carver County District Court.

Failure to condemn any inferior material or work at the time of its use or construction shall not be construed as an acceptance of the same, but the Contractor shall upon notice from the Engineer at any time prior to the final acceptance of the improvement immediately tear out, remove and properly reconstruct, at no cost to the Owner, any portion of this improvement which the Engineer may decide to be defective and the Contractor will be held wholly responsible for the safety, proper construction and perfection of the entire improvement until the same has been finally accepted and paid for by the Owner.

The Engineer will make final inspection of all work included in the contract or any portion thereof, as soon as practicable after notification by the Contractor that such work is nearing completion. If such work is not acceptable to the Engineer at the time of the inspection, the Contractor will be advised in writing as to the particular defects to be remedied before such work can be accepted. If, within a period of ten days after such notification, the Contractor has not taken steps to speedily complete the work as directed, the Engineer may, without further notice and without in any way impairing the contract, make such other arrangements as deemed necessary to have such work completed in a satisfactory manner without regard to remaining contract completion

time. The cost of completing such work shall be deducted from any moneys due, or which may become due the Contractor on the contract.

5.02 INTENT OF PLANS AND SPECIFICATIONS

The intent of the plans and specifications is that the Contractor furnishes all labor and materials, equipment and transportation necessary for the proper execution of the work unless specifically noted otherwise. The Contractor shall do all the work shown on the plans and described in the specifications and all incidental work necessary to complete the project in an acceptable manner and to fully complete the work or project, ready for use, occupancy and operation of the Owner.

It is further the intention of the plans and specifications to set forth requirements of performance, type of equipment and structures, and standards of materials and construction, to require new material and equipment unless otherwise indicated and to require complete performance of the work without specific reference to any minor component part. It is not intended, however, that materials or work not covered by the specifications shall be supplied unless distinctly so noted. Materials or work described in words, which so applied have a well-known technical or trade meaning, shall be held to refer to such recognized standards.

All work shall be completed in accordance with the specifications and plans, and in compliance with applicable laws of Federal, State and local governments.

5.03 SHOP DRAWINGS

The Contractor shall, upon request, submit shop drawings in quadruplicate for the approval of the Engineer.

5.04 DIMENSIONS

Figured dimensions on the plans will be used in preference to scaling the drawings. Where the work of the Contractor is affected by finish dimensions or manufacturer's equipment, these shall be determined by the Contractor at the site, and s/he shall assume the responsibility therefore.

5.05 MODELS

All models prepared for this work, in accordance with requirements of plans and specifications, shall become the property of the Owner at the completion of the work.

5.06 ADEQUACY OF PLANS AND SPECIFICATIONS

The complete requirements of the work to be performed under the contract shall be set forth in plans and specifications to be supplied by the Owner through the Engineer or by the Engineer as representative of the Owner.

5.07 CONFLICT

In the case of a conflict of meaning between any of the terms of the Contract Documents, the provisions of the document listed first below over those of a document listed later:

1. Contract Agreement Form
2. Special Provisions
3. Plans
4. Specifications
5. General Conditions
6. Bid
7. Bid Form

Special provisions and detail plans are intended to modify and prevail over standard plans and specifications.

5.08 DISCREPANCIES IN PLANS

The drawings, specifications, and other parts of the plans are intended to complement one another. Anything shown on the drawings but not mentioned in the specifications, or vice versa, or anything not expressly set forth in either but which is reasonably implied, shall be furnished as though specifically shown and mentioned in both without any extra charge. Should anything be omitted from the drawings and necessary to the proper construction of the work herein described, it shall be the duty of the Contractor to notify the Engineer prior to beginning work; and in the event of the Contractor failing to give such notice, the Contractor shall make good any damage or defect in work caused thereby, without extra charge to the owner.

Questions as to meaning of plans and specifications shall be interpreted by the Engineer, whose decisions shall be final and binding on all parties concerned. (See also Section 5.01 of these General Conditions.) The Engineer will provide the Contractor with such information as may be required to show revised or additional details of construction. The Engineer will provide full information when errors or omissions in the plans and specifications are discovered. Any work done by the Contractor, after discovery of such discrepancies, errors or omissions and prior to a decision by the Engineer, shall be done at the Contractor's risk.

5.09 SEPARATE CONTRACTS

The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate the work with that of other contractors.

If any part of the Contractor's work depends for proper execution or results upon the work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results. Failure to so inspect and report shall constitute an acceptance of the other Contractor's work.

To insure the proper execution of the work, the Contractor shall measure work already in place and shall at once report to the Engineer any discrepancy between the executed work and the drawings.

5.10 PLANS AND SPECIFICATIONS AT JOB SITE

One complete set of all plans and specifications shall be maintained by the Contractor at the job site and shall be available to the Engineer at all times.

The Owner retains the right of access to all plans, specifications and drawings.

5.11 MOVING OF PUBLIC AND PRIVATE UTILITIES

The Owner will give reasonable notice to all affected utility companies of the potential necessity of movement of their installations prior to commencement of the work. It shall be the responsibility of the Contractor to coordinate the work with the utility companies.

It is provided that no utility, private or public, shall be moved to accommodate the Contractor's equipment or the method of operation when such utility does not conflict with the installation of the improvement under construction unless the costs of such removal shall be at the expense of the Contractor.

The Contractor shall notify the proper representatives of any public utility, corporation, and company or individual, not less than 48 hours in advance of any work which might damage or interfere with the operation of their or his/her property along or adjacent to the work.

5.12 PROTECTION OF EXISTING IMPROVEMENTS AND UTILITIES

Prior to construction, the Contractor shall obtain field locations or other assistance as may be required to determine the existence and location of gas main and other private utilities as well as public utilities of the City, County, or State which may be underground or overhead within street and highway right of way or within easements and which may be interfered with under this contract.

In cases where the alignment, as shown on the plans, coincides with the existing location of either an overhead or underground privately owned utility so that, in the opinion of the Engineer, the relocation of said utility is required to complete the installation, the Owner shall provide for such relocation unless specified otherwise in the Special Provisions.

Existing underground, surface or overhead structures are not necessarily shown on the plans. Those shown are only approximate and no responsibility is assumed by the Owner or the Engineer for the accuracy of location. The Contractor shall make such investigations as are necessary to determine the extent to which existing structures may interfere with the work contemplated under this contract.

The sizes, locations and depths of such structures as are shown on the plans and

profiles are only approximate and the Contractor shall verify the accuracy of the information given.

The Contractor shall support and protect by timbers or otherwise, all pipes, conduits, poles, wires or other apparatus which may be in any way affected by the work.

At all shaft sites and on all open cut work, the Contractor shall provide and maintain free access to fire hydrants, water and gas valves, manholes and similar facilities. Gutters and waterways shall be kept open or other satisfactory provisions made for the removal of the storm water.

The Contractor shall provide as incidental to the work all methods for adequately draining the work and shall assume full responsibility and liability for damage to any persons or property resulting from such damage.

No trees shall be cut except upon the specific authority of the Engineer. Trees adjacent to the work shall be protected from all damage by the construction operations.

Storm and sanitary sewers must be carefully protected from any sand or debris and any such deposition caused by the Contractor's operations must be removed from the manholes and pipes by the Contractor.

Prior to construction commencement, the Contractor shall notify the Owner and conduct an inspection of potentially affected existing public utilities noting conditions such as sand in manholes or damaged valve boxes prior to the Contractor's construction. Once construction has commenced it will be assumed that all damage to surface and underground installations not previously noted has been caused by the Contractor's operations. The Contractor will be responsible to make the necessary corrections and/or repairs.

5.13 DAMAGE TO EXISTING IMPROVEMENTS OR UTILITIES

If, through the Contractor's operations, any of said pipes, conduits, poles, wires, or apparatus should be damaged, they shall be repaired by the authorities having control of same, and the expense of such repairs shall be charged to the Contractor.

The Contractor shall indemnify and save the Owner and Engineer harmless from claims for any damage done to any street or other public property; or to any private property by reason of breaking of any water pipe, sewer or gas pipe, electric conduit, or other utility by or through the Contractor's negligence.

The Contractor shall restore, or have restored at his/her own cost and expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring as may be directed, or shall make good such damage from injury in a manner acceptable to the Owner or the Engineer. In case of failure on the part of the Contractor to restore such property or make good such damage or injury, the Engineer may, upon 48 hours written notice under ordinary circumstances and without notice when a nuisance or hazardous

condition results, proceed to repair, rebuild, or otherwise restore such property as may be determined necessary, and the cost thereof will be deducted from any moneys due to the Contractor under this contract and if not so deducted, the Contractor will be obligated to forth with reimburse the Owner for the cost thereof.

The Contractor shall indemnify and save the Owner and Engineer harmless from claims brought for or on account of any damage, maintenance, removal or replacement, or relocation of mains, conduits, pipes, wires, cables or other such structures of private utility firms or corporations, whether underground or overhead, that may be caused or required by the Contractor during the time the work is in progress.

The Contractor shall not claim or be entitled to receive compensation for any damages sustained by reason of the inaccuracy or the omission of any of the information given on the drawings, relative to the surface, overhead, or underground structures or by reason of the Contractor's failure to properly protect and to maintain such structures.

The Contractor is to exercise extreme care in crossing or working adjacent to all utilities and shall be responsible to protect and maintain their operation during the time the work is in progress. The Contractor shall restore, at no cost to the Owner, any public structures such as water mains, water connections and appurtenances, sewers, manholes, catch basins and sewer connections which are damaged or injured in any way by his/her acts.

No trees shall be removed without permission of the Engineer. No compensation will be paid for cutting down, removing and disposing of shrubs. Any trees or shrubs deemed savable will be field located by the Engineer and shall be fully protected by this Contractor during construction. Any trees removed or damaged by the Contractor, which were deemed savable by the Engineer, will be replaced at the Contractor's expense with a new tree as near in size and kind as possible, but never larger than 6" caliper as measured six inches (6") above the ground surface.

All trimming of trees has to be approved by the Engineer. All trees damaged during construction shall be trimmed and repaired.

The following procedures shall be adhered to when constructing utilities near trees.

- A. Cut roots cleanly.
- B. Backfill trench as soon as possible; do not leave the roots exposed to air.
- C. No equipment or construction materials shall be stored beneath a tree's drip line.
- D. Clean up around trees immediately after construction.

5.14 MONUMENTS AND STAKES

The Contractor shall not disturb any monuments or stakes found on the line of this improvement until ordered by the Engineer. The Engineer will furnish and set all new monuments or stakes

required along the line of this improvement, but the Contractor will be responsible for their protection.

In case any monument or stake is disturbed by the Contractor without orders from the Engineer, the Contractor will be charged with cost of the survey and other work required to relocate the same.

Prior to the start of construction, the Contractor shall give the Engineer five working days written notice when s/he requires the services of the Engineer for laying out any portion of the work is required. After the start of construction, the Contractor shall give the Engineer 48 hours' notice, not including Saturday or Sunday, when s/he requires the services of the Engineer for laying out any portion of the work is required.

5.15 INSPECTORS

Inspectors may be appointed by the Engineer or Owner subject to approval by the City Engineer to see that the work is performed in accordance with the plans and specifications. Inspector qualifications shall be submitted in writing to the City Engineer.

5.16 EXAMINATION OF COMPLETED WORK

At the request of the Engineer, the Contractor at any time before acceptance of the work shall remove or uncover such portions of the finished work as requested. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering or removing, and the replacing of the covering or making good of the parts removed shall be paid for as extra work, in accordance with requirements of Section 9.03 of the General Conditions; but should the work so exposed or examined prove unacceptable, the uncovering, removing and replacing shall be at the Contractor's expense.

5.17 OWNER'S RIGHT TO CORRECT DEFICIENCIES

If the Contractor should neglect to execute the work properly or fail to perform any provision of this contract, the Owner after ten days' written notice to the Contractor may, without prejudice to any other remedy, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

5.18 TRAFFIC CONTROL AND MAINTENANCE

(A) Maintenance of Traffic

The Contractor is responsible for maintenance, control, and safeguarding of traffic within and immediately abutting the project as further outlined herein, and as may otherwise be provided in the Special Provisions. The Contractor is responsible for maintenance, control, and safeguarding of traffic on all detours. The Owner reserves the right to select any detour routes and will coordinate with other governmental agencies.

(B) Street Closures or Partial Closures

Streets may be closed to through traffic but shall not be closed to traffic until such closure has been approved by the Owner. Street closures shall be made in such a manner as to provide for maximum public safety and public convenience. They shall be opened to through traffic at such times as the work has been completed, or as the Owner may direct.

(C) Existing Traffic Signs and Facilities

The Contractor will make all necessary adjustments to traffic signals and traffic signal activators at no cost to the Owner. Existing traffic and street name signs which will interfere with construction will be removed by the Contractor as required by the construction schedule. Upon completion of the project, the Contractor shall reset all such signs.

(D) Detours & Haul Routes

Contractors shall plan haul routes utilizing State Trunk Highways and County State Aid Highways. Any requests to use City streets as haul routes shall be made in writing to the Engineer. The Engineer shall have the final decision to approve or disapprove haul route requests and impose road damage penalties as necessary.

(E) Local and Emergency Traffic

Local traffic shall be provided access to private properties at the end of each day, except during some urgent stages of construction when it is impracticable to carry on the construction and maintain access simultaneously, such as for the placing of bituminous pavement, placing and curing of Portland cement concrete, and utility excavations which prohibit safe travel of vehicular traffic. Emergency traffic such as police, fire and disaster units shall be provided reasonable access at all times.

The Contractor shall notify the Owner 48 hours prior to proposed partial blockage or closure of any street or public right of way and shall place all necessary warning signs and provide all necessary flaggers. The Contractor shall notify the police/fire department 48 hours prior to the proposed blockage or closure of any street or public right of way.

(F) Protection of Pedestrian and Vehicular Traffic

The Contractor shall take every precaution to protect pedestrian and vehicular traffic.

(G) Restriction of Parking

Where parking is a hazard to through traffic or to the construction work, it shall be restricted either entirely or during the time when it creates a hazard. Signs for this purpose will be furnished and placed by the Contractor. The Contractor shall be responsible for and shall maintain the signs if they are used on any street which is directly involved in the construction work. If the no parking signs are to be used beyond the confines of the work area, such as another street being used as a detour, the signs will be the responsibility of the Contractor.

(H) Flaggers

The Contractor shall furnish at his/her own expense all flaggers.

(I) Violations

In the event the Contractor performing work violates any part this Section, the Contractor will be provided written notice to remediate the violation. If after a reasonable amount of time, which will be outlined in the written notice, has passed with no correction, the Contractor shall be charged an administrative penalty of \$500.00 per day. If the violation is not remediated within 72-hours, all work associated with the violation must cease at once until traffic control is erected, inspected, and approved by the City Engineer.

5.19 TRAFFIC CONTROL WITHIN AND ABUTTING THE PROJECT

The Contractor shall place and maintain all signs, barricades and warning lights within the limits of the project on all streets, alleys and driveways entering the project so that approaching traffic will turn right or left on existing undisturbed streets before reaching the warning signs and barriers immediately abutting the project.

Barricades shall be furnished by the Contractor. The Contractor shall assume responsibility for signs and traffic control devices beyond the limits herein before described.

5.20 REMOVAL OF CONSTRUCTION EQUIPMENT, TOOLS AND SUPPLIES

At the termination of this contract, before acceptance of the work by the Owner, the Contractor shall remove all equipment, tools and supplies from the property of the Owner. Should the Contractor fail to remove such equipment, tools and supplies, the Owner shall have the right to remove them.

5.21 SUSPENSION OF WORK BY ENGINEER

When, in the judgment of the Engineer, unfavorable weather or any other condition makes it impractical to perform work in accordance with the contract, or should the Contractor fail to comply with the provisions of the contract or the requirements of the specifications, the Engineer may issue to the Contractor a written order to immediately suspend work and upon receipt of such notice, on that part of the contract work specified in said written order. When conditions are again favorable for prosecution of the work, the Engineer will issue to the Contractor a written order to resume the suspended work. Orders to suspend work will not be written for intermittent shutdowns due to weather conditions unless the suspension of work is to be for a period of time exceeding five working days. The Contractor shall be responsible for preventing any damage or unreasonable deterioration of the work during the time it is closed down.

Suspension of the work by the Engineer is not grounds for claims by the Contractor for damages or extra compensation.

Inspectors shall have authority to suspend all or a portion of the work which is not being properly performed and, subject to the final decision of the Engineer, to condemn and reject defective work and materials.

Inspectors shall have authority to permit deviation from the plans and specifications and to suspend work as required for conformance with the plans and specifications. If requested by the Contractor, the suspension order will be given in writing.

Inspectors shall not act as foremen or perform other duties for the Contractor.

5.22 SUSPENSION OF WORK BY OWNER

The Owner may at any time suspend the work, or any part thereof, by giving ten days' notice to the Contractor in writing. This work shall be resumed by the Contractor within ten days after the date fixed in a supplemental written notice from the Owner to the Contractor to do so.

If the work, or any part thereof, shall be stopped by the notice in writing aforesaid, and if the Owner does not give a supplemental notice in writing to the Contractor to resume work at a date within a year of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work so suspended, and s/he will be entitled to the estimates and payments for all work done on the portions so abandoned, if any.

If suspension of all or part of the work, which is subsequently resumed, causes additional expenses not due to the fault or negligence of the Contractor, the Owner shall reimburse the Contractor for additional expense incurred due to suspension of the work. Claims for such compensation, with complete substantiating records, shall be filed with the Owner within ten days after the date or order to resume work in order to receive consideration. This paragraph shall not be construed as entitling the Contractor to compensation for delays due to inclement weather, failure to furnish additional surety or sureties specified herein, for supervision made at the request of the Contractor, or for any other delay provided for in the Contract Documents.

SECTION 6.00 - CONTROL OF MATERIALS AND WORKMANSHIP

6.01 QUALITY OF EQUIPMENT AND MATERIALS

In order to establish standards of quality, the Engineer has, in the detailed specifications, referred to certain products by name and catalog number. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers where fully suitable in design.

Whenever in these specifications, a material or article is specified by using the specific description or name of proprietary product, or name of a manufacturer or vendor, rather than by using descriptive detail or substance and function, any article which will perform the duties imposed adequately and to the same effectiveness as determined by the Engineer will be acceptable as a substitute in lieu of the material or articles so specified.

Only materials conforming to the requirements of these specifications shall be used in the work. The source of any material shall not be changed at any time without the written approval of the Engineer. The Contractor may be required at any time to furnish a complete statement of the original, composition and manufacturer of any or all materials required in the work, or to submit samples of the same.

Unless otherwise specified, all materials shall be new and both workmanship and material shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials or tools used in the work.

All materials, supplies and articles furnished shall, whenever so specified, and otherwise wherever practicable, be the standard stock products of recognized reputable manufacturers.

The specifications and certifications for all products, materials and supplies furnished shall be submitted for review prior to the preconstruction conference.

The Contractor shall furnish a complete list of proposed desired substitutions, together with such engineering and catalog data as the Engineer may require. List and information must be submitted prior to submittal of first progress payment estimate.

The Contractor shall abide by the Engineer's judgment when proposed substitute materials or items of equipment are judged to be unacceptable and shall furnish the specified material or item of equipment in such case. All proposals for substitutions shall be submitted in writing by the Contractor and not by individual trades or material suppliers. The Engineer will approve or disapprove proposed substitutions in writing within a reasonable time. No substitute materials shall be used unless so approved in writing.

6.02 TESTING

All testing of materials and workmanship shall be conducted by a reputable and qualified firm totally independent of the contractor and owner.

6.03 USE OF PREMISES

The Contractor shall confine equipment, storage of materials and operation of work to the limits indicated by law, ordinances, permits, easements or direction of the Engineer, and shall not unreasonably encumber the premises with said equipment and materials.

6.04 STORAGE OF MATERIALS

Materials shall be stored so as to insure the preservation of their quality and fitness for the work and such materials, even though approved before storage, shall be subject to testing and must meet the requirement of these specifications at the time it is proposed to use them in the work. Materials shall be stored per the manufacturer's recommendations in a safe manner that will facilitate inspection and be in compliance with all applicable permits and regulations. The portion of the right of way not required for public travel may, with the consent of the Engineer, be used for storage purposes and for the placing of the Contractor's plant and equipment; but any additional space required; unless otherwise stipulated, shall be provided by the Contractor at no cost to the owner.

From the commencement of the work until the completion of the same, the Contractor shall be solely responsible for the care of the work covered by this contract and for the materials delivered at the site intended to be used in the work and all injury or damage to the same from whatever cause, shall be made good at the Contractor's expense before the final estimate is made. The Contractor shall provide suitable means of protection for and shall protect all material intended to be used in the work and all work in progress as well as completed work. All necessary precautions shall be taken to prevent injury or damage to work in progress of construction by flood, freezing or from inclemency's of the weather at any and all times and only approved methods shall be used for this purpose.

6.05 MANUFACTURER'S DIRECTIONS

Manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer unless herein specified to the contrary.

6.06 REJECTED WORK AND MATERIALS

All materials which do not conform to the requirements of the Contract Documents are not equal to samples approved by the Engineer, or are in any way unsatisfactory or unsuited to the purpose for which they are intended, shall be rejected and shall be removed immediately from the Project, unless otherwise permitted. No materials which have been rejected - the defects on which have been corrected or removed - shall be used until approval has been given. If the Contractor does not remove such condemned work and materials within a reasonable time fixed by written notice, the Owner may remove them and may store the materials at the expense of the Contractor. If the Contractor does not pay the expense of such removal within ten days thereafter, the Owner may, upon ten days' written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor.

The Contractor shall promptly remove from the premises all materials condemned by the Engineer as failing to conform to the contract, whether incorporated in the work or not and the Contractor shall promptly replace and re-execute the work in accordance with the Contract Documents without expense to the Owner and shall bear the expense of making good all work of the other contractors destroyed or damaged by such removal or replacement.

Work done contrary to or regardless of the instructions of the Engineer, work done without lines, grade or cross stakes and grades shown on the plans or as given by the Engineer, or any deviation made from the plans and specifications without written authority will be considered unauthorized and at the expense of the Contractor and will not be measured or paid for by the Owner. Any and all work so done may be ordered removed and replaced immediately at the Contractor's expense.

6.07 MATERIALS FURNISHED BY THE OWNER

Materials specifically indicated will be furnished by the Owner. The fact that the Owner is to furnish material is conclusive evidence of its acceptability for the purpose intended and the Contractor may continue to use it until otherwise directed. The Contractor shall notify the Engineer upon discovering any defect in materials furnished by the Owner. Materials furnished by the Owner, which are not of local occurrence, will be provided at locations listed on plans or in specifications. After receipt of the material the Contractor shall be responsible for material loss or damage, including that caused by third parties.

6.08 MATERIALS FURNISHED BY THE CONTRACTOR

All materials used in the work shall meet the requirements of the respective plans and specifications. All materials not otherwise specifically indicated shall be furnished by the Contractor.

6.09 UNACCEPTABLE WORK & MATERIALS

The Owner will consider all Work and Materials that do not meet the Contract requirements, or do not meet generally accepted industry standards if the Contract does not provide specific standards, to be unacceptable.

For unacceptable Work resulting from poor workmanship, use of nonconforming Materials, damage through carelessness, or any other cause existing before final acceptance of the Work, the Owner will take one of the following actions, at the Engineer's sole discretion:

- (1) Require the Contractor to acceptably correct the Work and Materials, immediately upon receipt of written order to do so
- (2) Allow the Work to remain in place and apply a monetary deduction to the Contract Unit Price
- (3) Decide the extent of acceptance for the Work to remain in place if a Contract Item fails to meet Contract requirements but is adequate to serve the design purpose, and document the basis of acceptance by Change Order to adjust the Contract Unit Price; the adjusted Contract Unit Price will be determined at the Engineer's sole discretion

- (4) Require the Contractor to remove and replace the unacceptable Work at the Engineer's sole discretion

The Owner may provide notice of default after the Contractor has been given proper notice to acceptably correct the Work and Materials, and has failed to do so.

The Contractor shall remove and replace the unacceptable Work, or correct the Work, at no additional cost to the Owner if a Contract Item does not meet specified requirements and results in Work that does not serve the design purpose.

SECTION 7.00 - LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

7.01 COMPREHENSIVE GENERAL LIABILITY

Contractor shall obtain the following minimum insurance coverage and maintain it at all times throughout the life of the Contract, with the City included as an additional name insured on a primary and non-contributory basis. The Contractor shall furnish the City a certificate of insurance satisfactory to the City evidencing the required coverage:

Bodily Injury: \$2,000,000 each occurrence
\$2,000,000 aggregate products and completed operations

Property Damage: \$2,000,000 each occurrence
\$2,000,000 aggregate Contractual Liability (identifying the contract):
Bodily Injury: \$2,000,000 each occurrence

Property Damage: \$2,000,000 each occurrence
\$2,000,000 aggregate

Personal Injury, with Employment Exclusion deleted:
\$2,000,000 aggregate Comprehensive Automobile Liability (owned, non-owned, hired):
Bodily Injury: \$2,000,000 each occurrence
\$2,000,000 each accident

Property Damage: \$2,000,000 each occurrence

7.02 CONSTRUCTION DAYS AND HOURS

Construction hours, including pick-up and deliveries of material and equipment and the operation of any internal combustion engine, may only occur from 7:00 a.m. to 6:00 p.m. on weekdays, from 9:00 a.m. to 5:00 p.m. on Saturdays with no such activity allowed on Sundays or on legal holidays. In addition to the aforementioned construction hours, on October 31st operations must cease by 3:00 p.m. (no construction activities are allowed on Sundays). Contractors must require their subcontractors, agents and supplies to comply with these requirements and the Contractor is responsible for their failure to do so. Under emergency conditions, this limitation may be waived by the written consent of the City Engineer. If construction occurs outside of the permitted construction hours, the Contractor shall pay the following administrative penalties:

First Violation	Written Warning
Second Violation	\$ 500.00
Third and Subsequent Violations	\$1,000.00

The Contractor expressly agrees to be responsible for, and to pay the Owner for the Inspector's hours and expenses for all inspection work required past the daily working hours, on weekends and legal holidays. The hourly rates will be in conformance with Engineer's current fee schedule. Overtime work is 1.5 times the hourly rate. Payment to the owner shall be made by deductions to the contractor's progress or final payments.

7.03 DRUG AND ALCOHOL TESTING

All contractors and their subcontractors shall provide the City, prior to conducting any work, written verification of compliance with the Federal Highway Administration (FHWA) drug use and alcohol testing rules published February 15, 1994, which apply to persons required to have a commercial driver's license (CDL).

7.04 WATER

The Contractor shall make all arrangements with the City's Public Works Department for obtaining any water which may be needed for the construction. No water may be taken from any City hydrants unless authorized in writing by the City. Failure to obtain City authorization will result in prosecution and fines within the limits of city ordinance.

7.05 NOISE ELIMINATION

The Contractor shall eliminate noise to as great an extent as possible at all times. Air compressing plants shall be equipped with silencers and the exhausts of all gasoline motors or other power equipment shall be provided with mufflers.

7.06 PATENTS

All fees or royalties for patented invention, equipment, or arrangements that may be used in any manner connected with the construction or erection of the work, or any part thereof, shall be included in the price mentioned in the contract.

7.07 PRIVILEGES OF CONTRACTOR IN STREETS, RIGHTS-OF-WAY AND EASEMENTS

For the performance of the contract, the Contractor will be permitted to occupy such portions of streets or alleys, or other public places, or other rights-of-way, as shown on the plans or as permitted by the Engineer. A reasonable amount of tools, materials and equipment for construction purposes may be stored in such space, but not more than is necessary to avoid delays in construction. Excavated and waste materials shall be piled or stacked in such a way as not to interfere with spaces that may be designated to be left free and unobstructed, nor inconvenience occupants of adjoining property. Other Contractors of the Owner may, for all purposes required by their contracts, enter upon the work and premises used by the Contractor, and the Contractor shall give to other Contractors of the Owner all reasonable facilities and assistance for the completion of adjoining work. Any additional ground desired by the Contractor for sole use shall be acquired by the Contractor at no cost to the Owner. Also, all maintenance and restoration costs shall be the responsibility of the Contractor.

Where the work encroaches upon any right of way of any railway or state or county highway, the Owner shall apply for the necessary permits and the Contractor shall secure, pay the cost of all fees and provide bonds as required at no additional compensation. Where railway tracks or such highway are to be crossed, the Contractor shall observe all the regulations and instructions of the railway company and highway department as to methods of doing the work, or precautions for safety of

property and the public. All negotiations with the railway company and highway department, except the right-of-way, shall be made by the Contractor at no cost to the Owner. The Contractor will not be paid direct compensation for such railway or highway crossing, unless so provided in the Special Provisions and Proposal.

7.08 DISCRIMINATION ON ACCOUNT OF RACE, CREED, OR COLOR

The Contractor agrees that the provisions of State Statutes are as much a part of this contract as if fully set forth herein.

7.09 SAFETY

Precautions shall be exercised at all times by the Contractor for the protection of persons, employees and property. The safety provisions of applicable laws and local building and construction codes shall be observed.

The Contractor is solely responsible for the safety, proper construction and protection of the entire work until the same has been finally accepted and paid for by the Owner. The Contractor is responsible for conducting all work in compliance with the requirements of applicable state and federal laws, and the rules and regulations of such governmental agencies having jurisdiction over such operations.

The Contractor shall be solely responsible for providing and maintaining at no additional cost to the Owner and on a 24-hour basis, all necessary safeguards such as temporary ladders, guard rails, protective fencing, shoring, bracing, dewatering, watchpersons, warning signs or signals, barricades and night lights at all unsafe places at or near the work. Provisions shall be made to prevent vehicles, pedestrians, and livestock from falling into open trenches or being otherwise harmed as a result of the work.

Excavation in or adjacent to public streets or alleys in which water stands more than one foot deep shall be securely barricaded with snow fence so as to prevent access by small children at all times work is not being carried on at the site of excavation. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least two lights at each barricade. A sufficient number of barricades shall be erected to keep vehicles from being driven on or into any work under construction. The Contractor shall furnish watchpersons in sufficient numbers to protect the work. The Contractor shall in all cases maintain safe passageways at all road crossings, crosswalks and street intersections, and shall do all other things necessary to prevent accident or loss of any kind.

7.10 SANITARY PROVISIONS

The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of employees as may be necessary to comply with the requirements and regulations of the governmental agency having jurisdiction there over. No public nuisance shall be permitted.

Suitable sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided and maintained by the

Contractor.

7.11 RAILROAD CROSSINGS

Wherever a project is being constructed beneath, at grade or above railroad track, it shall be the Contractor's responsibility to contact the railroad company prior to constructing such crossings and to proceed with the construction as approved by the railroad company. The Contractor shall comply with all construction and additional insurance requirements of the railroad company. The Contractor shall hold the Owner and Engineer harmless from any and all damages resulting from operations in the construction at such crossings.

7.12 USE OF EXPLOSIVES

Blasting will not be permitted in any case without specific authorization by the Owner, and then only under such restrictions as may be required by the proper authorities.

If it is necessary to use explosives in the performance of the work, the Contractor shall take out permits and comply with all the laws, ordinances and regulations governing same. The Contractor shall fully protect all completed works as well as all overhead, surface or underground structures and shall be liable for any damage done to the work or to other structures on public or private property and injuries sustained by persons, by reason of the use of explosives in the operations. Explosives shall be handled, used and fired only by qualified people. All firing shall be done by electricity. All explosive supplies shall be safely stored and protected in an approved manner. All such storage places shall be marked clearly "DANGEROUS EXPLOSIVES". Caps or other exploders shall not be stored at the place where dynamite or other explosives are stored.

7.13 PRIVATE PROPERTY

The Contractor shall not enter upon private property for any purpose without having previously obtained written permission from the property owner. The Contractor shall be responsible for the preservation of, and shall use every precaution to prevent damage to all trees, shrubbery, plants, lawns, sprinkler systems, fences, culverts, bridges, pavements, driveways, sidewalks, etc.; all water, sewer and gas lines; all conduits; all overhead pole lines or appurtenances thereof; and all other public or private property along or adjacent to the work.

Access to private property shall be maintained/provided after 5:00 PM. Temporary mailboxes must be installed when the Contractor anticipates or the plans show as such. The Contractor must furnish, install, and remove temporary mailboxes. Temporary mailbox locations must be approved by the Engineer.

7.14 RIGHT TO USE IMPROVEMENT

The Owner shall have the right to open to traffic or public use any portion of this improvement prior to the final completion of the whole work, but the use of any part or portion of this improvement by the Owner, by the public, or by any person or party, shall not be construed as acceptance of any portion of the work prior to the time of final completion and acceptance of the entire improvement.

7.15 CONTRACTOR'S RESPONSIBILITIES

The Contractor shall furnish all necessary machinery, tools, labor and material for every character required, and shall fully complete the work in accordance with the plan, specifications, and detail drawings, for the prices bid. The Contractor shall perform the entire work under the contract and assume the responsibility for and risk of all damages to the work or to property adjacent to or on the line of said work. The Contractor shall have charge of and be responsible for the entire project until its completion and acceptance. This includes the responsibility to maintain all stages of work in a safe and suitable condition at all times, including nights, weekends, and holidays. The Contractor shall make observations of the work during such periods as are necessary to insure proper care of the work. The Contractor is liable for any defects which may appear or be discovered before the final payment herein specified.

The Contractor shall designate one person who shall have charge of the job and to whom the inspector may communicate. Whenever the Contractor is not present on the work, communications will be given to the superintendent or foreman in immediate charge of the work. Communications received shall be strictly obeyed.

The Contractor shall be knowledgeable of and comply with the requirements of all pertinent permits and programs including, but not limited to, General Permit Authorization to Discharge Stormwater Associated With Construction Activity Under the National Pollution Discharge Elimination System, other provisions of the Clean Water Act, MN Rules Chapters 7001 and 7090, MN Wetland Conservation Act, DNR Public Waters Program, and others.

The Contractor shall submit, at such times as may reasonably be requested by the Engineer, schedules which shall show the order in which the Contractor proposes to carry on the work, with dates at which the Contractor will start the several parts of the work, and estimated dates of completion of the several parts.

In accordance with the contract agreement, the Contractor and associated sureties shall indemnify the Owner and any and all of its officers, Engineers, and employees from any claims and demands or losses, damages, costs, charges and expenses of every nature and description, whether direct or indirect, because of the performance of this contract, including all injuries to workers or persons other than workers and for all property damages. The Contractor shall indemnify the Owner against any such loss or any liability of any nature, whether direct or indirect, and the Owner reserves the right to deduct from any money due the Contractor the amount of any judgment or claims therefore.

The obligations of the Contractor do not extend to the liability of the consultant or Engineer, the consultant's agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications which are certified by the Engineer. The approval of the above documents by the Engineer shall be subject to the conditions, limitations and exceptions stated on such documents and in contract documents. No approval of any document by the Engineer shall be implied. The Engineer shall not be deemed to have approved any document unless such document bears the Engineer's certificate or seal.

7.16 LANDS BY OWNER

Where the work passes over or through private property, the Owner will secure right of way or easement. The Contractor shall not receive any extra compensation or be entitled to any extra payment because of delay on the part of the Owner in obtaining right of way or easement.

7.17 LANDS BY CONTRACTOR

Any additional land and access thereto that may be required for temporary construction facilities or for storage of materials shall be provided by the Contractor with no liability to the Owner. The Contractor shall confine equipment and storage of materials and activities of workers to those areas described in the plans and specifications and such additional areas which may be provided as approved by the Engineer.

SECTION 8.00 - PROSECUTION AND PROGRESS

8.01 SUBCONTRACTS

At the time specified by the Contract Documents or when requested by the Engineer, the Contractor shall submit-in writing to the Owner for approval the names of the subcontractors proposed for the work. Subcontractors may not be changed except at the request of and with the approval of the Owner. The Contractor is responsible to the Owner for the acts and omissions of all employees and subcontractors hired by the Contractor. The Contract documents shall not be construed as creating any contractual relation between any subcontractor and the Owner.

The Contractor agrees to bind every subcontractor and every subcontractor agrees to be bound by the terms of the Contract Documents as far as applicable to the subcontractor's portion of the work; including the following provisions of this section.

The Contractor agrees to be bound to the subcontractor by all the obligations that the Owner assumes to the Contractor under the terms of said documents, and by all the provisions thereof affording remedies and redress to the Contractor from the Owner.

The Contractor shall not assign, sublet, subcontract or transfer more than 50% of the total contract cost excluding "specialty items" without the written consent of the Owner. Any such assignment, subletting, or transfer shall not in any way relieve the Contractor of the responsibilities assumed under the contract, bonds, and guaranty.

For convenience of reference and to facilitate the letting of contracts and subcontracts, the specifications are separated into title sections. Such separations shall not, however, operate to make the Engineer an arbiter to establish limits to the contracts between Contractor and subcontractor.

8.02 CONTRACTOR'S SUPERINTENDENT

A qualified superintendent shall be in control of the work at all times and give efficient supervision to the work until its completion. The superintendent shall have full authority to act in behalf of the Contractor, and all directions given to the superintendent shall be considered given to the Contractor. The Engineer's instructions may be confirmed in writing and shall be so confirmed upon written request of the Contractor.z

8.03 CONTRACTOR'S EMPLOYEES

Incompetent or incorrigible employees shall be dismissed from the project by the Contractor or his/her representative when requested by the Engineer, and such persons shall not again be permitted to return to the project without the written consent of the Engineer.

The foreman or other persons directing the work shall be competent, sober, and reliable, and shall extend every facility to the Engineer to enable to proper execution of the Engineer's duties, and shall furnish such help as may be necessary to facilitate the inspection of materials.

8.04 INJUNCTIONS

If by reason of any court proceedings, instituted by any third party or by the Owner affecting, directly or indirectly, the construction or completion of any portion or portions of this improvement, the Contractor or the Owner shall be unable to construct or complete any other portion or portions thereof, the Contractor shall, and does hereby waive any and all claims for damages because of such inability to complete the improvement as completed and file the final estimate thereon as provided for in the full completion of other improvements in the Owner, and the Contractor shall accept in full payment of the work upon said improvement, and as a cancellation of the contract thereof, a sum of money determined in strict accordance with the Contractor's proposal for the contract, on the basis of the work actually completed up to the time of stopping thereof.

8.05 RIGHTS OF VARIOUS INTEREST

Wherever work being done by the Owner's forces or by other Contractors is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by the Engineer, to secure the completion of the various portions of the work in general harmony.

8.06 WORK DURING AN EMERGENCY

The Contractor shall perform any work and shall furnish and install any materials and equipment necessary during an emergency endangering life or property. In all cases, the Contractor shall notify the Engineer of the emergency as soon as practicable, but shall not wait for instructions before proceeding to properly protect both life and property. In cases where the Contractor cannot or does not meet the emergency, the Owner may take appropriate action to protect life and safety.

8.07 DELAYS AND EXTENSION OF CONTRACT TIME

The Contractor herewith specifically waives claims for damages for any hindrance, delay, or change of sequencing. The Contractor will, in lieu thereof, be granted extensions of time for which liquidated damages will not be claimed by the Owner for the following causes: A delay caused the Contractor by any suit or other legal action against the Owner will entitle the Contractor to an equivalent extension of time unless the period of such delay exceeds 90 days.

When such period is exceeded, the Owner will, upon request by the Contractor in writing, either terminate the contract, or grant a further extension of time, whichever as may at that time appear most desirable to both parties.

If the Contractor is delayed at any time in the progress of the work by any act of neglect of the Owner or the Engineer or any employees of either, or by any other Contractor employed by the Owner, or by strike, fire, unusual delay in transportation, unavoidable casualties, or other causes beyond the Contractor's control, or by any cause which, in the opinion of the Engineer, shall justify the delay, then the time of completion shall be extended for such reasonable time as the Engineer may decide. No such extension shall be made for delay occurring more than seven days before claim therefore is made in writing to the Engineer.

Shutdowns due to improper work, or otherwise due the Contractor's operation, are not

cause for extension of time.

If during the term of this contract, the volume of the specified work, measured in dollars, is increased over the total value shown in the Contractor's proposal at the time the award of contract is made, the Contractor will be granted an extension proportionately equal to the increase in the total value. Should unforeseen conditions require the performance under an extra work order, the work more complex or difficult than that originally specified and shown on the plans, and such work, in the Contractor's opinion, requires more time to execute than the proportional increase in dollar value, the Contractor shall state to the Engineer, in writing, prior to the performance of such work, his/her estimate of the added time required for such work.

The Owner will, if such estimate be reasonable, allow an added extension of time equal to the difference between the total time required and the proportional increase in the dollar value of the work.

8.08 CONSTRUCTION SCHEDULE & LIQUIDATED DAMAGES

Contract and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in the Contract, plus any extensions thereof allowed. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner a set charge based off the table below for each calendar day that expires after the time specified in the Contract for Completion until the Work is complete.

Daily costs are based on MnDOT Table 1807.1-1, "Schedule of Liquidated Damages as follows:

TABLE 1807.1-1 SCHEDULE OF LIQUIDATED		
Original Contract Amount		Charge Per Cal. Day
From More Than (\$)	To and Including (\$)	
0	25,000	300
25,000	100,000	400
100,000	500,000	900
500,000	1,000,000	1,200
1,000,000	2,000,000	1,500
2,000,000	5,000,000	2,500
5,000,000	10,000,000	3,000
10,000,000	----	3,500

8.09 OWNER'S RIGHT TO TERMINATE CONTRACT & COMPLETE THE WORK

The Owner has the right to terminate the employment of the Contractor for any of the following reasons:

- A. The Contractor is adjudged bankrupt, makes a general assignment for the benefit of creditors, or becomes insolvent;
- B. Failure of Contractor to supply adequate properly skilled workers or proper materials;
- C. Failure of Contractor to make prompt payment to subcontractor for material or labor;
- D. Persistent and continuing disregard of laws, ordinances, or proper instructions of the Engineer;
- E. Assignment of work without permission of the Owner;
- F. Abandonment of the work by Contractor;
- G. Failure to meet the work progress schedule set forth in the contract;

Termination of the contract shall be preceded by seven days written notice by the Owner to the Contractor and the surety stating the ground for termination and the measures if any which must be taken to assure compliance with the contract. The contract shall be terminated at the expiration of such seven day period unless the Owner shall withdraw its notice of termination.

Upon termination of the contract by the Owner, the Owner may complete the work required by the contract by whatever means deemed expedient, including requiring the Contractor's surety to complete the work.

The taking over of the work by the Owner upon contract termination shall not affect the right of the Owner to recover liquidated damages from the Contractor or the surety for failure to complete contract.

In the event that the Contractor involuntarily abandons the work, fails or refuses to complete the work embodied in the contract or fails to pay just claims for labor or material, the Owner reserves the right to charge against the Contractor all extra legal, engineering, or other costs resulting from such abandonment, failure or refusal. Legal costs will include the Owner's cost of prosecuting or defending any suit in connection with such abandonment, failure or refusal, and nonpayment of claims wherein the Owner is made codefendant, and the Contractor agrees to pay all such costs, including reasonable attorney's fees.

When the Owner assumes control of the work under the contract pursuant to termination, the Owner may take possession of the work and all material, tools, and equipment therein belonging to the Contractor and may use the same to complete the work at Contractor's expense.

Upon contract termination, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price exceeds

the expense of finishing the work, including compensation for additional managerial and administrative services, the excess shall be paid to the Contractor. If such expense exceeds the unpaid balance, the Contractor shall pay the difference to the Owner. The expenses incurred by the Owner as herein provided and the damages incurred through the Contractor's default shall be certified by the Engineer and Owner.

8.10 CONTRACTOR'S RIGHT TO TERMINATE CONTRACT

The Contractor may terminate contract upon ten days' written notice to the Owner and the Engineer for any of the following reasons:

- A. If an order of any court or other public authority caused the work to be stopped or suspended for a period of 90 days through no act of fault of the Contractor or his/her employees;
- B. If the Owner should fail to act upon any request for payment, in the manner set forth in the General Conditions, within 45 days after its approval by the Engineer;
- C. If the Owner should fail to pay the Contractor any sum within 45 days after its award by arbitrators.

SECTION 9.00 - MEASUREMENT AND PAYMENT

9.01 MEASUREMENT

The determination of pay quantities or work performed under this contract will be made by the Engineer based upon the lines, grades, and cross sections given, or measurements made by designated Inspectors. All items will be computed based upon the units in the bid forms.

9.02 SCOPE OF PAYMENT

The Contractor shall accept the compensation, as provided in the contract, in full payment for furnishing all materials, labor, tools and equipment necessary to the completed work and for performing all work contemplated and embraced under the contract; also for loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the Owner, and for all risks of every description connected with the prosecution of the work; also for all expenses incurred in consequence of the suspension or discontinuance of the work as herein specified; and for completing the work according to the plans and specifications.

Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

The unit contract prices for the various bid items of the contract shall be full compensation for all labor, materials, supplies, equipment, tools and all things of whatsoever nature required for the complete incorporation of the item into the work the same as though the item were to read "In Place", unless the plans and Special Provisions shall provide otherwise.

9.03 PAYMENT FOR EXTRA WORK

Adjustments, if any, in the amounts to be paid the Contractor by reason of any change, addition, or deduction, shall be determined by one or more of the following methods:

- (A) **FOR ITEMS COVERED BY THE PLANS AND SPECIFICATIONS:** The Owner reserves the right to increase or decrease any of the quantities shown. In the event the actual quantities differ more than 25% of the original contract amount, an equitable revision of the unit price shall be made when requested by either the Owner or the Contractor.

This 25 percent (25%) limit does not apply to items specifically excluded or listed as optional by the Owner, or to minor contract items, (items amounting to ten percent or less of the total contract).

- (B) **FOR ITEMS NOT COVERED BY THE PLANS AND SPECIFICATIONS:** If the Engineer orders, in writing, the performance of any work not covered by the plans or included in the specifications, and for which no item in the contract is provided, and for which no unit price or lump sum basis can be agreed upon, then such extra work shall be done on a cost-plus-percentage basis of payment as follows:

1. The Contractor shall be reimbursed for all costs incurred in doing the work and shall receive an additional payment of 5% of all such cost to cover his indirect overhead costs, plus 10% of all cost, including indirect overhead as his/her fee.
2. The term "Cost" shall mean the total sum of the labor, materials and equipment costs as defined in the following.
 - a. LABOR – The Contractor shall be compensated for the actual rate of wages paid and health and welfare benefits documented on the payroll for the actual time spent by the laborers and the foreman in performing the Force Account work. Unless already included in the wage rates paid, the Contractor shall also receive the actual labor-related costs incurred by reason of subsistence and travel allowance, pension funds, or other fringe benefits provided those payments are required through an employment contract or collective bargaining agreement applicable to the classes of labor employed in the work.
 - b. MATERIALS – For all materials accepted by the Engineer and permanently installed in the work, the actual cost of the material (including transportation charges paid by the Contractor) will be paid.
 - c. EQUIPMENT – Rental rates for equipment to be used in the force account work shall be established prior to use of the equipment in the work. The rental rates will be paid for the actual time the machinery and equipment are in operation on the Force Account work.
3. Each day the Contractor's representative and the Engineer shall compare and reconcile the records of labor, materials and equipment used in the Force Account Work.
4. The Contractor shall furnish the Engineer with duplicate itemized statements of the cost for Force Account work, consisting of the following.
 - a. Payroll for laborers and foreman.
 - b. Quantities of materials, prices, extensions and transportation costs paid by the Contractor.

Statements shall be accompanied by paid receipted invoices for materials used, including transportation charges paid by the contractor. If materials used in the Force Account work are not specifically purchased but are taken from the Contractor's stock, an affidavit shall be furnished certifying that the materials were taken from stock, that the quantity claimed was actually used, and that the price and transportation costs claimed are the Contractor's actual costs. After receipt of statements and invoices, the Engineer will prepare a change

order which will be submitted to the Contractor for verification and signature.

5. Monthly payments for force account work will be issued once each month for all work completed to the end of the preceding month. Claims for extra work not ordered in writing by the Engineer will not be allowed.

9.04 PROGRESS PAYMENTS, RETAINED PERCENTAGE

Monthly payment will be issued once each month for all work completed to the end of the preceding month. Progress estimates shall be prepared by the Engineer as accurately as the available information will permit but the only estimate that is binding will be the final estimate. Before the final estimate is prepared, all quantities will be reviewed and rechecked. Progress payments will be made in cash or equivalent. The Owner will retain 5% of the total amount owing the Contractor until 90% or more of the contract has been completed. At that time such portions of the retained percentage will be released in an amount which the Engineer determines is not required to protect the Owner's interest in completion of the contract.

The Contractor may request partial payments for the value of "Materials on hand," defined as acceptable Materials produced for or provided to the Project, but not yet incorporated into the Work. The Owner may pay for Materials on hand in an amount not greater than the delivered cost of the Material as verified by Contractor-provided-invoices and not greater than the Contract Unit Price for the Material complete in place.

The Owner may pay for materials on hand when the Contractor meets the following:

1. Requests payment for at least \$5,000
2. Provides Materials specifically manufactured, produced, or supplied for permanent incorporation into the Project
3. When storage provided by the Contractor is accepted by the Engineer for Materials delivered to, or adjacent to, the Project Site and is in accordance with Section 6.04
4. When the Contractor irrevocably assigns the Materials to the Project, stores the Materials separately from other similar Materials, and ensures the Materials are not available for use on other projects, and makes the Materials available for inspection by the Owner at the Material storage location for Materials not yet delivered to, or adjacent to, the Project Site
5. Provides Materials as shown on the Plans and in accordance with the Specifications

The Contractor must also provide the following actual, authentic, customary, and auditable documents, produced in the normal course of business, to receive payment for Materials on hand:

6. Paid invoices or receipts for delivery of Materials
7. An itemized list detailing the cost of Contractor-produced Material
8. Documents containing complete Material description and identification

Such materials when so paid for by the Owner shall become the property of the Owner, and in the event of the default on the part of the Contractor, the Owner may

use or cause to be used such materials in construction of the work provided for in the contract. The amount paid by the Owner for materials shall reduce estimates due the Contractor as the material is used in the work. The Owner will not make partial payments for living plant or perishable Materials as Materials on hand.

The Owner may withhold, in addition to retained percentages, from payment to the Contractor such an amount or amounts as may be necessary to cover:

- A. Defective work not remedied;
- B. Claims for labor or materials furnished the Contractor or subcontractor, or reasonable evidence indicating probable filing of such claims;
- C. Failure of the Contractor to make payments properly to subcontractors or for material or labor;
- D. Amounts necessary to insure that an overpayment on the total contract amount will not occur;
- E. Evidence of damage to another contractor or private property.

The Owner may disburse and shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment therefrom but the Owner assumes no obligation to make such disbursement. The Owner will render to the Contractor a proper accounting of all such funds disbursed.

9.05 ENGINEER'S ACTION ON REQUEST FOR PAYMENT

Within ten days of submission of any request for payment by the Contractor, the Engineer shall:

- A. Approve the request for payment as submitted; or
- B. Approve such other amount as the Engineer shall decide is due the Contractor, informing the Contractor in writing of the reasons for approving the amended amount; or
- C. Withhold the request for payment, informing the Contractor in writing of the reasons for withholding it.

9.06 OWNER'S ACTION ON AN APPROVED REQUEST FOR PAYMENT

Within 30 days from the date of approval of a request for payment by the Engineer, the Owner shall:

- A. Pay the request for payment as approved; or
- B. Pay such other amount as the Owner shall decide is due the Contractor, informing the Contractor and the Engineer in writing of the reasons for paying the amended amount; or
- C. Withhold payment informing the Contractor and the Engineer of the reasons for withholding

payment.

9.07 PAYMENT FOR WORK BY THE OWNER

The cost of the work performed by the Owner in removing construction equipment, tools and supplies and correcting deficiencies in accordance with the General Conditions shall be paid by the Contractor.

9.08 PAYMENT FOR UNCORRECTED WORK

Should the Engineer direct the Contractor not to correct work that has been damaged or that was not performed in accordance with the contract documents, an equitable deduction from the contract amount shall be made to compensate the Owner for the uncorrected work.

9.09 PAYMENT FOR REJECTED WORK AND MATERIALS

The removal of work and materials rejected and the re-execution of acceptable work by the Contractor shall be at the expense of the Contractor. The Contractor shall pay the cost of replacing the work of other contractors destroyed or damaged by the removal of the rejected work or materials and the subsequent replacement of acceptable work.

Removal of the rejected work or materials and storage of materials by the Owner in accordance with the General Conditions shall be paid by the Contractor within 30 days after written notice to pay is given by the Owner. If the Contractor does not pay the expenses of such removal and after ten day's written notice being given of the Owner's intent to sell the materials, the Owner may sell the materials at auction or at private sale and shall pay to the Contractor the net proceeds therefrom after deducting all the costs and expenses that should have been borne by the Contractor.

9.10 PAYMENT FOR WORK SUSPENDED BY THE OWNER

If the work or any part thereof shall be suspended by the Owner and abandoned by the Contractor as provided in the General Conditions, the Contractor will then be entitled to payment for all work performed on the portions so abandoned and nothing additional for the uncompleted portion of the work such as overhead, expenses, and anticipated profit.

9.11 PAYMENT FOR WORK FOLLOWING OWNER'S TERMINATION OF THE CONTRACT

Upon termination of the contract by the Owner no further payments shall be due the Contractor until the work is completed. If the unpaid balance of the contract amount shall exceed the cost of completing the work including all overhead costs, the excess shall exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The cost incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be certified by the Owner and approved by the Engineer.

9.12 PAYMENT FOR WORK TERMINATED BY THE CONTRACTOR

Upon termination of the contract by the Contractor, the Contractor shall recover payment from the Owner for work performed.

9.13 RELEASE OF LIENS

Before final payment is made to the Contractor for the work, the Contractor shall deliver to the Owner a complete release of all liens arising out of this contract or in receipt in full in lieu thereof and in either case, an affidavit that the releases and receipt include all the labor and material for which a lien could be filed; but the Contractor may, if any subcontractor refuses to furnish a release, a lien or receipt in full, furnish a bond satisfactory to the Owner which will indemnify the Owner against any lien.

If any lien remains unsatisfied after all payments are made to the Contractor, the Contractor shall refund to the Owner all money that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

9.14 ACCEPTANCE AND FINAL PAYMENT

When the Contractor shall have completed the work in accordance with the terms of the contract documents, the Engineer shall certify acceptance to the Owner and approval of the Contractor's final request for payment, which shall be the contract amount minus previous payments made. The Contractor shall furnish a two-year maintenance bond and a notarized certificate that all debts for labor, materials, and equipment incurred in connection with the work, have been fully paid, following which the Owner shall accept the work and release the Contractor except as to the conditions of the Maintenance Bond and legal rights of the Owner, requiring guaranties, and correction of faulty work after final payment, and shall authorize payment of the Contractor's final request for payment. The Contractor must allow sufficient time between time of completion of the work and approval of the final request for payment for the Engineer to assemble and check the necessary data.

The approval of a request for a final progress payment by the Engineer and the making of a final or progress payment to the Contractor does not relieve the Contractor of responsibility for faulty material or workmanship and the Owner by such payment does not waive any claims of overpayment resulting from mathematical error, unauthorized work, or from any other cause. Final payment will not be made until the Contractor furnishes a certificate showing compliance with State Statutes requiring withholding of State Income Taxes.

9.15 TERMINATION OF CONTRACTOR'S RESPONSIBILITY

The contract will be considered complete when all work has been finished, the final inspection made by the Engineer, and the project accepted in writing by the Owner. The Contractor's responsibility shall then cease, except as set forth in the maintenance bond, as required by the guaranty period.

9.16 CORRECTION OF FAULTY WORK AFTER FINAL PAYMENT

The Contractor shall be held responsible for any and all defects in workmanship and materials which may develop in any part of the entire installation furnished by the Contractor. Upon written notice by the Engineer the Contractor shall immediately replace and make good without expense to the Owner any such faulty part of the parts and damage done by reason of same, during the guarantee period of two years, or as specified, from the date of final payment approval or the installation of all work.

Should the Contractor fail to make good the defective parts within a period of 30 days of such notification, after written notice has been given, the Owner may replace these parts, charging the expense of same to the Contractor.

9.17 FAILURE TO PAY FOR LABOR AND MATERIALS

Pursuant to Minn. Stat. § 471.425, Subd. 4a, the contractor must pay any subcontractor within ten (10) days of the contractor's receipt of payment from the City for undisputed services provided by the subcontractor. The contractor must pay interest of 1½ percent per month or any part of a month to the subcontractor on any undisputed amount not paid on time to the subcontractor. The minimum monthly interest penalty payment for an unpaid balance of \$100.00 or more is \$10.00. For an unpaid balance of less than \$100.00, the contractor shall pay the actual penalty due to the subcontractor. A subcontractor who prevails in a civil action to collect interest penalties from the contractor shall be awarded its costs and disbursements, including attorney's fees, incurred in bringing the action.

If, at any time, the Contractor fails to pay the subcontractor or the laborers employed upon the work, or fails to pay for the material used herein, the Owner may withhold from the money which may be due the Contractor under this agreement such amount or amounts as may be necessary for the payment of the subcontractors, laborers, or materials, and may, acting as agent for the Contractor, apply the same to such payments and deduct the same from the final estimate of the Contractor.

9.18 CONTRACT DOCUMENTS:

INFORMATION FOR BIDDERS

1. COPIES OF BIDDING DOCUMENTS.

- 1.1 Complete sets of the Bidding Documents in the number and for the deposit sum stated in the Advertisement for Bids may be obtained from _____.
- 1.2 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 1.3 Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the work and do not confer a license or grant for any other use.

2. QUALIFICATIONS OF BIDDERS. To demonstrate qualifications to perform the work, each Bidder must be prepared to submit within five days of Owner's request written evidence of financial data, and previous experience. Each Bid must contain evidence of Bidder's qualification to do business in the State where the Project is located, or covenant to obtain such qualification prior to award of the Contract.

3. EXAMINATION OF CONTRACT DOCUMENTS AND SITE.

- 3.1 Before submitting a Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself/herself with local conditions that may in any manner affect cost, progress or performance of the work, (c) familiarize himself/herself with Federal, State, and Local laws, ordinances, rules, and regulations that may in any manner affect cost, progress or performance of the work, and (d) study and carefully correlate Bidder's observations with the Contract Documents.
- 3.2 Reference is made to the Special Provisions for the identification of those reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the work which have been relied upon by Engineer in preparing the Drawings and Specifications. Copies of such reports are bound with the Specifications. These reports are not guaranteed as to accuracy or completeness, nor are they a part of the Contract Documents. Before submitting his/her Bid, each Bidder will, at his/her own expense, make such additional investigations and tests as the Bidder may deem necessary to determine his/her Bid for performance of the work in accordance with the time, price, and other terms and conditions of the Contract Documents.
- 3.3 On request, Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of his/her Bid.
- 3.4 The submission of a Bid will constitute an incontrovertible representation by the Bidder that he/she has complied with every requirement of this Article 3 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work.

4. INTERPRETATIONS. All questions about the meaning or intent of the Contract Documents shall be submitted to Engineer in writing. Replies will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than four days prior to the date for opening of Bids will not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5. BID SECURITY.

- 5.1 Bid security shall be made payable to the Owner, in an amount as stated in the Advertisement

for Bids of the Bidder's maximum Bid price, and in the form of a certified or bank check or a Bid Bond, issued by a Surety, meeting the requirements of paragraph 2.06 of the General Conditions.

- 5.2 The Bid Security of the three lowest Bidders will be retained until the successful Bidder has executed the Agreement and furnished the required Contract Security, whereupon it will be returned; if the successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Security within 15 days of the Notice of Award. Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid Security of any Bidder whom Owner believes to have a reasonable chance of receiving the award (generally the second and third low Bidder) may be retained by the Owner until the earlier of the seventh day after the "effective date of the Agreement" (which term is defined in the General Conditions) by Owner to Contractor and the required Contract Security is furnished or the sixty-first day after the Bid opening. Bid security of other Bidders will be returned within seven days of the Bid opening.
6. CONTRACT TIME. The number of days within which, or the date by which, the work is to be completed (the Contract time) is set forth in the Bid Form and will be included in the Special Provisions.
7. LIQUIDATED DAMAGES. Provisions for liquidated damages are set forth in the General Conditions, Paragraph 8.08.
8. SUBCONTRACTORS, ETC.
- 8.1 If the Bid Proposal or Special Provisions require the identity of certain subcontractors and other persons and organizations to be submitted to Owner in advance of the Notice of Award, the apparent Successful Bidder, and any other Bidder so requests, will within seven days after the day of the Bid Opening submit to Owner a list of all subcontractors and other persons and organizations (including those who are to furnish the principal items of material and equipment) proposed for those portions of the work as to which such identification is so required. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification of each such subcontractor, person and organization if requested by Owner. If Owner or Engineer after due investigation has reasonable objection to any proposed subcontractor, other person or organization, either may before giving the Notice of Award request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price. If the apparent successful Bidder declines to make any such substitution, the Contract shall not be awarded to such Bidder, but his/her declining to make any such substitution will not constitute grounds for sacrificing his/her Bid Security. Any subcontractor, other person or organization so listed and to whom Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer.
- 8.2 In contracts where the Contract Price is on the basis of Cost-of-the-Work Plus a Fee, the apparent Successful Bidder, prior to the Notice of Award shall identify in writing to Owner those portions of the work that such Bidder proposes to subcontract and after the Notice of Award may only subcontract other portions of the work with Owner's written consent.
- 8.3 No Contractor shall be required to employ any subcontractor, other person or organization against whom he/she has reasonable objection.
9. BID FORM.
- 9.1 One Bid Form is attached hereto and is provided to each Bidder requesting Bid Documents. Additional copies may be obtained from the Engineer.
- 9.2 Bid Forms must be completed in ink or by typewriter. The Bid Price of each item on the form must be stated in words and numerals; in case of a conflict, words will take precedence.

- 9.3 Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 9.4 Bids by partnerships must be executed in the partnership name and be signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.
- 9.5 All names must be typed or printed below the signature.
- 9.6 The Bid shall contain an acknowledgement of receipt of all Addenda (the number of which shall be filled in on the Bid Form).
- 9.7 The address to which communications regarding the Bid are to be directed must be shown.
10. SUBMISSION OF BIDS. Bids shall be submitted at the time and place indicated in the Invitation to Bid or Advertisement for Bids and shall be included in an opaque sealed envelope, marked with the Project title and name and address of the Bidder and accompanied by the Bid Security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof. Bids arriving at the designated place after the designated time will be returned to the Bidder unopened.
11. MODIFICATION AND WITHDRAWAL OF BIDS.
- 11.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.
- 11.2 If, within twenty-four (24) hours after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of his/her Bid, that Bidder may withdraw his/her Bid and the Bid Security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the work.
12. OPENING OF BIDS. When Bids are opened publicly, they will be read aloud and an abstract of the amounts of the base Bids and major alternates (if any) will be made available after the opening of Bids
13. BIDS TO REMAIN OPEN. All Bids shall remain open for sixty days after the day of the Bid opening, but Owner may, in his/her sole discretion, release any Bid and return the Bid Security prior to that date.
14. AWARD OF CONTRACT.
- 14.1 Owner reserves the right to reject any and all Bids, to waive any and all informalities and to negotiate Contract terms with the Successful Bidder, and the right to disregard all nonconforming, non-responsive or conditional Bids. The quantities shown on the Bid Form are estimated and are furnished only as a basis to prepare a Bid and to determine the lowest Bidder. The Bid Price shall be determined by multiplying the unit price bid per item times the estimated quantity per item. The sum total of all Bid Prices shall be the Contract Price and the basis for determining the lowest Bid. Discrepancies between words and figures in a unit price bid will be resolved to harmonize with the Bid Price. If neither the words nor figures in the unit price harmonize with the Bid Price, the words will be used as the unit price bid.
- 14.2 In evaluating Bids, Owner shall consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and alternates and unit prices if requested in the Bid Forms. It is Owner's intent to accept alternates (if any are accepted) in the order in which they are listed in the Bid form but Owner may accept them in any order or combination.
- 14.3 Owner may consider the qualifications and experience of subcontractors and other persons and

organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identity of subcontractors and other persons and organizations must be submitted as provided in the Special Provisions. Operating costs, maintenance considerations, performance data and guarantee of materials and equipment may also be considered by Owner.

- 14.4 Owner may conduct such investigations as he/she deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of the Bidders, proposed subcontractors and other persons and organizations to do the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.
 - 14.5 Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.
 - 14.6 If the Contract is to be awarded, it will be awarded to the lowest Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project.
 - 14.7 If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within sixty days after the date of the Bid opening or other specified date.
15. PERFORMANCE AND OTHER BONDS. Paragraph 3.04 of the General Conditions set forth Owner's requirements as to performance and other Bonds. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by the required Contract Security.
 16. SIGNING OF AGREEMENT. When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by at least three unsigned counterparts of the Agreement and all other Contract Documents. Within fifteen days thereafter, Contractor shall sign and deliver at least three counterparts of the Agreement to Owner with all other Contract Documents attached. Within ten days thereafter, Owner will deliver all fully signed counterparts to Contractor. Engineer will identify those portions of the Contract Documents not fully signed by Owner and Contractor and such identification shall be binding on all parties.
 17. SPECIAL LEGAL REQUIREMENTS. Special Legal Requirements, if any, will be included in the Special Provisions.

END OF DOCUMENT

**FORM OF AGREEMENT
BETWEEN CITY OF CHANHASSEN AND CONTRACTOR**

THIS AGREEMENT, made this _____ day of _____, 20____, by and between the CITY OF CHANHASSEN, a Minnesota municipal corporation (“Owner”) and _____ (“Contractor”). Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

1. CONTRACT DOCUMENTS. The following documents shall be referred to as the “Contract Documents”, all of which shall be taken together as a whole as the contract between the parties as if they were set verbatim and in full herein:

- A. This Agreement;
- B. Specifications dated _____;
- C. City of Chanhassen General Conditions of the Construction Contract;
- D. Quote/Bid dated _____.

In the event of a conflict among the provisions of the Contract Documents, the order in which they are listed above shall control in resolving any such conflicts with Contract Document “A” having the first priority and Contract Document “D” having the last priority.

2. OBLIGATIONS OF THE CONTRACTOR. The contractor shall provide the goods, services, and perform the work in accordance with the Contract Documents.

3. CONTRACT PRICE. Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents _____.

4. PAYMENT PROCEDURES.

- A. Contractor shall submit Applications for Payment. Applications for Payment will be processed by Engineer as provided in the General Conditions.
- B. Progress Payments; Retainage. Owner shall make 95% progress payments on account of the Contract Price on the basis of Contractor’s Applications for Payment during performance of the Work.
- C. Payments to Subcontractor.

- (1) Prompt Payment to Subcontractors. Pursuant to Minn. Stat. § 471.425, Subd. 4a, the Contractor must pay any subcontractor within ten (10) days of the Contractor’s receipt of payment from the City for undisputed services provided by the subcontractor. The Contractor must pay interest of 1½ percent per month or any

part of a month to the Subcontractor on any undisputed amount not paid on time to the subcontractor. The minimum monthly interest penalty payment for an unpaid balance of \$100.00 or more is \$10.00. For an unpaid balance of less than \$100.00, the Contractor shall pay the actual penalty due to the subcontractor.

- (2) Form IC-134 (attached) required from general contractor. Minn. Stat. § 290.92 requires that the City of Chanhassen obtain a Withholding Affidavit for Contractors, Form IC-134, before making final payments to Contractors. This form needs to be submitted by the Contractor to the Minnesota Department of Revenue for approval.

The form is used to receive certification from the state that the vendor has complied with the requirement to withhold and remit state withholding taxes for employee salaries paid.

- D. Final Payment. Upon final completion of the Work, Owner shall pay the remainder of the Contract Price as recommended by Engineer.

5. COMPLETION DATE/LIQUIDATED DAMAGES.

- A. The Work must be completed within ____ (__) days after the date the Contract Times commence to run, and completed and ready for final payment in accordance with the General Conditions within ____ (__) days after the date when the Contract Times commence to run.
- B. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 5.A. above, plus any extensions thereof allowed. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$_____ for each calendar day that expires after the time specified in Paragraph 5.A. for Completion until the Work is complete.

Daily costs are based on MnDOT Table 1807-1, "Schedule of Liquidated Damages as follows:

TABLE 1807-1 SCHEDULE OF LIQUIDATED DAMAGES		
Original Contract Amount		Charge Per Cal. Day
From More Than (\$)	To and Including (\$)	
0	25,000	300
25,000	100,000	400
100,000	500,000	900
500,000	1,000,000	1,200
1,000,000	2,000,000	1,500
2,000,000	5,000,000	2,500
5,000,000	10,000,000	3,000
10,000,000	----	3,500

6. CONTRACTOR'S REPRESENTATIONS.

- A. Contractor has examined and carefully studied the Contract Documents and other related data identified in the Contract Documents.
- B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the site.
- E. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.
- F. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in

accordance with the other terms and conditions of the Contract Documents.

- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- I. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- K. Subcontracts:
 - (1) Unless otherwise specified in the Contract Documents, the Contractor shall, upon receipt of the executed Contract Documents, submit in writing to the Owner the names of the Subcontractors proposed for the work. Subcontractors may not be changed except at the request or with the consent of the Owner.
 - (2) The Contractor is responsible to the Owner for the acts and omissions of the Contractor's subcontractors, and of their direct and indirect employees, to the same extent as the Contractor is responsible for the acts and omissions of the Contractor's employees.
 - (3) The Contract Documents shall not be construed as creating any contractual relation between the Owner, the Engineer, and any Subcontractor.
 - (4) The Contractor shall bind every Subcontractor by the terms of the Contract Documents.

7. WORKER'S COMPENSATION. The Contractor shall obtain and maintain for the duration of this Contract, statutory Worker's Compensation Insurance and Employer's Liability Insurance as required under the laws of the State of Minnesota.

8. COMPREHENSIVE GENERAL LIABILITY. Contractor shall obtain the following minimum insurance coverage and maintain it at all times throughout the life of the

Contract, with the City included as an additional name insured on a primary and non-contributory basis. The Contractor shall furnish the City a certificate of insurance satisfactory to the City evidencing the required coverage:

Bodily Injury: \$2,000,000 each occurrence
\$2,000,000 aggregate products and completed operations

Property Damage: \$2,000,000 each occurrence
\$2,000,000 aggregate Contractual Liability (identifying the contract):
Bodily Injury: \$2,000,000 each occurrence

Property Damage: \$2,000,000 each occurrence
\$2,000,000 aggregate

Personal Injury, with Employment Exclusion deleted:

\$2,000,000 aggregate Comprehensive Automobile Liability (owned, non-owned, hired):

Bodily Injury: \$2,000,000 each occurrence
\$2,000,000 each accident

Property Damage: \$2,000,000 each occurrence

9. WARRANTY. The Contractor guarantees that all new equipment warranties as specified within the quote shall be in full force and transferred to the City upon payment by the City. The Contractor shall be held responsible for any and all defects in workmanship, materials, and equipment which may develop in any part of the contracted service, and upon proper notification by the City shall immediately replace, without cost to the City, any such faulty part or parts and damage done by reason of the same in accordance with the bid specifications.

10. INDEMNITY. The Contractor agrees to indemnify and hold the City harmless from any claim made by third parties as a result of the services performed by it. In addition, the Contractor shall reimburse the City for any cost of reasonable attorney's fees it may incur as a result of any such claims.

11. MISCELLANEOUS.

- A. Terms used in this Agreement have the meanings stated in the General Conditions.
- B. Owner and Contractor each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors,

assigns and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

- C. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provisions.
- D. Data Practices/Records.
 - (1) All data created, collected, received, maintained or disseminated for any purpose in the course of this Contract is governed by the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, any other applicable state statute, or any state rules adopted to implement the act, as well as federal regulations on data privacy.
 - (2) All books, records, documents and accounting procedures and practices to the Contractor and its subcontractors, if any, relative to this Contract are subject to examination by the City.
- E. Software License. If the equipment provided by the Contractor pursuant to this Contract contains software, including that which the manufacturer may have embedded into the hardware as an integral part of the equipment, the Contractor shall pay all software licensing fees. The Contractor shall also pay for all software updating fees for a period of one year following cutover. The Contractor shall have no obligation to pay for such fees thereafter. Nothing in the software license or licensing agreement shall obligate the City to pay any additional fees as a condition for continuing to use the software.
- F. Patented devices, materials and processes. If the Contract requires, or the Contractor desires, the use of any design, device, material or process covered by letters, patent or copyright, trademark or trade name, the Contractor shall provide for such use by suitable legal agreement with the patentee or owner and a copy of said agreement shall be filed with the Owner. If no such agreement is made or filed as noted, the Contractor shall indemnify and hold harmless the Owner from any and all claims for infringement by reason of the use of any such patented designed, device, material or process, or any trademark or trade name or copyright in connection with the Project agreed to be performed under the Contract, and shall indemnify and defend the Owner for any costs, liability, expenses and attorney's fees that result from any such infringement
- G. Assignment. Neither party may assign, sublet, or transfer any interest or obligation in this Contract without the prior written consent of the other

party, and then only upon such terms and conditions as both parties may agree to and set forth in writing.

- H. Waiver. In the particular event that either party shall at any time or times waive any breach of this Contract by the other, such waiver shall not constitute a waiver of any other or any succeeding breach of this Contract by either party, whether of the same or any other covenant, condition or obligation.
- I. Governing Law/Venue. The laws of the State of Minnesota govern the interpretation of this Contract. In the event of litigation, the exclusive venue shall be in the District Court of the State of Minnesota for Carver County.
- J. Severability. If any provision, term or condition of this Contract is found to be or become unenforceable or invalid, it shall not affect the remaining provisions, terms and conditions of this Contract, unless such invalid or unenforceable provision, term or condition renders this Contract impossible to perform. Such remaining terms and conditions of the Contract shall continue in full force and effect and shall continue to operate as the parties' entire contract.
- K. Entire Agreement. This Contract represents the entire agreement of the parties and is a final, complete and all inclusive statement of the terms thereof, and supersedes and terminates any prior agreement(s), understandings or written or verbal representations made between the parties with respect thereto.
- L. Permits and Licenses; Rights-of-Way and Easements. The Contractor shall procure all permits and licenses, pay all charges and fees therefore, and give all notices necessary and incidental to the construction and completion of the Project. The City will obtain all necessary rights-of-way and easements. The Contractor shall not be entitled to any additional compensation for any construction delay resulting from the City's not timely obtaining rights-of-way or easements.
- M. If the work is delayed or the sequencing of work is altered because of the action or inaction of the Owner, the Contractor shall be allowed a time extension to complete the work but shall not be entitled to any other compensation.

CITY OF CHANHASSEN

CONTRACTOR

BY: _____
Elise Ryan, Mayor

BY: _____
Laurie Hokkanen, City Manager

BY: _____
Its _____

END OF DOCUMENT

SAMPLE

PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address)

CONSTRUCTION CONTRACT

Date: _____

Amount: _____

Description (Name and Location): _____

BOND

Date (Not earlier than Construction Contract Date): _____

Amount: _____

Modification to this Bond Form: None, _____

CONTRACTOR AS PRINCIPAL

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title

By: _____
Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title

By: _____
Signature and Title

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.
3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
 - 3.1. The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and
 - 3.2. The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and
 - 3.3. The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 4.1. Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or
 - 4.2. Undertake to perform and complete the Construction Contract itself; through its agents or through independent contractors; or
 - 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the resulting from the Contractor's default; or
 - 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
 2. Deny liability in whole or in part and notify the Owner citing reasons therefore.
5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
6. After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elected to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract.. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:
 - 6.1. The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract:
 - 6.2. Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and
 - 6.3. Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.
8. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontractors, purchase orders and other obligations.
9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of

this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. DEFINITIONS

- 12.1. Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
- 12.2. Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 12.3. Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.
- 12.4. Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

SAMPLE

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place
Of Business):

OWNER (Name and Address):

CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL

Company: _____ (Corp. Seal)

SURETY

Company: _____ (Corp. Seal)

Signature: _____

Name and Title: _____

Signature: _____

Name and Title: _____

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corp. Seal)

SURETY

Company: _____ (Corp. Seal)

Signature: _____

Name and Title: _____

Signature: _____

Name and Title: _____

EJCDE No. 1910-28-A (1996 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrator, successors and assigns to the OWNER to pay for labor, materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the OWNER, this obligation shall be null and void if the CONTRACTOR:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies and holds harmless the OWNER from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract, provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the CONTRACTOR and the Surety, and provided there is no OWNER Default.

3. With respect to Claimants, this obligation shall be null and void if the CONTRACTOR promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this bond until:

4.1 Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy, of notice thereof, to the OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with the CONTRACTOR:

1. Have furnished written notice to the CONTRACTOR and sent a copy, or notice thereof, to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials are furnished or supplied or for whom the labor was done or formed; and

2. Have either received a rejection in whole or in part from the CONTRACTOR, or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to the Surety and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR.

5. If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety, that is sufficient compliance.

6. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1 Send an answer to the Claimant, with a copy to the OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2 Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the CONTRACTOR furnishing and the OWNER accepting this Bond, they agree that all funds earned by the CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the Surety under this Bond, subject to the OWNER's priority to use the funds for the completion of the Work.

(FOR INFORMATION ONLY—Name, Address, and Telephone)
AGENT or BROKER: OWNER'S REPRESENTATIVE (ENGINEER or other party)

9. The Surety shall not be liable to the OWNER, Claimants or others for obligations of the CONTRACTOR that are unrelated to the Contract. The OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by the Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4.1 or paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the OWNER or the CONTRACTOR, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions confirming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is, that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. DEFINITIONS

15.1 Claimant: An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include within limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2 Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

15.3 OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contractor or to perform and complete or comply with the other terms thereof.

**FORM OF NON-COLLUSION AFFIDAVIT
(MUST BE SUBMITTED WITH BID PROPOSAL)**

Affidavit of Non-Collusion:

I hereby swear (or affirm) under the penalty for perjury:

1. That I am the bidder (if the bidder is an individual), a partner in the bidder partnership (if the bidder is a partnership), or an officer or employee of the bidding corporation having authority to sign on its behalf (if the bidder is a corporation).
2. That the attached bid or bids have been arrived at by the bidder independently, and have been submitted without collusion with, and without, any other vendor of materials, supplies, equipment, or other services described in the invitation to bid, designed to limit independent bidding or competition.
3. That the contents of the bid or bids have not been communicated by the bidder or its employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid or bids, and will not be communicated to any such person prior to the official opening of the bids or bids; and
4. That I have fully informed myself regarding the accuracy of the statements made in this affidavit.

Signed _____

Firm _____

Name _____

Address _____

CONTRACTOR VERIFICATION OF COMPLIANCE

The undersigned, being first duly sworn, as a responding contractor on the Project, represents and swears as follows:

Now, and at all times during the duration of the Project, the undersigned complies with each of the minimum criteria in Minn. Stat. § 16C.285, subd. 3, the Responsible Contractor statute.

The undersigned understands that a failure to meet or verify compliance with the minimum criteria established for a "responsible contractor" as defined in Minn. Stat. § 16C.285, subd. 3, renders a bidder ineligible to be awarded a construction contract for the Project or to perform work on the Project.

Upon request, the undersigned will submit copies of the signed verifications of compliance from all subcontractors.

The undersigned understands that a false statement under oath verifying compliance with any of the minimum criteria shall make the undersigned, or its subcontractor that makes the false statement, ineligible to be awarded a construction project and may result in termination of a contract awarded to the undersigned or its subcontractor that submits a false statement.

CONTRACTOR:

By: _____

Its: _____

RESPONSIBLE CONTRACTOR VERIFICATION OF COMPLIANCE

Minnesota Statutes, Section 16C.285, subdivision 3. **Responsible Contractor, Minimum Criteria.** “Responsible Contractor” means a contractor that conforms to the responsibility requirements in the solicitation document for its portion of the work on the project and verifies that it meets the minimum criteria set forth below. Each contractor or subcontractor shall obtain from all subcontractors with which it will have a direct contractual relationship a signed statement under oath by an owner or officer verifying that they meet all of the minimum criteria in subdivision 3 prior to execution of a construction contract with each subcontractor.

1. The Contractor:
 - i. is in compliance with workers' compensation and unemployment insurance requirements;
 - ii. is in compliance with the Department of Revenue and the Department of Employment and Economic Development registration requirements if it has employees;
 - iii. has a valid federal tax identification number or a valid Social Security number if an individual; and
 - iv. has filed a certificate of authority to transact business in Minnesota with the secretary of state if a foreign corporation or cooperative.

2. The contractor or related entity is in compliance with and, during the three-year period before submitting verification, has not violated section 177.24, 177.25, 177.41 to 177.44, 181.13, 181.14, or 181.722, and has not violated United States Code, title 29, sections 201 to 219, or United States Code, title 40, section 3141 to 3148. For purposes of this clause, a violation occurs when a contractor or related entity:
 - i. repeatedly fails to pay statutorily required wages or penalties on one or more separate projects for a total underpayment of \$25,000 or more within the three-year period, provided that a failure to pay is “repeated” only if it involves two or more separate and distinct occurrences of underpayment during the three-year period;
 - ii. has been issued an order to comply by the commissioner of labor and industry that has become final;
 - iii. has been issued at least two determination letters within the three-year period by the Department of Transportation finding an underpayment by the contractor or related entity to its own employees;
 - iv. has been found by the commissioner of labor and industry to have repeatedly or willfully violated any of the sections referenced in this clause pursuant to section 177.27;
 - v. has been issued a ruling or findings of underpayment by the administrator of the Wage and Hour Division of the United States Department of Labor that have become final or have been upheld by an administrative law judge or the Administrative Review Board; or
 - vi. has been found liable for underpayment of wages or penalties or misrepresenting a construction worker as an independent contractor in an action brought in a court having jurisdiction.

Provided that, if the contractor or related entity contests a determination of underpayment by the Department of Transportation in a contested case proceeding, a

violation does not occur until the contested case proceeding has concluded with a determination that the contractor or related entity underpaid wages or penalties;*

3. The contractor or related entity is in compliance with and, during the three-year period before submitting the verification, has not violated section 181.723 or chapter 326B. For purposes of this clause, a violation occurs when a contractor or related entity has been issued a final administrative or licensing order;*
4. The contractor or related entity has not, more than twice during the three-year period before submitting the verification, had a certificate of compliance under section 363A.36 revoked or suspended based on the provisions of section 363A.36, with the revocation or suspension becoming final because it was upheld by the Office of Administrative Hearings or was not appealed to the office;*
5. The contractor or related entity has not received a final determination assessing a monetary sanction from the Department of Administration or Transportation for failure to meet targeted group business, disadvantaged business enterprise, or veteran-owned business goals, due to a lack of good faith effort, more than once during the three-year period before submitting the verification; and*
6. The contractor or related entity is not currently suspended or debarred by the federal government or the state of Minnesota or any of its departments, commissions, agencies, or political subdivisions that have authority to debar a contractor.

*Any violations, suspensions, revocations, or sanctions, as defined in clauses 2 to 5 occurring prior to July 1, 2014, shall not be considered in determining whether a contractor or related entity meets the minimum criteria.

Certification

By signing this document, I am certifying that I am an owner or officer of the contractor and am verifying under oath that:

1. **Contractor is in compliance with Minnesota Statutes, Section 16C.285, and**
2. **I have included Attachment A-1.**

Contractor Company Name

Date

Authorized Signature of Owner or Officer

Printed Name

Title

NOTICE OF AWARD

Dated _____, 20__

TO: _____
(BIDDER)

ADDRESS: _____

PROJECT _____

OWNER'S CONTRACT NO. _____

CONTRACT FOR _____

You are notified that your Bid dated _____, 20__ or the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a contract for

The Contract Price of your contract is _____
_____ and xx/100..... Dollars (\$ _____).

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

You must comply with the following conditions precedent within fifteen days of the date of this Notice of Award, that is by _____, 20__.

1. You must deliver to the OWNER _____ fully executed counterparts of the Agreement including all the Contract Documents. Each of the Contract Documents must bear your signature.
2. You must deliver with the executed Agreement the Performance Bond and Payment Bond as specified in the General Conditions.
3. You must deliver with the executed Agreement a Certificate of Insurance as specified in the General Conditions.

NOTICE TO PROCEED

Dated _____, 20__

TO: _____
(CONTRACTOR)

ADDRESS: _____

PROJECT _____

OWNER'S CONTRACT NO. _____

CONTRACT FOR _____

You are notified that the Contract Times under the above contract will commence to run on _____, 20__. By that date, you are to start performing your obligations under Contract Documents. In accordance with Article 3 of the Agreement, the dates of Substantial Completion and completion and readiness for final payment are _____, 20__, and _____, 20__.

Before you may start any Work at the site, you must

CITY OF CHANHASSEN
(OWNER)

By: _____
(AUTHORIZED SIGNATURE)

(TITLE)

ACCEPTANCE OF AWARD

(CONTRACTOR)

By: _____
(AUTHORIZED SIGNATURE)

(TITLE)

(DATE)

9.19 AS-BUILT REQUIREMENTS

Upon completion of construction and acceptance of the final punchlist, all elements of the project shall be remeasured with an as-built field survey. The as-built plans shall be corrected and modified to show correct distances, elevations, dimensions, and any other change in the specific detail of the plans. All changes shall be drawn to scale to accurately represent the work constructed. All elevation/length changes shall be crossed out and correct information added and all locations updated on the as-built plans.

Upon completion of all public utility and street improvement projects and within 60 days of acceptance of the final punchlist, the project engineer shall supply a set of as-built drawings and tie-cards in .pdf format to the City for review. If changes or corrections are required, the as-built plans and tie cards will be returned to the project engineer showing any corrections to be made as marked in red.

Once all changes to the as-built plans have been made and approved by the City, the project engineer shall supply the City with all submittals required under Section 2. Electronic Documents, below.

1. As-built Requirements:

- A. Indicate on the cover sheet of the as-built drawings the benchmark system, the contractor(s) that performed the street and/or utility improvements, the Engineer of Record, and if applicable the Developer. The top nut on each fire hydrant shall be noted and used as a benchmark.
- B. All curb boxes, gate valves, and draitile clean-outs shall be located by swing ties shown on the as-built plans and shall be measured in the field at the time of installation.
 1. Curb box swing ties are to be supplied on the City of Chanhassen's standard tie card (Detail Plate No. 5221). Only the curb box swing tie applicable for the lot it is servicing shall be shown on the tie card.
 2. Swing ties to permanent structures such as manholes, catch basins, fire hydrants, etc. shall be no longer than 100 feet in length.
 3. Utility boxes, trees, property corners are not acceptable swing tie points.
 4. If a permanent structure is not available within the 100-foot length, or there is no sanitary sewer to properly reference a station of the curb stop at the property line from a downstream manhole, a third tie point of not more than 150 feet is to be supplied or tied between curb boxes.
- C. The water main profile shall be shown with the appropriate information as to size, type of pipe, depth of cover, location of vertical bends, and any insulation.
- D. All sanitary and storm sewer lines shall be shown in plan and profile with the appropriate information as to size, type of material, length, class of pipe, vertical separation (in feet) of utility crossings, grade and elevations.
- E. All manholes shall be numbered in both plan and profile view utilizing the approved City's nomenclature. All inverts, top of casting or rim elevations, depth of manhole and

stationing shall be provided. Stationing of sanitary sewer wyes shall be provided from the downstream manhole.

- F. If water and sewer services are not located in the same trench, it shall be noted on the as-built plans.
- G. If sanitary sewer service risers are constructed, the elevation (z) and coordinates (x, y) of the riser shall be provided and shown on the profile view to scale.
- H. The storm sewer as-built plans shall provide the limits of all ponding (normal and high water elevations), acres-feet of storage, outlet control structure details (including all invert elevations), and typical sections for each stormwater BMP.
 - I. Prior to acceptance, all stormwater BMPs shall be field surveyed. The Engineer of Record shall confirm the BMPs have been constructed per the approved design.
 - 1. The most recent Stormwater BMP Compliance and Acceptance Form shall be provided for each stormwater BMP installed in conjunction with the project prior to acceptance.
- J. The grading as-built plan must have spot elevations on all lot corners, building pads, swales/berms, emergency overflows and all other critical drainage areas.
- K. The storm sewer as-built plans shall include all drainage culverts, original and final grade of cover over pipe on the profile view if not indicated on street grade profile.
- L. The street as-built plans shall indicate the original and final grades as constructed, type of curb/gutter, sidewalk, draintile and associated clean-outs, manhole castings, hydrants, street width (back of curb to back of curb), right-of-way width, and curve data.
 - 1. Any sub-base excavation performed in efforts to correct unstable soil conditions shall be shown on the as-built plans indicating depth of sub-cut, sub-cut from station to station, type of backfill (select granular, size of rock, etc.), and location by center line station of any fabric that may have been used.
 - 2. The most recent MnDOT ADA Compliance Checklist (Curb Ramp) shall be provided for each curb ramp installed in conjunction with the project.
- M. All draintile used on the project shall be shown on the as-built street and storm drainage plans. The as-built plans shall also provide the size of pipe and depth installed.
- N. The lot and block numbers from the approved final plat and any easements which exist shall be shown on the as-built plans.
- O. Each as-built plan sheet shall indicate the date of installation, labeled as as-built or record plan, and the contractor who performed the work for the associated street and/or utility improvements.
- P. All trace wire access boxes shall be shown on the as-built plan. A note shall be added next to each box labeling the utility that it locates.

2. Electronic Format

- A. All construction plans must be submitted electronically to the City in AutoCAD .DWG or .DXF format in Carver County Coordinates within 120 days after completion of construction and acceptance of the final punchlist. In AutoCAD combine the XREFs to the layout drawings. All survey GPS data collected for the as-built plans must be delivered as a text file (.CSV) or GIS dataset (shapefile, Esri geodatabase). The data must include corresponding as-built structure reference numbers/ids for each corresponding GPS record. Each GPS record must include X, Y coordinates and Z elevation values. Data delivered must adhere to the horizontal control and vertical control requirements as defined in requirements found under subsection D. and E., below.
- B. The electronic plans shall be submitted within three folders. The first folder should contain .DWG or .DXF drawings.
 - 1. AS-BUILT PLAN SET (DWG): This folder should contain the entire as-built plan set and any drawings or pictures referenced to the plan set. It should also contain drawings related to the existing utilities and the proposed utilities submitted as construction drawings.
 - 2. AS-BUILT PLAN SET (PDF): This folder should contain signed, full size copies of the plan set and final plat in .pdf format.
 - 3. TIE CARDS: This folder should contain the tie cards submitted in .pdf format. Refer to City Detail Plate 5221 for tie card requirements.
- C. All electronic files must be accompanied by a “layer description list” which defines what each layer name represents within the drawing (e.g. “E-SAN is the existing sanitary sewer”, etc.). Only active layers need to be defined.
- D. Horizontal Control of the Construction Record Drawings and Final Plat must be on the Carver County Coordinate System.
- E. Vertical Control of the Construction Record Drawings must be on the City’s Benchmark System. The vertical control loop tying the project to the City’s benchmark must be submitted with the record drawings.

2024
STREET CONSTRUCTION SPECIFICATIONS

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SECTION 1.00 - GRADING

1.01 CLEARING AND GRUBBING (2101)

All clearing and grubbing shall be performed in accordance with and the basis of payment shall be made as per Section 2101 of the current Minnesota Department of Transportation Standard Specifications, with the following amendment: All costs associated with clearing and grubbing shall be considered incidental to the project, unless a separate bid item is included in the proposal form. Clearing shall be under the direction of the engineer in the field and care will be required to protect all trees not removed. All timber, stumps, roots and other debris or by-products resulting from the clearing and grubbing operation shall be disposed of off the site.

1.02 EXCAVATION AND EMBANKMENT (2105)

All site grading and street construction of excavation and embankment shall be in accordance with Section 2106 of the current Minnesota Department of Transportation Standard Specification with the following modifications:

A. Requirements

The following compaction requirements shall be met for all embankment and trench backfilling relative to subgrade under this contract:

1. The zone below the upper 3 feet of the embankment or trench shall be compacted to 95 percent of standard proctor density.
2. The zone from 3 feet below subgrade to finished subgrade (upper 3 feet) shall be compacted to 100 percent of standard proctor density.

B. Excessive Moisture

If the existing moisture content of the backfill material below three feet of subgrade is greater than 3 percentage points above the optimum moisture content, the soil shall be compacted to a minimum density of 3 pounds per cubic feet less than the standard Proctor curve at that moisture content. At no time shall the density be less than 90 percent of the standard Proctor density. This modification of the compaction specification shall at no time be used or applied to the upper 3 feet of the subgrade or the aggregate base.

1.03 SUBGRADE PREPARATION AND CORRECTION (2112)

Subgrade preparation and correction shall be performed in accordance with the following: The contractor shall prepare the subgrade to the grade, compaction and stabilization to a depth of one foot (1') below subgrade elevation. All work in preparing the subgrade to this one-foot depth shall be considered incidental.

Test or proof rolling shall be performed on the completed subgrade prior to addition of base materials. The contractor will furnish a tandem truck loaded with a minimum of 14 tons to check the completed subgrade and/or base. This truck will be driven near the curb and gutter locations on both sides of the roadway and in other locations the Engineer may direct, to determine if any soft spots exist so that these areas may be removed and replaced with satisfactory material before completing subgrade or base preparation, subject to Engineer approval. Cost of furnishing the loaded truck and driver for the test roll and any retests shall be incidental to construction of the subgrade and/or aggregate base and no direct compensation will be made therefore.

- A. If, in the Engineer's opinion, based on the test roll, there are any sections of the road subgrade that are unstable, the contractor shall, at his/her expense, scarify the roadbed and aerate or add moisture to the material as necessary and re-compact the material to the extent that it will be stable when re-tested by rolling.
- B. However, where test failures re-occur and the Engineer is satisfied that the corrective measures were exhausted, then a qualified soils engineer shall be retained to recommend corrective measures (i.e. subcut, fabric, draitile). Upon review of the soils report, the City Engineer shall determine an alternative to produce acceptable stability on the roadbed. The unstable sections shall be repaired by the contractor as directed by the Engineer and at the owner's expense.

In the event subgrade subcut efforts are deemed necessary to correct any unsuitable soils in the road section, at the Engineers discretion three inch minus and/or a granular (free draining) backfill meeting the requirements of MnDOT Section 3149.2 "D.3 Select Granular Backfill" shall be used. In addition, if the road section is in need of subgrade removal, the depth of removal shall be consistent throughout the entire road section with the exception of a small isolated area. The practice of varying depths of subcut in a continuous section of road will not be allowed.

In roadbeds where existing soil subcuts have been performed, drain tile and cleanouts in low areas and any other areas deemed necessary by the Engineer shall be installed as per standard detail plate nos. 5232, 5233 and 5234.

1.04 APPLICATION OF WATER (2130)

This work shall consist of furnishing and applying water for dust control or moisture content within the Project limits as directed by the Engineer or stipulated in the Contract.

A. Materials

The water shall be furnished by the Contractor and it shall be reasonably clean. The Contractor shall make all arrangements with the City's Utility Superintendent for obtaining any water which may be needed for the construction. No water may be taken from any City hydrants unless authorized in writing by the Utility Superintendent. Failure to obtain City authorization will result in prosecution and fines within the limits of city ordinance.

B. Construction Requirements

1. Equipment

Water supply tanks shall be equipped with distributing bars or other apparatus that will ensure uniform application of the water. Application of water on the road shall be with a self-propelled distributor of the pressure type, mounted on pneumatic-tired wheels. Pump capacity shall be sufficient to permit application of the whole load uniformly at any rate up to 250 gallons per minute.

2. Application

The water supply and equipment used shall be sufficient to apply the quantity required within the time interval necessary to secure optimum results and avoid unwarranted loss of water through evaporation, absorption, or drainage. The water shall be applied at such times and in such quantities as the Engineer approves.

C. Method of Measurement

Water applied for Dust Control or moisture content within the Project limits, by direct order of the Engineer, will be considered Incidental to the Project unless a specific bid item is provided. If a bid item is provided, deductions may be made for any water wasted through failure of the Contractor to coordinate the application of water with other operations as may be directed.

D. Basis of Payment

If a bid item is provided, payment for the accepted quantities of water at the Contract price per unit of measure will be compensation in full for all costs of furnishing, transporting, and applying the water as directed.

These provisions apply to water used for dust control within the Project limits as directed by the Engineer. These provisions do not apply to any sprinkling or other uses for water required in conjunction with the construction of concrete pavements; to any water used in the production or curing of concrete; to any water used to maintain plant life; to any water used in conjunction with compacting soil and aggregate; or to any water used for dust control in any Contractor selected haul roads, detours, or work sites outside of the Project limits; all costs of which will be incidental to the Contract items involved.

When a bid item is provided, payment for the application of water will be made on the basis of the following schedule:

Item No.	Item	Unit
2130.501	Water	Gallon

SECTION 2.00 - BASE MATERIALS AND CONSTRUCTION

2.01 AGGREGATE BASE (2211)

The contractor shall place and compact the aggregate base of the class and depth specified. All aggregate base and its placement shall conform to Section 2211 of the current Minnesota Department of Transportation Standard Specification.

Aggregate base shall be paid for by the number of cubic yards as calculated from the design widths, depths and lengths. No payment shall be made for additional material used due to low subgrades, spillage, tolerances, etc.

Prior to the placement of any aggregate base material, all soil reports and compaction tests including previous tests on utilities must be reviewed by the City.

2.02 MATERIALS

A. Aggregate 3138

The class of aggregate to be used in each course will be shown in the contract. Gradation acceptance for Classes 1, 2, 3, 4, 5 and 6 aggregates will be by the random sampling method in accordance with 2211.3D.1.

2.03 REQUIREMENTS

A. Spreading and Compacting

At the time of spreading the base material for compaction, the aggregate shall be so uniformly mixed that it will meet specified gradation requirements, based on the results of gradation tests run on aggregate samples obtained after mixing and prior to compaction.

The material for each layer shall be spread and compacted to the required cross section and density before placing aggregate thereon for a succeeding layer. The surface of each layer shall be maintained, with uniform texture and firmly keyed particles, until the next layer required by the contract is placed thereon or until the completed base is accepted if no other construction is required thereon.

Compaction shall be obtained by the:

1. Specified density method,
2. Quality compaction method, or
3. Penetration index method

whichever method is prescribed for the particular course. **Compaction by the specified density method will be required on all base courses except those that are otherwise designated in the contract for compaction by either the quality compaction or penetration index method.** If Class 5C or Class 5BC is specified or substituted for another class of aggregate, then densification shall only be obtained by the quality compaction method or the penetration index method.

B. Penetration Index Method

The full thickness of each layer of Classes 5 or 6 shall be compacted to achieve passing results in a modified DCP or a penetration index value less than or equal to 10 mm per blow, as determined by a MnDOT standard dynamic cone penetrometer (DCP) device. For test purposes, a layer will be considered to be 75 mm in compacted thickness but a testing layer can be increased in thickness to a maximum of 150 mm if compacted in one lift by a vibratory roller. At least two passing dynamic cone penetrometer tests shall be conducted at selected sites within each 800 cubic meters (CV) of constructed base course. If a test fails to meet the specified requirements, the material represented by the test shall be recompacted and will be retested for density compliance.

All aggregates prescribed to be tested under the Penetration Index Method 2211.3D.2.c must be tested and approved within 24 hours of placement and final compaction. Beyond the 24 hour limit, the same aggregate can only be accepted by the Specific Density Method 2211.3D.2.a.

Water shall be applied to the base material during the mixing, spreading and compacting operations when and in the quantities the Engineer considers necessary for proper compaction.

C. Determination of Penetration Index Value

The Penetration Index Value will be determined using a MnDOT standard dynamic cone penetrometer (DCP) device. The basic test method can be found in the MnDOT User Guide to the Dynamic Cone Penetrometer and the detailed test methods and procedures for base and shouldering aggregate are available from the Grading and Base Office, Maplewood.

D. Random Sampling Gradation Acceptance Method

The following provision shall apply to the use of Classes 1, 2, 3, 4, 5 and 6 aggregates:

Gradation Control

The contractor and/or aggregate producer shall be responsible for maintaining a gradation control program in accordance with the random sampling acceptance method described in the Grading and Base manual. The contractor will be permitted to proceed with and complete the base construction on the basis of the contractor's Certification (on Form 24346 furnished by the engineer) that the material supplied and used conforms to the appropriate specification

requirements. The contractor shall assume full responsibility for the production and placement of uniform and acceptable materials.

2.04 ACCEPTANCE TESTING

Aggregate gradation compliance will be determined in accordance with the following table:

ACCEPTANCE TESTING SCHEDULE^(A)

Quantity ((metric tons (t)) ^{(a)(b)})	No. Lots ^(c)	No. Samples ^{(d)(e)} or No. Sublots/Lot ^(f)	Payment Acceptance Schedule
Less than 500	NA	Use Form 2415 or 2403 (small quantity)	See Chanhassen's General Condition 6.09
≥ 500 but less than 4,000	NA	1/1,000t ^(g)	See Chanhassen's General Condition 6.09
≥ 4,000 but less than 10,000	1 ^{(h)(i)}	4 ⁽ⁱ⁾	See Chanhassen's General Condition 6.09

- A.** In accordance with section 1503 of the current Minnesota Department of Transportation Standard Specification, Conformity with Contract Documents, it is the intent of these specifications that materials and workmanship shall be uniform in character and shall conform to the prescribed target value or to the middle portion of the tolerance range. The purpose of the tolerance range is to accommodate occasional minor variations from the median zone. The production and processing of the materials and the performance of the work shall be so controlled that the material or workmanship will not be of borderline quality.
- B.** Or equivalent in cubic meters loose volume or cubic meters compacted volume ((1t – 0.6m³ (LV) or 1t – 0.46m³ (CV), respectively)).
- C.** The use of any one kind or class of material from more than one source is prohibited without permission of the engineer according to section 1601 of the current Minnesota Department of Transportation Standard Specification. If the contractor changes sources (with the engineer's approval), a new lot consisting of four sublots will be established provided that the quantity equals or exceeds 4,000t. When a material source is changed prior to completing a lot, the remainder of the 4 samples will be taken from the previously placed materials, provided that the quantity equals or exceeds 4,000t. However, if the quantity placed is less than 4,000t, acceptance testing will be based on one test per thousand metric ton.
- D.** Samples for gradation testing will be taken randomly by the engineer prior to compaction, in accordance with the random sampling method described in the Grading and Base Manual.

- E. Classes 1, 2, 5C and 5BC, Shoulder Surfacing Aggregate, may be sampled from the stockpile for testing and acceptance in accordance with section 3138.3 of the current Minnesota Department of Transportation Standard Specification.
- F. Each lot will be divided into four sublots which are approximately equal in quantity.
- G. Each individual sample will be analyzed separately for payment.
- H. Each lot shall consist of a maximum of approximately 10,000t of material, although lesser sized lots may occur due to construction constraints.
- I. Each lot will be analyzed separately for payment.
- J. One gradation sample will be taken from each subplot and tested. The results obtained from the four samples will be averaged for payment to the nearest one-tenth of one percent for the specified sieves.

The engineering firm will have each sample tested in the field by a MnDOT certified technician or may submit them to the district laboratory for testing. A delay of at least three (3) working days is anticipated before laboratory tests results are available but a maximum of eight (8) working hours delay is anticipated for field gradations.

Non-complying material shall be dealt with in accordance with the City of Chanhassen's General Conditions Section 6.09.

2.05 SPECIFIED DENSITY METHOD

The full depth of aggregate base shall be compacted to not less than 100% of the maximum density and at the time of compaction the moisture content of the material shall not be less than 65% of optimum moisture. All failing moisture and density tests must be corrected before the project is complete.

2.06 AGGREGATE COMPOSITION (3138)

Scope

Provide certified aggregate along with Form G&B-104 for 2118, 2211 and 2221.

Note that Class 5Q, which a designer may designate for use as a base, would most commonly be produced at a quarry.

Requirements

A. General

Use aggregate sources meeting the requirements of 1601, "Source of Supply and Quality."

Provide certified aggregate materials that have uniform: appearance, texture, moisture content and performance characteristics.

Provide binder soils from sources meeting the requirements of 3146, “Binder Soil.” Add binder soils during the crushing and screening operations.

B. Virgin Materials

Provide virgin aggregates meeting the following requirements:

1. Comprised of naturally occurring mineral materials, and contains no topsoil, organics or disintegrating rock as defined in Laboratory Manual Section 1209,
2. Class 2 must be composed of 100% crushed quarry rock, and
3. Conforms to the quality requirements of the latest edition of Table 3138.2-1.

**Table 3138.2-1
Quality Requirements for Virgin Materials**

Requirement	Class			
	1 and 2	3 and 4	5	6
Maximum Shale	NA	7.0 percent	7.0 percent	7.0 percent
Minimum Crushing Requirements *	NA	NA	25 percent	30 percent
Maximum Los Angeles Rattler (LAR) loss from Carbonate quarry rock	40 percent	40 percent	40 percent	35 percent
Maximum Insoluble residue for the portion of quarried Carbonate Aggregates passing the No. 200 Sieve	10 percent	10 percent	10 percent	10 percent
Maximum amount of Brick	1.0 percent			
Maximum amount of other objectionable Materials including but not limited to: wood, plant matter, plastic, plaster, and fabric	0.1 percent			
* Material crushed from quarries is considered crushed Material.				
The Contractor/supplier may not knowingly allow brick and other objectionable Material and must employ a QC process to screen it out, before it becomes incorporated into the final product.				

C. Recycled Materials

The Contactor may substitute recycled aggregates for virgin aggregates, if meeting the following requirements:

1. Recycled aggregates contain only recycled asphalt pavement (RAP), recycled concrete materials, recycled aggregate materials, or certified recycled glass, and
2. Must meet the requirements of the latest edition of Table 3138.2-2.

**Table 3138.2-2
Quality Requirements for Recycled Materials**

Requirement	Class 1	Classes 3, 4, 5, and 6
Maximum Bitumen Content of Composite	4.0 percent	4.0 percent
Maximum Masonry block percent	10 percent	10 percent
Maximum percentage of glass *	Not Allowed	10 percent
Maximum size of glass *	Not Allowed	3/4 inch
Maximum amount of Brick	1.0 percent	1.0 percent
Maximum amount of other objectionable debris including but not limited to: wood, plant matter, plastic, plaster, and fabric	0.2 percent †	0.2 percent †
<p>* Glass must meet certification requirements on the Grading and Base website. Combine glass with other Aggregates during the crushing operation.</p> <p> The Contractor/supplier may not knowingly allow brick and other objectionable Material and must employ a QC process to screen it out, before it becomes incorporated into the final product.</p> <p>† It is recognized that recycled Aggregates may occasionally contain debris, and the 0.2 percent requirement is meant to be an average requirement for each Material delivery.</p>		

D. Surfacing Aggregates

Provide surfacing aggregates in accordance with 3138.2A, “General,” 3138.2B, “Virgin Materials,” and 3138.2C, “Recycled Materials,” and meeting the following requirements:

1. 100 percent (100%) of the material passes the ¾ in [19.0 mm] sieve, regardless of the class specified,
2. Does not contain glass,
3. Recycled concrete materials only may only be used for the roadway shoulders,
4. There is no restriction on the bitumen content, if used for shouldering,

Note: Class 2 must be composed of 100% crushed quarry rock per 3138.2B3.

E. Gradation Requirements

1. For products containing less than 25 percent (25%) recycled materials, conform to the latest edition of Table 3138-3.
2. For products containing 25 percent (25%) or more recycled materials and less than 75% recycled concrete, conform to the latest edition of Table 3138-4.
3. For products containing 75 percent (75%) or more recycled concrete, conform to the latest edition of Table 3138-5.
4. Perform gradation tests prior to bituminous extraction, and
5. Provide Aggregate with a minimum clay content of 3 percent and Plasticity Index (PI) of 5-12. The requirements for PI and minimum clay content are fulfilled if one of the following are met:
 - a) the Material composed of at least 25 percent recycled Materials
 - b) the Material composed of at least 50 percent crushed quarry Aggregate

Table 3138.2-3
Base and Surfacing Aggregate
(Containing less than 25 percent recycled Aggregates)
Total Percent Passing *

Sieve Size	Class 1 (Surfacing)	Class 2 (Surfacing †)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 6 (Base)
2 inch	—	—	100	100	—	—
1 1/2 inch	—	—	—	—	100	100
1 inch	—	—	—	—	—	—
3/4 inch	100	100	—	—	70 - 100	70 - 100
3/8 inch	65 - 95	65 - 90	—	—	45 - 90	45 - 85
No. 4	40 - 85	35 - 70	35 - 100	35 - 100	35 - 80	35 - 70
No. 10	25 - 70	25 - 45	20 - 100	20 - 100	20 - 65	20 - 55
No. 40	10 - 45	12 - 35	5 - 50	5 - 35	10 - 35	10 - 30
No. 200	8.0 - 15.0	5.0 - 16.0	5.0 - 10.0	4.0 - 10.0	3.0 - 10.0	3.0 - 7.0

* If product contains recycled Aggregate, add letters in parentheses for each Aggregate blend designating the type of recycled products included in the mixture: (B) = Bituminous, (C) = Concrete, (G) = Glass, (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass, (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass.
 || Recycled concrete when used for surfacing is only allowed for Shoulders.
 † Class 2 must be composed of 100 percent crushed quarry rock per 3138.2B, "Virgin Materials," Note (2).

Table 3138.2-4
Base and Surfacing Aggregate
(Containing 25 percent or more recycled Aggregates & 75 percent or less recycled concrete)
Total Percent Passing *

Sieve Size	Class 1 (Surfacing)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 6 (Base)
2 inch	—	100	100	—	—
1 1/2 inch	—	—	—	100	100
1 inch	—	—	—	—	—
3/4 inch	100	—	—	70 - 100	70 - 100
3/8 inch	65 - 95	—	—	45 - 90	45 - 85
No. 4	40 - 85	35 - 100	35 - 100	35 - 80	35 - 70
No. 10	25 - 70	20 - 100	20 - 100	20 - 65	20 - 55
No. 40	10 - 45 † 5 - 45	5 - 50	5 - 35	10 - 35	10 - 30
No. 200	5.0 - 15.0 † 0 - 15.0	0 - 10.0	0 - 10.0	0 - 10.0	0 - 7.0

* Add letters in parentheses for each Aggregate blend designating the type of recycled products included in the mixture: (B) = Bituminous, (C) = Concrete, (G) = Glass, (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass, (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass.
 || Recycled concrete is only allowed for Shoulders.
 † Note: For Class 1, if the bitumen content is ≥ 1.5 percent, the gradation requirement is modified to 5 - 45 percent for the No. 40 Sieve and 0 - 15.0 percent for the No. 200 Sieve.

Table 3138.2-5
Base and Surfacing Aggregate
(Containing more than 75 percent recycled concrete)
Total Percent Passing *

Sieve Size	Class 1 (Surfacing)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 6 (Base)
2 inch	—	100	100	100	100
1 1/2 inch	—	—	—	—	—
1 inch	—	—	—	—	—
3/4 inch	100	—	—	45 - 100	45 - 100
3/8 inch	65 - 95	—	—	25 - 90	25 - 85
No. 4	40 - 85	35 - 100	35 - 100	15 - 65	15 - 65
No. 10	25 - 70	20 - 100	20 - 100	10 - 45	10 - 45
No. 40	10 - 45	0 - 20	0 - 20	0 - 20	0 - 20
No. 200	5.0 - 15.0	0 - 6.0	0 - 6.0	0 - 6.0	0 - 6.0

* Add letters in parentheses for each Aggregate blend designating the type of recycled products included in the mixture: (B) = Bituminous, (C) = Concrete, (G) = Glass, (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass, (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass.
 || Recycled concrete is only allowed for Shoulders.

Table 3138.2-6
Reclamation Material Permitted as a Substitute for Class 3, 4, 5, or 6
Total Percent Passing

Sieve Size	Class 3	Class 4	Class 5	Class 6
3 inch*	100	100	100	100
3/4 inch	-	-	70 - 100	70 - 100
3/8 inch	-	-	45 - 90	45 - 85
No. 4	35 - 100	35 - 100	35 - 80	35 - 70
No. 10	20 - 100	20 - 100	20 - 65	20 - 55
No. 40	5 - 50	5 - 35	10 - 35	10 - 30
No. 200	0 - 10.0	0 - 10.0	0 - 10.0	0 - 10.0

* Note for bedding within 2 feet of plastic pipe, the requirement is 100 percent passing the 1 inch Sieve.

F. Sampling and Testing

Report the No. 200 sieve results to the nearest 0.1 percent and all other sieve results to the nearest 1percent (1%).

- A Sampling, Sieve Analysis and Crushing Tests Grading and Base Manual
- B Los Angeles Rattler Loss Laboratory Manual Method 1210
- C Shale Tests Laboratory Manual Method 1207 & 1209
- D Bitumen Content Laboratory Manual Method 1852

- E Insoluble Residue Laboratory Manual Method 1221
- F Reclaimed Glass AGI Visual Method (AGI Data sheet 15.1 and 15.2)

2.07 SCHEDULE OF PRICE REDUCTIONS

The following schedule for price reductions on non-complying construction material shall be used when not addressed in the Contract.

The following schedule of price adjustments and/or corrective action for non-compliance material and/or work is a guideline only. Special circumstances may result in price reductions differing from this schedule. These special circumstances shall be determined and evaluated by the City Engineer.

Price reductions are implemented only if it is in the best interest of the City to leave the non-complying material in place, otherwise, the material should be removed and replaced.

Gradation Failures

A. MnDOT Specification 3138, Aggregate for Surface and Base Courses.

- 1. Class 1, 2, 3, 4, 5 and 6 designations.

The above classes of material should be accepted for payment in accordance with the provisions of the City of Chanhassen’s General Conditions Section 6.09.

Price reductions for more than one failing sieve size shall be accumulative, but will not exceed 50.0 percent. The compensation due to the contractor should be reduced accordingly.

B. MnDOT Specification 3149, Granular Material.

The granular materials listed in MnDOT Specification 3149 should be accepted for payment in accordance with the following:

- 1. All Sieves
Price adjustments shall be in accordance with MnDOT specs
- 2. # 200/1 inch or 75µm/25 mm. Ratio
(MnDOT Specification 3149.2.B1 and 3149.2.B2)

% Outside	
<u>Specified Limits*</u>	
+1.0	Substantial Compliance
+1.1 - 2.0	5.0% Price Reduction
2.1 - 3.0	15.0% Price Reduction

>3.0

Corrective Action Required

*Based on individual sample test results. Price adjustment applied to the quantity of non-compliance material represented by the sample. The compensation due to the contractor should be reduced accordingly.

- C. The Contractor may correct the quantity of non-compliance material in order to qualify for full payment. When corrective action is required for acceptance of the non-complying material, in accordance with the previously indicated schedules, the Contractor shall perform the corrective work at no cost to the Owner. The Contractor shall remove the unacceptable material and replace with acceptable materials, or correct the unacceptable materials on the road. The corrected material will be tested for compliance with the specification after the completion of the corrective action. In lieu of replacement or correction, the Engineers may allow (in the best interest of the City) the Contractor to accept a price reduction instead of corrective action.

SECTION 3.00 – PAVEMENT CONSTRUCTION

3.01 PLANT MIXED BITUMINOUS ASPHALT (2360)

This Specification requires the Contractor to follow of the most current MnDOT Standard Specification and provide a mix that complies with all of the design, production, and placement requirements of the specification. The City does not make any guaranty or warranty, either express or implied, that compliance with one part of this specification guarantees that the Contractor will meet the other aspects of the specification.

A. Description

This work consists of the construction of one or more pavement courses of hot plant mixed asphalt-aggregate mixture on the approved prepared foundation, base course or existing surface in accordance with the specifications and in conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer. Mixture design will be 2360 (gyratory) as described in the Special Provisions or the Standard Detail Plates through the mixture designation.

B. Submittals

In addition to the submittals required under MnDOT Bituminous Specifications 2360, submit Q/C testing for Class B aggregates included in mix designs based on the following schedule:

1. For every 5,000 tons of bituminous mixture placed on the project, or for mix placed 25 days after the previous submittal, perform and submit Q/C testing from Class B aggregate stockpile:
 - a) Soundness Testing (ASTM C 88)
 - b) Loss by Abrasion and Impact (ASTM C 131)
2. Aggregate testing requirements shall be submitted on a per project basis. Individual tests and submittals are required for each project.

3.02 CITY OF CHANHASSEN COMPACTION TEST METHOD

For the specified density method of compaction, each lift shall be uniformly compacted to a density not less than what is required per Table 2360.3-1. The density test shall be in accordance with MnDOT Bituminous Specifications 2360 and the MnDOT Bituminous Manual. Compaction testing will be performed for the owner by an independent testing laboratory approved by the Engineer as identified below. The cost of all tests will be paid by the contractor.

- A.** One (1) sample for a density test per 200 tons of mix installed or a minimum of two (2) sample per job.

B. In-place density test performed by one of the following procedures as directed by the Engineer:

1. A minimum of one (1) core sample for in-place density tests per 200 tons of mix installed or a minimum of four (4) cores per job. No cores are to be taken in the wheel tracks.
2. Four (4) density test taken with a portable nuclear testing device at randomly selected locations per 200 tons of mix installed. A minimum of six (6) tests per job.

The mixture with failing density will not be accepted for payment at the Contract bid price, but, in lieu of being removed and replaced, will be accepted at a reduced price in accordance with Table 2360-22. The appropriate pay factor will be applied to the quantity of mixture represented by the failing density test. One retest of each failing test will be permitted and the higher of the two densities will be used in determining the pay factor. All retesting shall be done within three (3) working days after placement of the bituminous mixture. The Contractor will be responsible for the costs of all retesting.

3.03 BITUMINOUS PATCHING

Over any areas that need to be corrected (settlements, bird baths, etc.) one of the following methods as required by the Engineer should be used for patching:

- A.** Wedge cut one inch (1") into the existing pavement around the outer limits of the area that needs to be patched, tack and fill with approved bituminous material.
- B.** Tack area to be patched then skin patch with approved bituminous material and apply a seal coat over patched areas. Seal coat should be trap rock and applied as per Section 3.09 Bituminous Seal Coat.
- C.** Bituminous materials to be used in patch areas shall be in accordance with Section 2231 of the current Minnesota Department of Transportation Standard Specification unless otherwise directed by the engineer.
- D.** Straight line cut (mill/colter wheel or saw cut) and remove. Tack edges to be patched and fill with approved bituminous material.

Patching shall be done in such a manner to produce a smooth driving surface of which the patch or patch edge shall not deviate from surrounding pavement. Milling of patches will be required when any deviation occurs.

In areas where, in a 100-foot length of street, measured from any area in need of repair or in either direction and three or more patches/settlements are evident, a one and one-half inch bituminous overlay shall be constructed over the entire length and width of the affected street section.

In areas where trench settlements (of any kind) have occurred, corrections may be performed by either the above-listed methods, or if, in the opinion of the Engineer, the existing bituminous is in satisfactory condition, it may be repaired by a bituminous leveling course.

Prior to any overlays deemed necessary, a minimum four-foot wide edge mill along the gutter line shall be completed and any settlements shall be filled with bituminous material, leveled out, and thoroughly compacted.

3.04 BITUMINOUS TACK COAT

The bituminous material for tack coat shall be applied in accordance with Section 2357 of the current Minnesota Department of Transportation Standard Specification. The rate of application shall be in accordance with Table 2357.3-1 or as approved by the engineer.

Tack coat shall be applied in a manner that will allow traffic movement on at least one side of the street at all times without pick up or tracking of tack coat material.

At no time will the application of tack coat be applied by means other than a motor powered distributor.

3.05 MILL PAVEMENT SURFACE

A. Description

This work shall consist of improving the profile, cross slope, and surface texture of an existing pavement surface by machine (cold) milling preparatory to placement of another course thereon.

B. Equipment

Pavement milling shall be accomplished with a power operated, self-propelled cold milling machine capable of removing concrete and bituminous surface material as necessary to produce the required profile, cross slope, and surface texture uniformly across the pavement surface. The machine shall also be equipped with means to control dust and other particulate matter created by the cutting action.

The machine shall be equipped to accurately and automatically establish profile grades along each edge of the machine, within plus or minus 1/8 inch (3 mm), by referencing from the existing pavement by means of a ski or matching shoe, or from an independent grade control. The machine shall be controlled by an automatic system for controlling grade, elevation, and cross slope at a given rate.

C. Operations

The pavement surface shall be milled to the depth, width, grade, and cross slope as shown in the Plans or as otherwise directed by the Engineer. Machine speeds shall be varied to produce

the desired surface texture grid pattern. Milling shall be performed without excessive tearing or gouging of the underlying material.

The pavement milling operations shall be referenced from an independent grade control in those areas where the Engineer considers such control is essential. The control shall be established and maintained by the Contractor in a manner and in such position as the Engineer approves.

Milling operations shall be conducted so that the entire pavement width is milled to a flush surface at the end of each work period, whenever the pavement is open to traffic. In case of uncompleted operations resulting in a vertical or near vertical longitudinal cutting face, it shall be the Contractor's responsibility to minimize the hazardous effects to traffic by resloping the longitudinal face to provide a suitable taper, by constructing a temporary bituminous taper, or by otherwise providing the necessary protective measures, as approved by the Engineer. Transverse cutting faces shall be tapered at the end of each working period where traffic is permitted. To further provide for traffic, the Contractor shall also construct temporary bituminous tapers at intersecting streets, around utility appurtenances, and at all appropriate entrances during the milling operations, as ordered by the Engineer.

The Contractor shall construct the temporary milled tapers and furnish, place, and remove temporary bituminous tapers as incidental work for which no direct compensation will be made.

In areas inaccessible to the milling machine, the work shall be accomplished by other equipment or methods acceptable to the Engineer.

After the milling operations are completed to the planned depth, the milled area shall be cleaned by sweeping or vacuuming with equipment approved by the Engineer. Such cleaning shall be performed to the satisfaction of the Engineer.

Debris resulting from milling and cleaning operations shall be disposed of outside of the Right of Way except as otherwise authorized by the Engineer.

Milling at previously patched areas shall be performed to the required depth below the pavement surface existing prior to the previous patch being placed, and not from the surface of the patch.

The contractor shall take care to avoid disturbing or damaging any existing drainage or utility structures on the Project. Any damage resulting from the Contractor's operations shall be repaired by the Contractor at no expense to the City.

D. Method of Measurement (2232.4)

Pavement milling will be measured by the area of each type of surface removed. Measurements will be of those areas milled as specified, based on actual finished dimensions of the work.

E. Basis of Payment (2232.5)

Payment of pavement milling at the appropriate Contract price per unit of measure will be compensation in full for all costs of performing the work as specified, including, but not limited to, traffic control, cleanup, and disposal operations.

Payment for pavement milling will be made on the basis of the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2232.504	Mill Bituminous Surface	square yard (square meter)

3.06 BITUMINOUS OVERLAY

This work shall consist of constructing a pavement overlay course of hot plant mixed bituminous aggregate mixture on a prior approved prepared surface. It shall be constructed in a manner that when complete, all low or high areas of the overlay surface have been adequately tolerated to provide a smooth profile, cross slope and exhibit satisfactory ride ability. Overlays for all streets shall consist of a minimum of two inches in compacted depth and meet all construction and material specifications as stated in Section 3.00. Material for overlays shall meet MnDOT 2360 specification and shall be specified in the project documents.

SECTION 4.00 - MISCELLANEOUS CONSTRUCTION

4.01 SUBSURFACE DRAINTILE (2502)

See Section 2.19 of Sanitary and Storm Sewer Specifications.

4.02 UTILITIES

- A.** Unless specified otherwise, this work shall be entirely at the contractor's expense.
1. There shall be an inspection of the sanitary sewer, storm sewer and water main utilities prior to the start of construction. The contractor shall notify the Engineer 24 hours in advance to aid in accomplishing this inspection. All deficiencies in these existing systems prior to beginning street construction must be immediately brought to the attention of the Engineer.
 2. After the manholes and valve boxes are cleaned, and raised to proper grade prior to paving the wear course, they shall be inspected to assure trouble free operation.
 3. The contractor shall be responsible for locating all curb boxes within the limits of the project. The City has location ties to the curb boxes. The contractor shall notify the Engineer at least 24 hours in advance of this location work so that a representative of the Engineer can be present at all times while this work is being done and to aid in the accomplishment of this work. This work shall be done prior to start of construction. Prior to completion of the project, the curb boxes shall be adjusted to be flush with final grade.
- B.** A final inspection of all utilities will be performed at the completion of the project for acceptance. Adjustments shall be made as follows:
1. **Sanitary Sewer.** All sanitary sewer manhole castings shall be left in place during the paving operation. The castings shall be adjusted before the mat is laid and shall be left one-quarter to one-half inch (1/4 – 1/2") below finished grade. Where the Engineer requires or where it is impossible to adjust the structure with the addition or removal of adjustment rings, reconstruction will be necessary. In such cases, it will be necessary to add or remove manhole sections.
 2. **Storm Sewer.** Existing storm sewer castings shall be adjusted where necessary to be two inches (2") below finished gutter line. In areas of surmountable curb, the top of casting shall match the top of curb.
 3. **Water Valve Boxes.** All water valve boxes shall be adjusted prior to paving the wear course, and left one-quarter to one-half inch (1/4 – 1/2") below finished grade. Thorough tamping of the material around the valve box is required. In the event the valve box cannot be adjusted without the use of extensions, the contractor shall remove the upper section, place the necessary extension and replace the upper section.

4. **Grouting Adjusting Rings.** Adjustment rings are required to be grouted; the contractor shall grout between rings, place the casting and-remove all excess grout on the inside of the manhole by wiping smooth with a gloved hand or similar instrument. Refer to detail plates for limitations on number of rings allowed. I and I shields to be installed as specified.

4.03 WARRANTY

The contractor should take special note of the warranty provisions of these contract documents as detailed in Sections 3.04 and 9.16 of the General Conditions of the Contract which are included as part of this Standard Specification

4.04 WATER TO HOMES

The contractor shall be responsible (until completion of the project) for providing water to any homes which have their individual water systems become inoperative due to dewatering operations during the project construction

4.05 CONCRETE (2531)

A. Concrete Curb and Gutter and Driveway Aprons

All concrete curb and gutter and driveways shall be constructed in accordance with Sections 2301, 2461 and 2531 of the current Minnesota Department of Transportation Standard Specifications, except as modified or altered below:

1. Driveway openings in the curb shall be constructed as shown on the plans, standard plates, or as directed by the Engineer in the field.
2. The contractor shall construct concrete gutters and driveway aprons as detailed on the City's standard detail plates, and as located on the plans.
3. Localized panels or sections of concrete determined either by the plan set or Engineer to be saw cut, removed and replaced shall be joined to each adjacent panel by two grouted #4 epoxy coated rebar.
4. Delete that portion of Section 2531 which requires that the concrete curb and gutter joints be sealed with joint sealer material.
5. The contractor shall furnish without charge all concrete samples needed for test cylinders, slump tests, air entrainment tests, and other tests ordered by the Engineer.
6. For surmountable curb installations, all radii at intersections shall be B-618 concrete curb and gutter with a 5-foot taper section, on each side of the radius.

7. Where a curb machine is used, the contraction joints shall be formed (tooled) or sawed at 10 foot intervals as approved by the engineer to a depth of two inches (2") from all exposed surfaces. Provide full depth expansion joints where indicated on detail plates, on the plans, against fixed objects and/or at a maximum of 200 foot intervals.
8. After the concrete is finished and a transverse broomed surface texture provided, the contractor shall spray it with a spray membrane curing compound conforming to MnDOT specifications, Section 3754.
9. Section 2531.2A.1 shall be mix no. 3F52 with granite aggregate.
10. Section 2531.2A.2 shall be mix no. 3F32 with granite aggregate.
11. The use of High-early concrete pavement used by the Contractor will be incidental to the Contract Item unless specified otherwise in the Special Provisions.

B. Concrete Sidewalk

All concrete sidewalk shall be constructed according to Section 2521 of the current Minnesota Department of Transportation Standard Specifications and City Standard Detail Plates, except as modified or altered below:

1. Delete that portion of Section 2521 which requires that the sidewalk be sealed with joint sealer material.
2. Calcium Chloride Type 1 or 2, MnDOT Specification 3753 shall not exceed 2% of the weight of the cement incorporated into the mix.
3. Concrete used for sidewalk shall meet the requirements of MnDOT Section 2521, mix no. 3F52 with granite aggregate.

C. Reduced Payment Associated With Deficient Strength Requirements On All Concrete Construction

If the Specified Strength requirement has not been obtained on the date specified, the mixture with failing tests will not be accepted for payment at the Contract bid price. If the material strength is in a range within 95% of the specified strength, in lieu of being removed and replaced acceptably, will be accepted at a reduced price in accordance with the schedule shown below. All material below 95% of the specified strength will be removed and replaced to specified requirements. The appropriate pay factor will be applied to the quantity of mixture represented by the failing test. Two core samples of each failing test will be permitted and the higher of the two tests will be used in determining the pay factor. All re-testing shall be done within a time frame determined by the City Engineer.

Strength Requirements
(% Below Specified Minimum)

Pay Factor
(% of Contract Price)

0%	100%
0 to 1%.....	98%
1 to 2%.....	95%
2 to 3%.....	90%
3 to 4%.....	85%
4 to 5%.....	75%
More than 5%	Remove and Replace

The Contractor does not have the option of taking a price reduction in lieu of complying with the Specifications. Material not meeting requirements shall not knowingly be placed in the work. Should any non-conforming material be inadvertently placed in the work, it will be up to the City Engineer to determine whether the non-conforming work will be allowed to remain in place or removed and replaced or otherwise corrected to meet specifications. Non-conforming material that is allowed to remain in the project shall be subject to the price reductions listed below for the indicated test provided the material was placed to the satisfaction of the Engineer. Otherwise the Engineer may make the determination according to other procedures addressed in MnDOT Specification 1503.

With failing or borderline material, make sure next load is tested before it is incorporated into the work.

1. General

- a) Price reductions that are not part of the Contract should not be issued unless the price reduction is in excess of \$350. If the calculated price reduction is equal to or less than \$350, it shall be documented as substantial compliance. At the discretion of the Engineer, several smaller price deductions may be lumped together to comply with the \$350 minimum to alleviate a continuous marginal failure problem.
- b) Bid prices for the project in question should be reviewed prior to calculating a price reduction. If the bid prices are considerably below average prices, then the price reduction should be assessed based on: (1) the average bid price as determined by the City Engineer or (2) a fair market value.
- c) The price reduction shall represent only the quantity of material represented by the sample and actually used.

Example: A quantity of ready mixed concrete is placed in the work. A slump test indicates failing material. Then the price reduction would only apply to that load of ready mix represented by the test, not by all concrete placed since the last passing test.

- d) The price reduction will normally be the quantity represented by the failing test times price reduction per unit quantity (tons, gals, etc.) determined from the “Schedule of Price Reductions” times the bid price of (2) above.
- e) The following guide for price reductions on non-conforming construction materials shall be used when not addressed in the contract:

D. Schedule of Price Reductions For Materials For Concrete Construction Slump / Air - Isolated tests (not consistently high or low)

(See MnDOT Specification 2461). Slumps or air tests that are consistently high or low require corrective action by the Contractor’s quality control personnel. When test results are inconsistent or borderline, every load should be tested.

- 1. Slump out of compliance (see MnDOT Specification Table 2461.5-6)
- 2. Air Content Out of Compliance (See MnDOT Specification Table 2461.5-8)
- 3. Low Slump Concrete (See MnDOT Specification Table 2461.5-7)

4.06 BITUMINOUS CURB (2535)

All bituminous curb shall be constructed in accordance with Section 2535 of the current Minnesota Department of Transportation Standard Specification, except as modified or altered below:

- A. Driveway openings in the curb shall be constructed as shown on the plans, standard plates, or as directed by the engineer in the field.
- B. The contractor shall provide all samples needed for tests ordered by the engineer.
- C. Where specified, a bituminous berm shall be constructed along the edge of the roadway instead of a bituminous curb. The bituminous berm shall meet the requirements of Section 2535 except that the berm shall be formed by a shoe attached to the paver. The berm section shall be as shown on the plans.
- D. Bituminous curb shall not be used to tie in catch basin inlets or manholes. Concrete sections shall be poured in these areas.

4.07 BITUMINOUS TRAIL/PATHWAY

Bituminous trail/pathway shall be paved in such a way to minimize or eliminate cold joints, which may require milling or other means deemed necessary by the Engineer, when abutting existing infrastructure or other trails. Trail intersections shall be constructed with 20’ radii or as approved by the Engineer. This shall be done at no extra expense to the City. Trails shall be constructed in accordance with Standard Detail Plate 5216.

4.08 ELECTRIC LIGHTING SYSTEMS (STREET LIGHTING)

A. General

The street lighting system shall comprise all of the work shown on the respective plan and detail sheets for the system, complete, in place and in operation, all in accordance with the current Minnesota Department of Transportation “Standard Specifications and for Construction” except as shown and noted in the drawings and modified in these specifications.

The distribution circuits of the lighting system shall consist of two conductors. The two conductors shall constitute 240 volt circuits. Lighting circuits shall be installed complete to each standard.

All circuit wires including runs between light poles and street crossings shall be placed in conduit. Splice boxes or handholes shall be installed at all street crossings that serve an opposite side light pole.

Power supply to the lighting system is unmetered 120/240 volt, single phase, alternating current.

B. Permits and Inspections

Obtain and pay for all permits and inspections required for the electrical work, arrange for inspections to be performed and furnish a Certificate of Final Inspection and approval by enforcement authorities.

C. Standards

The following industry standards are considered minimum requirements:

1. Standard rules and regulations of the Institute of Electrical and Electronic Engineers.
2. Rules and regulations of the National Fire Protection Association - NFPA No. 70.
3. National Electrical Manufacturers Association Standards.
4. American National Standards Institute.
5. National Electrical Safety Code.
6. Minnesota Department of Transportation Standard Specifications for Construction
7. Other Industry Standard Listings per MnDOT 2545.2.

D. Codes, Ordinances and Regulations

The National Electric Code, together with applicable state and city ordinances or regulations, shall be considered as establishing minimum requirements for the work.

Ascertain the existence of, and comply with, any interpretations and/or enforcement policies of the local enforcement agencies or individuals peculiar to this area or to this particular installation.

Where these specifications call for materials or construction of better quality or larger size than required by the above rules and regulations, the provisions of the specifications shall take precedence.

E. Conduit

All rigid steel conduits (R.S.C.) shall meet the requirements of MnDOT 3801. Rigid Steel Conduit (R.S.C.) shall be installed at all roadway crossings as shown in the Plans. The RSC shall be installed by auguring or jacking methods and not by open trenching across the roadways. When auguring or boring operations through a roadbed are abandoned for any reason, the resultant voids shall be grouted to the satisfaction of the Engineer.

F. Conductors

1. Pole Wire - The pole wire from the in-line fuse connector and the distribution cables to the luminaries and photo cell wires shall be No. 12 AWG copper wires type R.H.W., T.H.W., or X.H.H.W. rated 600 volts.
2. Branch Circuit Conductors - The branch circuit conductors and feeder wires, shall by type T.H.W.N., or T.H.W., or type X.H.H.W. copper rated 600 volts.

G. Fuses

Light standards in the 240 volt system shall include in-line fuse holders with fuses (3 amps) in the phase conductors to the luminaire ballast. Breakaway fuse holders shall be installed at the handhole of the light standards.

H. Grounding

System shall be solidly grounded throughout. Lighting standards, lighting service cabinet, ground rods and any exposed metal system components shall be solidly bonded to the system equipment ground conductor with accessible mechanical approved grounding connectors. Ground rods shall be 5/8" x 15' for lighting service cabinet and 5/8" x 10' for lighting standards and shall be copperweld type.

I. Feed Point

Power will be supplied to the system from utility owned pole or pad mounted transformer. Make all provisions and arrangements for service as required by the respective utility agency.

Lighting service cabinet shall be pad mounted type T1 in accordance with MnDOT Standard Plate No. 8140A. Enclosure shall be a NEMA 3 rated minimum 12 gauge steel cabinet with gasketed full hinged doors and padlock hasps. Suitable galvanized steel anchor bolts with double nuts to be provided for concrete foundation mounting. Inside of cabinet shall be finished with white enamel on suitably prepared surface.

Service cabinet equipment, as applicable, shall be as specified below, or equal.

Lightning Arresters	McGraw Edison Type L
Panelboard	Square D NQOB
Circuit Breakers	Square D Q1B & Q0
Contactors	Allen Bradley Bulletin 500L
Selector Switch	Allen Bradley Bulletin 800H

Lighting service cabinet concrete foundation shall be provided in accordance with City of Chanhassen's Standard Plate No. 5243.

The contractor shall furnish and install 2" R.S.C. stubouts from the lighting service cabinet through the foundation. One 2" R.S.C. shall be provided for the lighting service cabinet to the utility transformer and two conduits (2" R.S.C.) shall be provided for the lighting circuits. One 2" R.S.C. shall be provided as a spare.

J. Lighting Equipment

Lighting equipment shall be as described herein. Each lighting unit shall be complete as described with luminaire, standard or supports, auxiliaries, internal wiring, mounted accessories, etc. All equipment shall be UL labeled.

Luminaries shall be of weather proof construction. LED lamps shall be in accordance to detail plate no. 5240 and operable to -20 degrees F. All internal parts of luminaire shall be readily accessible.

Lighting standards shall be as individually described hereinafter. Concrete shall be Mix No. 3G52 and shall cure 28 days before placing lighting equipment. Anchor bolt assemblies shall be provided by the lighting standard manufacturer.

K. Lighting Unit

Roadway lighting unit including foundation, standard and luminaire.

1. Foundation - Shall be constructed of 3G52 concrete as per MnDOT specifications and shall include anchor rods and anchor rod bolt pattern as per pole manufacturer's

recommendations or as modified per base detail as indicated on the drawings. Anchor rods shall be furnished by the pole manufacturer; anchor bolt assemblies shall be high strength steel with top 12” galvanized after threading, galvanized break-away couplings and galvanized double nuts.

Each foundation shall include three non-metallic conduit (N.M.C.) stubouts. The stubouts shall be 2” N.M.C. for feeders and one 3/4” N.M.C. for grounding conductor.

L. Residential Street Lighting

Street lighting in residential areas shall conform to Xcel/Minnesota Valley Electric Group V rating. Street light fixtures shall be the Xcel/Minnesota Valley Electric Traditional, Acorn, or an approved equal style.

4.09 FENCE RESTORATION (2557)

Removal and relocation or restoration of any fences disturbed shall be in accordance with the current Minnesota Department of Transportation Standard Specifications and considered incidental to the cost of the project unless otherwise specified.

4.10 PAVEMENT MARKINGS

- A.** Applications shall be in accordance with MnDOT specifications and the Minnesota Manual on Uniform Traffic Control Devices, and as supplemented or modified by Chanhassen Detail Plates. A portion of the MnDOT requirements are as follows:
1. All pavement markings shall be ground-in epoxy unless otherwise directed by the City Engineer.
 2. At the time of applying the marking material, the application area shall be free of contamination. The Contractor shall clean the roadway surface prior to the line application in a manner and to the extent required by the Engineer.
 3. Glass beads shall be applied immediately after application of the paint line.
 4. Pavement markings shall only be applied in seasonable weather when the air temperature is 50 degrees F or higher, and shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface after cleaning and before the marking material can be applied.
 5. The filling of tanks, pouring of materials or cleaning of equipment shall not be performed on unprotected pavement surfaces unless adequate provisions are made to prevent spillage of the material.
 6. No striping operations will be permitted between sundown and sunrise without written permission from the Engineer.

7. All material shall be placed in a workmanlike manner, which shall result in a clearly defined line that has been adequately reflectorized with glass beads.
8. All pavement striping shall be 4 inches wide unless designated otherwise on the plans, and skip lines shall be in lengths of 10 feet separated by gaps of 40 feet. All pavement striping shall be a minimum of 15 mils thick (wet thickness).
9. Glass beads shall be uniformly applied at a rate of 6 pounds per gallon.
10. A reduction in pay shall be made for reduced thickness and/or width. Width shall be computed by random measuring. Thickness shall be computed by the following formula:

$$\text{Thickness} = \frac{\text{Gallons} \times 231}{\text{Length} \times \text{Width}}$$

11. Application for the marking material shall be such as to provide uniform film thickness throughout the coverage area. Stripe ends shall be cleaned out and square, with a minimum of material beyond the cutoff.
12. Maintenance of traffic during pavement marking operations.

- B.** The contractor shall furnish and place, without extra compensation, all necessary warning and direction signs to maintain traffic during all pavement marking operations, and shall provide such protection to the uncured markings as may be necessary until traffic may cross them without any damage thereto. Traffic control during the striping operation shall be safe and satisfactory to the Engineer or all marking operations shall cease until traffic control meets with the Engineer's approval. Traffic control requirements may include, but are not limited to, furnishing a pilot car and/or flag persons. Traffic shall be allowed to keep moving at all times, and the striping equipment shall be operated in such a manner that will not force traffic to cross uncured markings. Protection devices such as "cones shall be of an approved typed that will not cause damage to the vehicle when accidentally struck.
- C.** Payment for pavement markings shall be paid for at the contract unit price per linear foot or as otherwise specified.

4.11 STREET SIGNS AND POSTS

- A.** Signs and installation shall be in accordance with the Minnesota Manual on Uniform Traffic Control Devices, and as supplemented or modified by Chanhassen Detail Plates.
 1. Residential Street Sign Post:

- a) Posts are to be of a modified channel design with two ribs along the back of each post as well as each toe.
- b) Post shall be fabricated from high-strength billet steel with minimum yield strength of 80,000 PSI and minimum tensile strength of 100,000 PSI.
- c) Post installation shall be composed of two 7-foot lengths. The upper section shall weigh 2.5 lbs/ft and the lower section shall weigh 3 lbs/ft before punching. The posts shall be punched with continuous 3/8-inch diameter holes on 1-inch centers for the entire length of the post. The first hole shall be 1 inch from the top.
- d) The posts shall be hot dip galvanized to ASTM-A123.

Bracket: 12” flat blade, heavy-duty bracket assembly part nos. BA8A12 & BA90F12 or approved equal by the engineer.

Signs: White lettering on dark brown background – Double-faced, DG3 Hi-intensity on .08 aluminum. White E-450 border (white around bolt). E-450 size radius corner, punch and notch for E-450. First letter of each word upper case with bottom justification. See chart below for lettering sizes. Nine inch (9”) by 36” or 42” wide plates used.

- B. Private streets signs shall be the same as above, except lettering to be white on blue background.

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height	
			Initial Upper-Case	Lower Case
Overhead	All Types	All Speed Limits	12 inches	9 inches
Post-Mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post-Mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-Mounted	2-lane	All Speed Limits	6 inches*	4.5 inches*

*On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.

- C. Supplementary lettering to indicate the types of streets (such as Street, Avenue, or Road) or the section of the city (such as NW) on the D3-1 and D3-1a signs may be in smaller lettering, composed of initial upper-case letters at least 3 inches in height and lower-case letters at least 2.25 inches in height.

4.12 PROTECTION AND RESTORATION OF VEGETATION (2572)

This work consists of protecting and preserving vegetation from damage and taking corrective action when damage occurs. Vegetation includes but is not limited to trees, brush, roots, woody vines, and perennial forbs and grasses. All work done shall conform to Section 2572 of the current MnDOT Standard Specifications.

4.13 EROSION CONTROL (2573)

The Contractor shall be solely responsible for the installation, maintenance and removal of all sediment and erosion control measures within the project areas. The Contractor shall install fabric fences, culverts, check dams, sediment traps, erosion control blanket, hydroseed, etc. and all other such appropriate procedures as may be required to prevent sedimentation or erosion as noted on the plans or as directed by the Engineer. Upon completion of the project and restoration of all disturbed areas, the City will authorize the removal of all sediment and erosion control measures. The contractor shall remove and dispose of the erosion and sediment control measures.

The BMPs shown on the plans are the minimum requirements for the anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, the contractor shall anticipate that more BMPs will be necessary to ensure erosion and sediment control on the site. BMPs must be adjusted accordingly as to not cause flooding on roadway that would impede traffic flow. During the course of construction it is the responsibility of the contractor to address any new conditions that may be created by construction activities and/or climatic events and to provide additional BMPs over and above the minimum requirements shown on the plans that may be needed to provide effective protection of soil and water resources.

4.14 TURF ESTABLISHMENT (2575)

All turf establishment shall be in accordance with Section 2575 of the current Minnesota Department of Transportation Standard Specification and the current MnDOT Seeding Manual, except as modified or altered below.

The BMPs shown on the plans are the minimum requirements for the anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, the contractor shall anticipate that more BMPs will be necessary to ensure erosion and sediment control on the site. During the course of construction it is the responsibility of the contractor to address any new conditions that may be created by construction activities and/or climatic events and to provide additional BMPs over and above the minimum requirements shown on the plans that may be needed to provide effective protection of soil and water resources.

A. Sodding

1. The Contractor shall furnish and install sod and topsoil to the areas designated by the engineer.
2. The sod shall meet the requirements of MnDOT Specification 3878. Sod shall be from vendors on the "Approved/Qualified Products List".
3. The Contractor shall use a sod cutter to make a straight line cut at full sod widths to match existing areas. Waste material shall then be removed and the area prepared to allow a depth of six inches (6") for topsoil placement.

4. The topsoil shall not be placed until the Engineer has inspected the area and approved the subgrade preparation and topsoil materials.
5. The topsoil fine grading shall not be completed more than 24 hours prior to the sod laying operation. The contractor shall be required to remove topsoil placed on unapproved areas or topsoil which does not meet Section 4.14(D) for topsoil material with such removal being done at the contractor's expense.
6. The Contractor shall not dump the topsoil on the street unless specifically approved by the engineer in the field. Topsoil dumped on the street shall not be allowed to remain overnight unless proper safety flashers are installed and approved by the Engineer in the field.
7. At all times during grading, preparation and sod laying, it shall be the Contractor's responsibility to see that all catch basins in the working area are kept clean. Gutters shall be cleaned and free of dirt and other materials at the end of each working day to ensure proper drainage.
8. Starter fertilizer, with a 1:2:1 ratio, shall be applied to all sod areas at the rate of one half (0.5) pound Nitrogen per 1,000 square feet.
9. A follow-up application of fertilizer consisting of one (1) pound Nitrogen per 1,000 square feet is required 3-4 weeks after the initial application.
10. Watering of the sod shall be the responsibility of the Contractor. Watering may occur on Sunday's if written approval is provided by the City Engineer or their designee.

B. Seeding

1. Site Preparation
 - a) Verify that areas to receive seeding are free of stones larger than 1½ inches in diameter, weeds, debris and other extraneous material. The surface shall also be free of tire ruts, rills and low spots where "bird baths" may form.
 - b) Verify that grades are within acceptable tolerances of required finished grade and that drainage will be per design.
 - c) Site shall have received six inches (6") of topsoil. Import may be required.
 - d) Apply water to areas to be seeded as necessary to bring soil to optimum soil moisture content for planting
2. Seeding shall not be done until the Engineer has inspected the area and approved the subgrade preparation and topsoil materials.

3. The Contractor shall furnish and install seed and six inches (6") of topsoil to the areas designated by the Engineer. Imported topsoil may be required.
4. Unless otherwise noted, all measurement of seed shall be in pure live seed (PLS). The following State seed mixtures and rate of application shall be used per the plan:
 - a) 25-151 at 120 PLS lbs./acre.;
 - b) 25-141 at 59 PLS lbs./acre.;
 - c) 34-262 at 145 PLS lbs./acre.;
 - d) 32-241 at 38 PLS lbs./acre.
5. The seeding shall not be done until the Engineer has inspected the area and approved the subgrade preparation and topsoil materials.
6. In the absence of soil analysis, a starter fertilizer, with a 1:2:1 ratio, shall be applied to all seeded areas at the rate of one half (0.5) pound Nitrogen per 1,000 square feet.
7. A follow-up application of fertilizer consisting of one (1) pound Nitrogen per 1,000 square feet is required 3-4 weeks after the initial application.
8. If so directed by the Engineer, the Contractor shall reseed, at his/her cost, any area on which the original seed has failed to grow.
9. Seed shall be broadcasted prior to applying mulch or other stabilization material.
10. Hydro-seeding must use a hydro-seeder capable of continuous agitation action to uniformly distribute the seed at the adjusted bulk application rate of each mixture. Add 50 pounds of Type Hydraulic Mulch per 3884, "Hydraulic Erosion Control Products," as a tracer for each 500 gallons of water in the hydro-seeder tank. Use flood type nozzles and manufacture's recommended water volume. Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour is passed the excess mixture must be discarded.
11. Hydraulic Mulch (Type 4) shall be applied in accordance with Section 2575.3 and the requirements of Section 3884 of the current Minnesota Department of Transportation Standard Specification. Areas to be mulched shall be as shown on the plans or as directed by the Engineer in the field.

- a) Mechanically spread mulch to provide a uniform distribution over all exposed soil at the application rate to provide 90 percent uniform soil coverage. If non-uniform distribution occurs, remulch areas or remove the excess coverage.
 - b) Equipment shall have a built in agitation system sufficient to agitate, suspend and homogenously mix the slurry.
 - c) Apply Type 4 mulch as a dual operation with the Type 3 mulch blown on the soil surface at 1 ½ tons per acre and immediately over-spray with stabilized fiber matrix per 3884, "Hydraulic Erosion Control Products," at 750 pounds per acre.
12. Rapid stabilization method 3 shall be used on all slopes greater than 10% and on all slopes with a positive gradient toward all impaired waters that are not to be sodded.
 13. Seeding shall not be done in excessively windy conditions (greater than 15 mph) or when soil is overly wet or frozen.
 14. Hydro-seeding shall be performed separate from placing hydraulic erosion control products (hydro-mulch).

C. Maintenance and Establishment

1. During seeding applications care shall be taken to avoid overspray onto fences, walls, other structures, other plant material, other planting areas and paved areas. The contractor shall be responsible for washing the overspray from these areas.
2. The contractor shall request that the planted areas be inspected within 24 hours of completion.
3. The work includes a grass-establishment period of 30 calendar days commencing immediately after completion and acceptance of initial stabilization.
4. If, during the establishment period, areas are lacking sufficient sod growth or seeding to assure adequate stands of acceptable vegetation, such areas shall be re-cultivated and re-sodded/reseeded within 48 hours of notification from the Engineer.
5. The establishment period, in this case, shall be continued until the work meets the specified requirements.
6. The establishment period shall include continuous operation of watering, weeding, mowing, fertilizing, spraying, insect and pest control and any other normal operation required to assure proper growth.
7. Only Rodeo™, C-2, 4-D and Accord™ shall be used within 50 feet of streams, wetlands and ponds.

8. The contractor shall manage activities onsite to minimize compaction of vegetated areas. Post project compaction shall not exceed compaction of 1,400 kilopascals (kPa) / 200 pounds in vegetated areas.

D. Topsoil Material

All topsoil material and its placement shall conform to Section 3877 of the current Minnesota Department of Transportation Standard Specifications except as modified or altered below,

1. The minimum amount of organic material shall be 5%
2. The minimum amount of sand shall be 15%.
3. Stripped topsoil material may be reused onsite if one or more of the following conditions apply:
 - a. Material is tested and meets the City of Chanhassen's standard specifications for topsoil. A minimum of 1 test per 500 CY is required. Additional testing requirements may be required as determined by the Engineer.
 - b. Material is approved by the Engineer.
 - c. Four inches of 60 percent sand and 40 percent compost mix is ripped into existing soil materials to a depth of ten inches on the site.

E. Street Sweeping

The Contractor shall sweep the streets following the completion of the sodding and seeding operations. All sweeping shall be completed within two (2) calendar days after completion of the sodding and seeding operation. This sweeping shall be with a pick-up power sweeper and shall continue until all loose material is completely cleaned up to the satisfaction of the Engineer. Also, all catch basins shall be cleaned within the same time requirements stated above.

F. Basis of Payment

1. Sodding. The contract price bid for the sod shall include the cost of furnishing and installing 6 inches of topsoil under the sod.
2. Water (sod). The cost shall be considered incidental to the project.
3. Roadside seeding. The contract price bid for the roadside seeding shall include the cost of furnishing and installing 6 inches of topsoil over the area to be seeded.

4.15 GEOTEXTILE STABILIZATION FABRIC

Geotextile fabric shall be used where shown on the plans, and shall be MnDOT Type 5, Amoco 2002 or Mirifi 500X or approved equivalent. The fabric shall be overlapped a minimum of two

feet (2'). The fabric in extremely bad soil conditions may need to be sewed together as directed by the engineer, and shall be paid for at an agreed upon hourly rate.

Payment for the fabric shall be in square yards in place, and excluding overlap.

4.16 SEGMENTED MASONRY RETAINING WALL UNITS (2411)

A. Part A (Dry Cast)

1. Scope

This specification covers segmental masonry units for use in the construction of mortarless walls. Locations and wall heights shall be as shown on the plans and/or as directed in the field by the Engineer.

2. Requirements

General

Each wall that exceeds four (4) feet in exposed height shall be designed and certified by a registered professional engineer of the State of Minnesota. Design shall be submitted to the Engineer for review. In addition, the Contractor shall submit the following for all wall design:

- a) Manufacturer's literature: materials description and installation instructions.
- b) Shop drawings: Retaining wall system design including wall heights, reinforcement and drainage provisions approved by a registered professional engineer.
- c) Color sample for selection by owner.
- d) A one (1) foot square piece of geotextile reinforcing as required by the Engineer.

Materials

Each manufacturing facility shall provide the Engineer with a copy of their quality control plan and procedures, including testing rates and material sources. Each manufacturing facility shall also supply test reports and documentation to verify compliance with this specification.

The units shall conform to ASTM C1372, except that:

a) The minimum compressive strength requirements shall be 38 Mpa (**5500 psi**) for any individual unit and 40Mpa (**5800 psi**) for the average of 3 units.

b) The freeze/thaw durability of wall units tested in accordance with ASTM C 1262 in a 3% saline solution shall be the minimum of the following:

- (1) The weight loss of each of five test specimens at the conclusion of 90 cycles shall not exceed 1% of its initial weight; or:
- (2) The weight loss of 4 out of 5 test specimens at the conclusion of 100 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen to not exceed 10%.
- (3) The freeze/thaw durability of cap units test tested in accordance with ASTM C 1262 in a 3% saline solution shall be the minimum of the following:
 - (i) The weight loss of each of 5 test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight; or:
 - (ii) The weight loss of 4 out of 5 test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen to not exceed 10%.
- (4) Cap units must meet the requirements of (a) and (c) and have a top surface sloped at minimum of 1 mm fall per 10 mm run (**1 inch fall per 10 inches run**) front to back or be crowned at the center.
- (5) ASTM C 1262 test results shall be recorded and reported in 10 cycle intervals.

Note: It is the intention of this testing that 100% of the wall units and cap units meet the weight loss requirements for (2i) and (3i) respectively, or the a minimum of 80% of the wall units and cap units tested meet the weight loss requirements for (2ii) and (3ii) respectively. If a manufacturer chooses to increase the sample size tested beyond the 5 units required for each block type, these percentages will still apply to the sample size chosen (i.e. if a sample size of 7 blocks is tested a minimum of 6 must meet the weight loss requirement of (2ii) and (3ii), if a sample size of 10 blocks is tested a minimum of 8 must meet the weight loss requirement).

3. Sampling and Testing

Shall conform to ASTM C 140, except that:

Section 6.2.4 shall be selected and replaced with: “The specimens shall be coupons cut from a finished side or back shell of each unit and sawn to remove any face shell projections. The coupon size shall have a height to thickness ratio of 2 to 1 before capping and a length to thickness ratio of 4 to 1. The coupon shall be cut from the unit

such that the coupon height dimensions are in the same direction as the unit height dimension. Compressive testing of full size units will not be permitted. The compressive strength of the coupon shall be assumed to represent the net area compressive strength of the whole unit”.

Cap units and wall units shall be sampled and tested as separate block types.

Each manufacturing facility is required to sample and test each block type at the rate of one set of samples per 5000 units of continuous production or fraction thereof (if production is interrupted) as part of their overall quality control testing. Each 5000 units of continuous production (or fraction thereof) shall constitute a lot.

Example: If 12,000 wall units are produced in a continuous production run, this would constitute 3 lots and 3 sets of samples would be required. If 6000 units are produced in each of two production runs (12,000 total) then 2 sets of samples would be required from each separate production run or lot (4 sets of samples total).

Minimum manufacturing testing shall include a minimum of 5 randomly selected units from each lot and the following testing on each set of samples:

- a) Compressive strength (average of 3 units)
- b) Freeze-thaw durability (average of 5 units)

Test results from each lot of production shall be provided to the Engineer within 30 days of the completion of testing and prior to the incorporation of any material into a project. The test report will clearly state the production lot number represented by the test results. This lot number shall correspond with the lot number supplied with the block on the certificate of compliance as outlined in section 4 below.

4. Acceptance and Use

All block manufacturers complying with the requirements of Sections 1, 2 and 3 above shall submit test results supporting this compliance to the Engineer. An approved products list on file in the MnDOT Foundations Unit and can be viewed on the MnDOT website at: <http://www.dot.state.mn.us/materials/foundations.html>.

Block types and manufacturing facilities not on this list shall not be allowed for use.

All block submitted for use on MnDOT or Federal-Aid projects shall be accompanied by a certificate of compliance attached to each pallet of block (MnDOT specification 1603). The certificate of compliance shall include the name and address of the manufacturing facility, date of manufacture and lot number, in addition to all other required information.

5. Method of Measure

Measurement will be made by the square foot for the area of the wall face above and below finished grade furnished and installed as specified.

6. Basis of Payment

Payment will be made under unit (Modular Block Retaining Wall). Payment will include all labor and materials required to completely construct the wall including, but not limited to, backfill, drainage system components, geo-grid (as required), stain, sealer and aggregate base material. Common Excavation for the wall will be paid under a separate line item.

4.17 MINOR CONCRETE STRUCTURES

B. Part B (Wet Cast)

1. Description

This work shall consist of the construction of a modular block retaining wall where shown on the plans. Locations and wall heights shall be as shown on the Plans and/or directed in the field by the Engineer. Wall design shall include aggregate foundation, drainage rock, geo-grid tiebacks (as required), subdrainage system, staining, sealant and all other materials necessary to construct the wall.

a) Concrete

- Concrete shall be 3F52 (Mn/DOT Certified Mix) and have a minimum 29 day compressive strength requirement of 4,000 psi for any individual load bearing unit.
- Concrete blocks shall be wet cast and shall be 6% air entrained by volume.
- Blocks shall be a minimum of 16" high, 48" wide and 24" deep.
- Exterior face pattern shall be limestone textured rockface as approved equal. Apply per manufacturer's recommendations.

b) Sealant

After construction of the wall, apply TK-290 sealant as manufactured by TK products Minnetonka, MN 800-441-2129 or approved equal. Apply per manufacturer's recommendations.

c) Staining

Wall face shall be stained to wall manufactures recommendations after sealant is applied.

2. Construction Requirements

a) General

The wall system shall be constructed in accordance with the manufacturer's recommendations upon review of the design methodology by the Engineer.

b) Manufacturer

Modular Block Retaining Wall shall be RECON Wall Systems Inc. (952-922-0027) or approved equal.

c) Submittals

Each wall that exceeds two (2) feet in exposed height shall be designed and certified by a registered professional Engineer of the State of Minnesota. Design shall be submitted to the City Engineer for review. In addition, the Contractor shall submit the following for all wall design:

- (1) Manufacturer's Literature: Materials description and installation instructions.
- (2) Shop Drawings: Retaining wall system design including wall heights, reinforcement, and drainage provisions approved by a Registered Professional Engineer.
- (3) Color sample for selection by Owner.
- (4) A one (1) foot square piece of geotextile fabric reinforcing as required by the Engineer.

d) Delivery, Storage and Handling

Contractor shall check the materials upon delivery to assure that proper materials have been received and then protect the materials from damage. Contractor shall prevent excessive mud, wet cement, epoxy and like materials, which may affix to the materials, from coming in contact with the materials. No damaged materials may be used on the project.

e) Footing Construction

Shall be as recommended by the manufacturer. Over excavated areas shall be filled with select granular backfill material and compacted to 95% standard proctor density. Base material shall be compacted so as to provide a level hard surface on which to place the first course of units. Compaction shall be with mechanical plate compactors with density obtained by the Ordinary Compaction Method.

f) Wall Construction

First course of block shall be placed on the prepared base and then checked for level, alignment, and full contact with the base. Units shall be placed end to end for the full length of the wall alignment. The alignment shall be set by using a string line or offset from a base line.

g) Backfill and Compaction

Shall be in accordance with the manufacturer's recommendations and commence immediately after placement of the first course.

3. Method of Measure

Measurement will be made by the square foot for the area of the wall face above and below finished grade furnished and installed as specified.

4. Basis of Payment

Payment will be made under the unit price (Modular Block Retaining Wall). Payment will include all labor and materials required to completely construct the wall including, but not limited to, backfill, drainage system components, geo-grid (as required), stain, sealer and aggregate base material. Common Excavation for the wall will be paid under a separate line item.

4.18 SEGMENTAL MASONRY RETAINING WALL SURFACE SEALING

C. Part C (Surface Sealing)

1. All segmental masonry retaining walls shall have their surfaces sealed.

Segmental masonry retaining wall surface sealing shall consist of preparation, furnishing and applying the surface sealer to the top, exposed front face, and backside of the upper three courses of all walls.

Surface sealers shall meet requirements on file in the MnDOT Concrete Engineering Unit. The list may also be viewed on the MnDOT website at:
www.dot.state.mn.us/products/concrete/index.html.

Due to the potentially hazardous ingredients contained in sealer formulations extreme care must be exercised in their handling and use, and the manufacturer's recommendations shall be closely followed.

2. Construction Requirements

- a) The Contractor shall comply with the manufacturer's written instructions for preparing, handling and applying the surface sealer.
- b) The surface to be treated shall receive a light-blast to the extent that the surface is clean and free of oils.
- c) Before the surface sealer is applied the surface to be sealed shall be dry and free of all dust, debris and frost.
- d) Surface sealers shall be applied at the heaviest applications rate specified by the manufacturer.

All materials and work performed as specified above will be incidental to the construction of the wall.

4.19 PEDESTRIAN CURB RAMPS

Pedestrian curb ramps shall be constructed in accordance with MnDOT Standard Plate No. 5-297.250. Detectable warnings shall be Neenah R-4984 or approved equal by the Engineer.

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WATER MAIN SPECIFICATIONS

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SECTION 1.00 - SCOPE

1.01 GENERAL

It is the intent of these detailed specification requirements to provide the requirements for water main construction in the City of Chanhassen, Minnesota.

1.02 WORK INCLUDED

The contractor shall, unless specified otherwise, furnish all material, equipment, tools and labor necessary to do the work required under his/her contract and unload, haul and distribute all pipe, castings, fittings, valves, hydrants, and accessories. The contractor shall also remove any street surfacing as required; excavate the trenches and pits to the required dimensions; construct and maintain all bridges for traffic control; sheet, brace and support the adjoining ground or structures where necessary; handle all drainage or ground water; provide barricades, guards and warning lights; lay and test the pipe, castings, fittings, valves, hydrants, and accessories, backfill and consolidate the trenches and pits; maintain the street or other surface over the trench until surface restoration; restore the roadway surface unless otherwise stipulated; remove surplus excavated material; and clean the site of the work.

The contractor shall also furnish all equipment, tools, labor and materials required to rearrange sewers, conduits, ducts, pipes or other structures encountered in the installation of the work. All the above work to completely construct the water main facilities shall be done in strict accordance with the project's contract documents to which these specifications are a part thereof.

1.03 LOCATION OF THE WORK

The location of this work is as shown on the plans.

1.04 COORDINATION OF WORK

The contractor shall be responsible for the satisfactory coordination of the construction of the water main facilities with other construction and activities in the area affected. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties.

1.05 WORKING HOURS

Refer to Section 7.02 of the General Conditions. The Contractor shall provide a minimum of 48-hour notice to the Public Works Department for planned water main shutdowns. These shutdowns may only occur between the hours 9 A.M. – 3 P.M., unless otherwise approved by the City Engineer, and shall be planned by the Contractor in a manner such to minimize the impact to surrounding users to the maximum extent practicable. For City led projects, the Contractor shall assist the city in notifying impacted users of the planned shutdown.

1.06 REFERENCE REQUIREMENTS

In the specification requirements, reference is made to "MnDOT Specifications" which shall mean the "Standard Specifications for Highway Construction" of the Minnesota Department of Transportation, the most current edition and all subsequent amendments, and City Engineers Association "Standard Utilities Specifications" for Water Main and Service Line Installation and Sanitary Sewer and Storm Sewer Installation, the most current edition, and all subsequent amendments shall apply. If any portion of the City's Specifications are in conflict with the MnDOT Specifications, the City's Specification shall control.

SECTION 2.00 - MATERIALS

2.01 GENERAL

The materials used in this work shall be all new, and conform to the requirements for class, kind, size and materials as specified below. All materials permanently incorporated in the work shall be domestically manufactured in the U.S.A. The contractor shall submit in writing a list of materials showing the manufacturer designation of all materials. The City may review the Contractor's supporting documentation to verify compliance that all materials are domestically manufactured in the U.S.A. The burden of proof to meet this requirement rest with the Contractor. If the supporting documentation does not demonstrate to the City that he materials were produced in the United States, then the materials will be considered unauthorized Work and must be removed and replaced according to MnDOT Specification 1512.2, "Unauthorized Work". Only one manufacturer shall be approved for each material used. This list must be approved by the Engineer.

All materials will be certified lead free with the NSF-372 and NSF/ANSI 61.

2.02 DUCTILE IRON FITTINGS

Ductile iron fittings shall have mechanical joints and shall be Class 350 for sizes up to and including twelve inches (12") in diameter and shall conform to A.W.W.A. Specification C153, covering compact fittings. Ductile iron fittings shall be paid per ductile iron body weights.

Mechanical joints shall conform to A.W.W.A. Specification C111, latest revision, with gaskets. Gaskets shall be made from vulcanized crude rubber compound. All surfaces shall be smooth, free from imperfections and free from porosity. No "uni-flange", set-screw type restraints, or plain end fittings are to be used. Conductivity straps shall be installed in accordance with the manufacturer's recommendations.

All fittings shall be epoxy coated and furnished with either 304 stainless or NSS Cor-Blue nuts and bolts.

2.03 DUCTILE IRON PIPE (DIP)

Ductile iron pipe shall be designed for a minimum working pressure of 150 pounds per square inch and shall conform to the applicable dimensions and tolerances of A.W.W.A. Specification C151, latest revision, for ductile iron pipe.

Fittings shall be ductile iron and shall meet the requirements as specified in Section 2.02.

All ductile iron pipe shall be cement lined and the maximum deflection of the pipe shall not exceed 2% of the pipe diameter to prevent cracking of the lining.

Weighing scales may be required, as specified in Section 2.02, to verify weight of pipe.

Nominal thickness of wall for ductile iron pipe shall be as follows:

<u>Size</u>	<u>Class Pipe</u>	<u>Thickness Inches</u>
6"	Class 52	0.31
8"	Class 52	0.31
10"	Class 52	0.35
12"	Class 52	0.37
14"	Class 51	0.36
16"	Class 51	0.37
18"	Class 51	0.38
20"	Class 51	0.39
24"	Class 51	0.41
30"	Class 51	0.43
36"	Class 51	0.48
42"	Class 51	0.53

Pipe walls shall be of a thickness to support 2½ full threads for the size of service necessary of Standard Corporation stop threads as specified by A.W.W.A. C800. A service saddle shall be used on all mains.

All ductile iron pipe shall be marked "DUCTILE IRON" in large letters. The nominal wall thickness shall be plainly marked on each piece of pipe.

- A. Plastic Film Wrap.** An approved plastic film wrap for protection of ductile iron pipe shall be provided at all locations. The wrap shall be the "tube" type having 8-mil thickness. A two (2) inch wide polyethylene adhesive tape shall be used to secure the tube of film to the pipe. The unit bid price per lineal foot shall include the cost of furnishing and installing the plastic wrap and shall be compensation in full regardless of the size of the pipe to be protected.

2.04 POLYVINYL CHLORIDE PIPE (PVC)

Polyvinyl chloride (PVC) pressure pipe for water main shall conform to A.W.W.A. C900 and shall be installed per Section 2.04, Polyvinyl Chloride Pipe, of the Watermain Specifications which is included as part of this Standard Specification. All pipe shall have a minimum dimension ratio (DR) of 18 corresponding to a working pressure of 200 PSI for PVC type 1120 pipe. The pipe shall be manufactured to ductile iron outside dimensions in accordance with A.W.W.A. C900.

- A. Rubber Gasket Joints.** Joint restraint for C900 PVC pipe and fitting systems shall be determined by the Engineer. Such a system shall be rated by the manufacturer to pressures that meet or exceed the rating of the C900 PVC pipe being restrained (e.g. DR 18 is rated for service at 235 psi). No degradation of the pipe's performance is allowed.

The pipe bell shall consist of an integral wall section with a factory-installed Rieber gasket. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of A.W.W.A. C900. Gasket material shall be SBR or approved equal. Installation shall be in accordance with ANSI/AWWA C605 and the restraint manufacturers recommendations. Joints shall be kept clean and properly lubricated prior to installation.

B. Fittings.

Fittings shall be epoxy coated ductile iron, having a minimum working pressure rating of 200 PSI and shall conform to the requirements of A.W.W.A. C110 (ANSI A21.10) or A.W.W.A. C153 (ANSI 21.53) Ductile Iron Compact Fittings. Valves, tees, crosses, hydrant barrels or any other ductile iron fitting shall be wrapped with a flat sheet or split length polyethylene tube by passing the sheet under the appurtenance and bringing it up around the body. Make seams by bringing the edges of the polyethylene sheet together, folding over twice and taping down. All buried nuts and bolts shall be Cor-Blue or 304 stainless.

C. Service Saddles.

All service saddles shall be constructed of stainless steel installed as per Section 2.14.

D. Pipe Bedding Material.

Pipe bedding material shall be in accordance with Section 7.02 of the Sanitary Sewer Specifications and shall be installed as per Standard Plate No. 2203 of these specifications. Pipe bedding material shall be considered incidental to the pipe installation.

2.05 TRACE WIRE

All requirements for trace wire materials, installation and testing in the City of Chanhassen, Minnesota shall be in accordance with the most recent edition of the City of Chanhassen's Sewer & Water Trace Wire Specifications.

2.06 RESILIENT WEDGE GATE VALVES

Gate vales shall be Clow, Mueller or approved equal. Gate valves shall be resilient wedge type, manufactured to meet all applicable requirements of A.W.W.A. Standard for Resilient Sealed Gate Valves C509 or C515. Valves shall have non-rising stems, opening in a counterclockwise direction. Valves shall be furnished with all exterior solid 304 stainless steel nuts and bolts and a bronze operating nut 2" A.W.W.A. square. **Do not install riser rods.**

Valves shall have full epoxy coating on the inside with full epoxy coating on the exterior of valve, or approved equal, and a 10-year warranty. Payment shall be at the bid unit price stated on the proposal and shall include all miscellaneous items associated with the work.

2.07 BUTTERFLY VALVES

All new mainline valves shall meet the requirements of Section 2.06 Resilient Wedge Gate Valves. Butterfly valves may only be installed at the approval of the City Engineer.

2.08 VALVE BOXES

Valve boxes shall be cast iron of the three piece type suitable for a depth of 7½ feet of cover over the top of the pipe or to a depth as shown on the plans. Boxes shall be 5¼" diameter, bases may be round or oval and length adjustment shall be screw type. Valve boxes shall be Tyler 6860 G, Mueller H10361 or Bibby-Ste.-Croix or approved equal as shown on City Standard Plate No. 1006. **Do not install riser rods.**

Drop covers on valve boxes shall bear the word "water" on the top.

2.09 VALVE BOX ADAPTERS

Valve box adapters shall be installed on all gate valves as manufactured by Adapter, Inc. or approved equal. Payment for said adapters shall be considered incidental to the price of gate valves.

2.10 HYDRANTS

Fire hydrants purchased or installed shall meet or exceed all applicable requirements and tests of ANSI and the latest revisions of AWWA Standard C502. Fire hydrants shall meet all test requirements and be listed by Underwriters Laboratories Inc. Fire hydrants shall meet all test requirements and have full approval of Factory Mutual. Fire hydrants shall meet the following requirements.

Fire hydrants shall be rated for a working pressure of 250 psi. (1825 kPa).

Fire hydrants shall be of the compression type, opening against the pressure and closing with the pressure.

Fire hydrants shall have a minimum 5¼" main valve opening and a minimum inside lower/upper barrel diameter (I.D.) of 7" to assure maximum flow performance. Pressure loss at 1,000 GPM shall not exceed the following value.

4½" Pumper Nozzle: 2.50 psi

Fire hydrants shall be three-way in design, having one 4½" pumper nozzle and two 2½" hose nozzle(s). Nozzle thread type shall be national standard fire coupling screw threads. Nozzles shall thread counterclockwise into hydrant barrel utilizing "o" ring seals. A suitable nozzle lock shall be in place to prevent inadvertent nozzle removal.

The operating nut shall be a one-piece or two-piece design, manufactured of ASTM B-584 bronze. It shall be national standard pentagon in shape and the nut dimensions shall be measuring 1½" from point to flat.

The direction of the opening shall be counter-clockwise and an arrow shall be cast on the hydrant to indicate the specified opening direction.

Hydrants shall be a "traffic-model" having upper and lower barrels joined at the ground line by a separate and breakable flange providing 360° rotation of upper barrel for proper nozzle facing. This flange shall employ not less than four bolts. The safety flange segments shall be located under the upper barrel flange to prevent the segments from falling into the lower barrel when the hydrant is struck. The pressure seal between the barrels shall provide not less than 24" of clearance from the centerline of the lowest nozzle to the ground.

The operating stem shall consist of two pieces not less than 1¼" diameter (excluding threaded or machined areas) and shall be connected by a stainless steel safety coupling. Screws, pins, bolts, or fasteners used in conjunction with the stem couplings shall also be stainless steel.

The lower barrel shall be an integrally cast unit. The use of threaded on or mechanically attached flanges is deemed unacceptable. The hydrant bury depth shall be a minimum of 7.5' of cover over the hydrant service.

All buried bolts and nuts shall have composition, dimensions, and threading in accordance with the latest revision of ANSI/AWWA Standard C111/A21.11. **All buried bolts and hex nuts shall be 304 stainless steel, NSS Cor-Blue, or an approved equal.**

Composition of the main valve shall be molded rubber having a durometer hardness of 95 +/- 5 and shall be reversible in design to provide a spare in place. Plastic (polyurethane) main valves are unacceptable. The main valve shall have a cross section not less than 3/4".

Hydrants shall be equipped with two (2) drain valves that drain the barrel when the hydrant is closed and seal shut when the hydrant is opened. These drain valves shall be an integral part of the one piece bronze upper valve plate. They shall operate without the use of springs, toggles, levers or other intricate synchronizing mechanisms.

The upper valve place, seat ring and drain ring (shee bushing) must be ASTM B-584 bronze and work in conjunction to form an all bronze drain way. A minimum of one (1) internal and two (2) external drain openings are required. Drains ported through an iron shoe must be bronze lined.

The bronze seat ring shall thread into a bronze drain ring (or shoe bushing) providing a bronze-to-bronze connection. Seat rings shall be "o" ring pressure sealed.

The shoe inlet size and connection type shall be MJ having ample blocking pads for sturdy setting and the MJ connection must have two strapping lugs to secure the hydrant to piping. A minimum of six solid 304 stainless steel bolts and nuts are required to fasten the shoe to the lower barrel.

The interior of the shoe including the lower valve plate and stem cap nut shall have a protection coating that meets the requirements of AWWA C-550. If a stem cap nut is utilized, a stainless steel lock washer or similar non-corrosive device that will prevent the cap nut from backing off during normal use must lock it in place.

Hydrants shall be warranted by the manufacturer against defects in materials or workmanship for a period of ten years (10) from the date of manufacture. The manufacturing facility for the hydrant must have current ISO certification.

Hydrants shall be Clow Medallion, Mueller Super Centurion, or Waterous Pacer.

All painted surfaces shall be warranted for a period of two years from the time the City accepts the public utility improvements. In the event the hydrant paint is not in satisfactory condition at the end of the warranty period, the entire hydrant shall be prepared (scraping, sanding) and repainted in accordance with the manufacturer's specifications.

Any hydrant that is extended 6" or more shall be supplied with an extra-heavy operating rod from the base to top of hydrant. All operating rods shall be original equipment from the manufacturer.

All hydrant installations shall include a location marker as shown on Detail Plate No. 1004. **Immediately after installing or relocating a fire hydrant, it must be securely covered by the contractor with a plastic bag to indicate it is "out of service".** The plastic bag may only be removed for testing purposes by a city representative.

Upon approval of all testing (hydro, bacteria, flush and conductivity) and city acceptance, the Chanhassen Utility Department will open the gate valve, remove the plastic bag and flush the hydrant.

****PLEASE NOTE:** The Utility Department requires a 48-hour advance notice to schedule turning on or off water lines.

2.11 CORPORATION STOPS

Corporation stops shall be installed using a snug fitting smooth jaw wrench and as per manufacturer's recommendations. Corporation stops shall be quick compression-type fittings and shall be one of the following, or approved equal:

Mueller B-25005N; or
Ford FB-1001-4Q-NL; or
AY McDonald 74701B-3Q

2.12 CURB STOP AND BOX

Curb stop valves shall be of the compression-type fitting and shall be one of the following and specifically for the use with copper inlet and outlet service pipe (without a set screw):

Mueller B-25152N or approved equal; or
AY McDonald 76104-3Q or approved equal; or
Ford B66-444M-Q-NL with quick joint option, or approved equal.

All curb stop valves shall be threaded and conform to the Minneapolis Pattern. Curb stop fittings shall be tightened with a snug fitting smooth jaw wrench and as per manufacturer's recommendations. **Do not install riser rods.**

Curb box shall be Mueller H-10300, McDonald 5614 or equal, which can be extended from 72" to 84" high and shall conform to the Minneapolis Pattern.

Where curb boxes are placed in paved or concrete areas, a curb box cover and frame shall be installed (McDonald 74 Series Standard "A" or approved equal).

2.13 WATER SERVICE TUBING

Plastic water service tubing shall yield standard hydrostatic pressure ratings of 200 psi minimum, be manufactured in the United States of America, and shall comply with the following:

<u>Polyethylene Pipe (PE/HDPE)</u>	
ASTM Specification	D3350
AWWA Specification	C901

<u>Cross-linked Polyethylene (PEX)</u>	
ASTM Specification	F876, F877
AWWA Specification	C904

One-inch (1") seamless SIDR7 (I.P.S.) diameter lines shall be of minimum size for all water service, except where specified by City of Chanhassen in high-pressure water areas or where there are other unusual circumstances.

2.14 SERVICE SADDLES

All service saddles will be made of stainless steel and tightened to manufacturer's specifications, and verified with a torque wrench.

Service saddles shall be Smith Blair 372, or approved equal.

2.15 RESERVED

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2.16 MECHANICAL JOINT RESTRAINTS

Mechanical joint restraints shall be manufactured of ductile iron conforming to ASTM A 536-80 with ductile iron restraining devices heat treated to a minimum hardness of 370 GHN.

Thrust Restraint Criteria:

- A. Megalug, or approved equal, joint restraining glands are required at pipe joints.
- B. Restrained joints shall be determined by the Engineer of Record as required to meet the most recent AWWA Standards.
- C. For special cases not covered by the standard plate design of thrust restraint, the construction shall be in accordance with *Thrust Restraint Design for Ductile Iron Pipe*, Ductile Iron Pipe Research Association (1989). A working pressure of 250 psi (1725 kPa), shall be used for design calculation.

The mechanical joint restraint shall have a working pressure of at least 250 psi and shall be MegaLug Series 1100 manufactured by EBAA IRON, INC. or approved equal. Restraints for C900 PVC shall be Ebba IRON Mega-Lug Series 2000 PV or approved equal.

2.17 ELECTRICAL CONDUCTIVITY MATERIALS

All joints on ductile iron pipe and fittings shall be connected with an electrical conducting copper strap, clips or cable designed and tested to withstand 400 amps.

2.18 AIR RELIEF MANHOLES

Air relief manholes shall be constructed using pre-cast sections conforming to ASTM Specification C478 according to the standard plate.

The standard manhole casting shall be as shown on the Standard Detail Plate Nos. 1008 and 2111.

Watermain to be installed in manhole shall have booted connections through manhole walls.

Lettering on the manhole castings shall be as shown on the standard plate.

All castings shall conform to the requirements and dimensions shown on the drawings. All covers must fit closely in the rings in any and all positions and, when placed in the rings, must fit the ring solidly in all positions so that there will be no rocking from pressure applied on any point of the cover.

2.19 AIR RELIEF VALVES

Automatic air relief valves shall be Val-Matic Model 101S Water Air/Vacuum Valves or approved equal.

The valve shall be furnished with a 1" inlet, a 1" stainless shut-off (ball valve), and all other accessories needed as per Standard Detail Plate No. 1008.

An operating and maintenance instruction manual shall be included with the valve.

2.20 CONCRETE

Concrete to be used shall be composed of a mixture of fine and coarse aggregate and a Portland Hydraulic Cement conforming to the ASTM Specification designation C-150, Type 3, with the proper water-cement ratio to obtain a compressive strength not less than 3,000 pounds per square inch in 28 days. The fine aggregate for concrete shall be composed of a clean washed sand of hard, sharp, durable particles. Coarse aggregate for concrete shall be composed of a gravel uniformly graded three-fourth inch (3/4") maximum size to #4 sieve. Coarse aggregate shall be composed of hard durable particles free of shale, chert, flat or elongated pieces. Fine and coarse aggregate shall conform to the A.S.T.M. Specification for Concrete Aggregates, Designation C-33. Mixing water shall be suitable for drinking purposes, containing no acids, alkalis, oils or other deleterious materials. Concrete shall be mixed in a mechanically operated mixer so controlled that the drum shall operate a minute and one-half after all materials including water are in the drum. Concrete mixtures shall conform to MnDOT Specification 2461. The slump shall not exceed four inches (4") plus or minus one inch (1").

2.21 SOIL MATERIALS

A. Normal "Fill Material"

Is defined under the backfilling Section No. 9.05

B. Crushed Rock

The material shall consist of durable crushed quarry rock of which 100% passes a 2" sieve and of which 95% is retained on a #4 sieve size. It shall not contain soil overburden, sod, roots, plants, and other organic matter, or any other materials considered objectionable by the engineer.

2.22 INSULATION

Sheet insulation shall be a total of four-inches thick, four-foot wide Direct Bury insulation. Sheets shall be centered on the pipe and installed above or below the pipe in accordance with typical Detail Plate No. 2204.

Sheet insulation shall be extruded rigid board material having a thermal conductivity of 0.23 BTU/hour/square foot/degree Fahrenheit/per inch thickness, maximum, at 40°F mean, a comprehensive strength of thirty-five (35) psi minimum, and water absorption of one quarter percent (0.25%) by volume minimum.

Site specific requirements shall be determined by the Engineer and shall be preapproved prior to construction.

SECTION 3.00 - INSPECTION AND TESTING OF MATERIALS

3.01 SHOP INSPECTIONS AND TESTING

All materials furnished by the contractor are subject at the discretion of the engineer, to inspection and/or testing by accepted methods at the plant of the manufacturer. This inspection and/or testing is to be made at the cost of the owner. The material supplier shall provide the city with copies of test results on materials that are furnished to the contractor.

3.02 FIELD INSPECTION AND TESTING

All materials furnished by or for the contractor for incorporation into the work under contract shall, at the discretion of the engineer, be subject to inspection and/or testing by methods acceptable to the engineer.

3.03 DISPOSITION OF DEFECTIVE MATERIAL

All material found during the process of inspecting and testing to be defective, or defective material encountered at any time during the progress of the work, will be rejected by the engineer and the contractor shall promptly remove from the site all such material.

3.04 CONCRETE TEST CYLINDERS

On all types of concrete construction, up to four (4) test cylinders may be taken from each section of the structure cast in one operation. The project engineer or authorized representative shall, within four (4) days of their origin, deliver all cylinders to an approved testing laboratory. The actual cost of testing shall be paid by the owner.

SECTION 4.00 - CONTRACTOR'S RESPONSIBILITY FOR MATERIALS

4.01 MATERIAL FURNISHED BY CONTRACTOR

The contractor shall be responsible for all material furnished by him, and she shall replace at his/her own expense all such material that is found to be defective in manufacture or that has become damaged in handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work, or during the warranty period of the work.

4.02 MATERIAL FURNISHED BY THE OWNER

The contractor's responsibility for material furnished by the owner shall begin at the point of delivery by the manufacturer, or owner, and upon acceptance of the material by the contractor. The contractor shall examine all material furnished by the owner at the time and place of delivery and shall reject all defective material. The point of delivery shall be stated in the "Special Provisions".

4.03 REPLACEMENT OF DAMAGED MATERIAL

Any material furnished by the owner that becomes damaged after acceptance by the contractor shall be replaced by the contractor at his/her own expense.

4.04 RESPONSIBILITY FOR SAFE STORAGE

The contractor shall be responsible for the safe storage of material furnished by or to him, and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage and freezing.

SECTION 5.00 - MATERIAL HANDLING, ALIGNMENT AND GRADE

5.01 MATERIAL HANDLING

Pipe and other accessories shall, unless otherwise directed in the special provisions, be unloaded at the point of delivery, hauled to and distributed at the site of the project by the contractor. They shall at all times be handled with care to avoid damage. In distributing the material at the site, each piece shall be unloaded opposite or near the place where it is to be laid in the trench. Pipe shall be so handled such that the coating and lining will not be damaged. If, however, any part of the lining or coating is damaged, the repair shall be made by the contractor at his/her expense in a manner satisfactory to the engineer.

5.02 PIPE ALIGNMENT AND GRADES

All pipe shall be laid and maintained to the required lines and grades; with hydrants, valves and fittings at the required locations; and with joints centered and drawn "home"; and with all valve and hydrant stems plumb. The owner will furnish line and grade stakes necessary for the work. It shall be the contractor's responsibility to preserve these stakes from loss or displacement. The engineer may order replaced any stakes she deems necessary for the proper protection of the work. Any replacements shall be at the contractor's expense. All pipes shall be laid to the depth shown on the contract drawings. The contractor shall satisfactorily maintain the specified cover. If additional bends are required where not shown on the drawings to maintain alignment around curves, the contractor shall provide the required number and be compensated at the unit price as proposed on the bid form. The following is the maximum allowable joint deflection for the cast iron pipe.

A.W.W.A. C-600 TABLE 1 & 2 - SUMMARY

(20' Pipe Length - except as noted)
Maximum Allowable Deflections (inches)

<u>Pipe Size</u>	<u>Mechanical Joint</u>	<u>Push-on Joint</u>
4	31"*	21"
6	27"*	21"
8	20"	21"
12	22"	21"
16	15"	12"
18	12"	12"
20	12"	12"
24	10"	12"
30	10"	8"
36	9"	8"
42	8"	8"
48	8"	8"

*18' length

5.03 DEVIATION WITH ENGINEER'S CONSENT

No deviation shall be made from the required line or grade except with the written consent of the Engineer.

5.04 DEVIATIONS OCCASIONED BY OTHER UTILITY STRUCTURES

Wherever existing utility structures or branch connections leading to main sewers or to main drains or other conduits, ducts, pipe or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated or reconstructed by the contractor through cooperation with the owner of the utility, structure or obstruction involved. In those instances where their relocation or reconstruction is impracticable, a deviation from the grade will be ordered and the change shall be made in the manner directed with extra compensation allowed therefore at unit prices, if applicable.

SECTION 6.00 – DIRECTIONAL BORE OF HIGH DENSITY POLY ETHYLENE

6.01 GENERAL

This section covers the directional bore of High Density Poly Ethylene pipe (HDPE). The HDPE pipe shall be designed, furnished, and installed complete with all fittings, jointing materials, anchors, blocking, encasement, and other necessary appurtenances. All materials and equipment used in the drilling systems shall be of high quality and generally accepted in the industry. The services furnished by the contractor shall be performed in accordance with standard HDD industry practice and these documents and shall include all labor, equipment, and consumables necessary to accomplish the following tasks:

- Clearing, grading, and general site/access preparation necessary for construction operations.
- Transportation of all equipment, labor, materials, and consumables to and from the jobsite.
- Erection of horizontal drilling equipment at the rig site indicated on the drawings.
- Drilling of a pilot hole to a diameter suitable for installation of the prefabricated pull section.
- Reaming the pilot hole along the path indicated on the drawings.
- Prefabrication of the pull section including thermal butt fusion of the individual HDPE pipes in accordance with the applicable specification.
- Installation of the prefabricated pull section in the reamed hole.
- Fusion of HDPE fittings to the ends of each individual HDPE pipe following installation of the pull section.
- Pre-installation and post-installation hydrostatic testing of each individual HDPE pipe in accordance with the applicable specification.
- Clean-up and restoration of all work areas.

6.02 GOVERNING STANDARD

Except as modified or supplemented herein, all HDPE pressure pipe shall conform to the applicable requirements of ANSI/AWWA C906.

The supplementary information required in the foreword of the governing standard is as follows:

Affidavit of Compliance (Sec. 6.3)	Required
Plant Inspection (Sec. 5.9)	Not Required
Special Markings (Sec. 6.1.4)	Not Required
Special Preparation for Shipment (Sec. 6.2)	Not Required
Special Quality Assurance Testing (Sec. 5)	Required

6.03 SUBMITTALS

All procedures or material descriptions requiring the engineer's approval shall be submitted not less than 3 weeks prior to commencing any horizontal directional drilling activities. Submittals shall include but are not limited to the following:

1. Composition of drilling fluid.
2. Description of the drilling fluid solids control system (plan for minimization and disposal of excess drilling fluids).
3. Buoyancy control plan (if applicable).
4. Drilling fluid disposal plan.

6.04 PROTECTION OF UNDERGROUND FACILITIES

The contractor shall undertake the following steps prior to commencing drilling operations.

1. Contact the utility location/notification service and all other utilities not covered by this service for the construction area.
2. Positively locate and stake all existing lines, cables, or other underground facilities including exposing any facilities which are horizontally located within 10 feet of the designed drilled path.
3. Modify drilling practices and downhole assemblies to prevent damage to existing facilities.

The contractor shall be responsible for locating any and all underground facilities regardless of the engineer's previous efforts in this regard. The contractor shall be responsible for all losses and repairs to underground facilities resulting from drilling operations.

6.05 PERMITS AND APPROVALS

The Contractor shall obtain all other necessary permits and approvals. All work performed shall comply with the requirements of the permits obtained.

6.06 QUALITY ASSURANCE

- A. Qualifications.** The pipe manufacturer shall provide the services of an experienced, competent, and authorized representative to visit the site of the work to advise and consult with the contractor during joining and installation of the pipe. The manufacturer's representative shall not directly supervise the contractor's personnel, and the contractor shall remain responsible for the pipeline work.
- B. Storage and Handling.** Pipe, fittings, and accessories shall be handled in a manner that will ensure installation in sound, undamaged condition. Pipe shall not be stored uncovered in direct sunlight.

6.07 DESIGN

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6.08 MATERIALS

- A. Pipe/Fittings.** Chevron "Plexco" or Phillips "Driscopipe", ANSI/AWWA C906; material designation (ASTM D3350), PE 3408, minimum cell classification 334434C, DIPS (Ductile Iron Pipe Size) OD, SDR 11.0, with coextruded blue dual stripes.
- B. Joints.** Thermal butt fusion joints, ASTM D3261.
- C. Couplings.** No electrofusion fittings will be allowed.
- D. Connections with DIP.** Connections shall be made using fittings suitable for such purposes. Mechanical joining to the ductile iron pipe shall be made using polyethylene flange adapter and metal backup ring. The adjoining ductile iron fitting shall be of an equivalent internal diameter as the polyethylene piping.

6.09 RESERVED

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6.10 ACCESS

The contractor shall work within the designated Right of Way. Resident access and access to the work site shall be acceptable to all governing agencies.

6.11 INSTALLATION

- A. Laying Pipe.**
Pipe shall not be laid in water or under unsuitable weather or trench conditions, and shall be protected against entry of foreign matter.

During cold weather, particular care shall be taken in handling and laying pipe to prevent damage by impact.

Whenever pipe laying is stopped, the open end of the line shall be closed with a tight-fitting end board to keep out sand and earth. The end board shall have several perforations near its center to permit water into the pipe, thus preventing flotation in the event that the trench is flooded. Standing water in the trench shall be removed before the end board is removed.

Pipe shall be protected from exposure to sunlight, shall be kept as cool as possible during installation, and shall be covered with backfill immediately after installation.

B. Cleaning.

The interior of all pipe and fittings shall be thoroughly cleaned before installation and shall be kept clean until work has been accepted.

C. Directional Tolerance.

The pilot hole shall be drilled along the path shown on the drawings to the tolerances listed below:

1. Alignment - Plus or minus 5 feet.
2. Entry Point Location - The pilot hole shall initially penetrate the ground surface at the exact location shown on the drawings. The contractor shall determine the entry side of the pilot hole drilling depending on the pipe grade, availability of right-of-way, room to string the pipeline, and other factors.
3. Exit Point Location - The pilot hole shall finally exit the ground surface at the exact location shown on the drawings.
4. In all cases, right-of-way restrictions shall take precedence over the listed tolerances. Regardless of the tolerance achieved, no pilot hole will be accepted if it will result in any or all of the pipeline being installed in violation of right-of-way restrictions. In all cases, concern for adjacent utilities and/or structures shall take precedence over the listed tolerances. Listing of tolerances does not relieve the contractor from responsibility for safe operations or damage to adjacent utilities and structures.

D. Cutting Pipe.

Cutting shall comply with the pipe manufacturer's recommendations. Cuts shall be smooth, straight, and at a right angle to the pipe axis. After cutting, the end of the pipe shall be dressed to remove all roughness and sharp corners and shall be beveled in accordance with the manufacturer's instructions.

E. Jointing.

Jointing shall conform to the instructions and recommendations of the pipe manufacturer. Sections of HDPE pipe shall be joined into continuous lengths above ground by the thermal butt fusion method in accordance with the pipe manufacturer's recommendations for the specified service. The butt fusion equipment used in the

joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but shall not be limited to, temperature requirements of 400° F, alignment, and 75 psi interfacial fusion pressure. Butt fusion joining shall be 100% efficient offering a joint weld strength equal to or greater than the tensile strength of the pipe.

Socket fusion and extrusion welding or hot gas welding will not be acceptable.

All joining procedures shall be acceptable to the engineer.

F. Inspection.

Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation, with special attention to pipe ends. All defective pipe and fittings shall be removed from the site of the work.

G. Connections with Other Piping.

Connections between HDPE pipe and other piping shall be made using suitable fittings. Each connection with other piping shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by the City. The pipe shall remain in the drilled hole at least 24 hours before any connections or cutting of pipe shall be made. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.

Special care shall be taken to prevent contamination of potable water lines when dewatering, cutting into, and making connections with other pipe. No trench water, mud, or other contaminating substances shall be permitted to get into the lines. The interior of all pipe, fittings, and valves installed in such connections shall be thoroughly cleaned and then swabbed with, or dipped in, a 200 mg/L chlorine solution.

H. Reaction Anchorage and Blocking.

All tees and plugs installed in piping subject to internal hydrostatic heads in excess of 30 feet shall be provided with suitable reaction blocking, anchors, joint harnesses, or other acceptable means of preventing movement of the pipe caused by internal pressure.

Concrete blocking shall extend from the fitting to solid undisturbed earth and shall be installed so that all joints are accessible for repair. The dimensions of concrete reaction blocking shall be as indicated on the drawings or as directed by the engineer.

Reaction blocking, anchorages, or other supports for fittings installed in fill or other unstable ground shall be provided as indicated on the drawings or as directed by the engineer.

I. Protective Coating.

All steel clamps, rods, bolts, and other metal components of tapping saddles or reaction anchorages subject to submergence, or in contact with earth or other fill material, and not encased in concrete, shall be protected from corrosion. The first coat shall be dry and hard before the second coat is applied.

6.12 REAMING AND PULL BACK

A. Pre-reaming.

Pre-reaming operations shall be conducted at the discretion of the contractor. The contractor shall insure that a hole sufficient to accommodate the pull section has been produced. Any damage to the pipe resulting from inadequate pre-reaming shall be the responsibility of the contractor. All provisions of this specification relating to simultaneous reaming and pulling back operations shall also pertain to pre-reaming operations.

B. Pulling Loads.

The maximum allowable tensile load imposed on the pipe section shall be equal to 50 percent (50%) of the product of the HDPE pipe's specified tensile yield strength and the area of the pipe section.

C. Torsional Stress.

A swivel shall be used to connect the pull section to the reaming assembly to minimize torsional stress imposed on the section.

D. Pull Section Support.

The pull section shall be supported as it proceeds during pull back so that it moves freely and the pipe is not damaged.

E. External Collapse Pressure.

The pull section shall be installed in the reamed hole in such a manner that external pressures are minimized and an appropriate counter-balancing internal pressure is maintained. Any damage to the pipe resulting from external pressure during installation shall be the responsibility of the contractor.

F. Buoyancy Modification.

Buoyancy modification shall be used at the discretion of the contractor. Any buoyancy modification procedure proposed for use shall be submitted to the engineer for approval. No procedure shall be used which has not been reviewed and approved by the engineer. The contractor is responsible for any damage to the pull section resulting from buoyancy modification.

6.13 DRILLING FLUIDS

A. Composition.

The composition of all drilling fluids proposed for use shall be submitted to the engineer for review and approval. No fluid will be approved or utilized that does not comply with permit requirements or environmental regulations.

B. Water.

The contractor is responsible for obtaining, transporting, and storing any water required for drilling fluids. Connecting to fire hydrants is not acceptable. Contact the City to determine acceptable water locations.

C. Recirculation.

The contractor shall maximize recirculation of drilling fluid surface returns. The contractor shall provide solids control and fluid cleaning equipment of a configuration and capacity that can process surface returns and produce drilling fluid suitable for reuse.

A description of solids control and cleaning equipment proposed for use shall be submitted to the engineer.

D. Disposal.

Disposal of excess drilling fluids is the responsibility of the contractor and shall be conducted in compliance with all environmental regulations, right-of-way and workspace agreements, and permit requirements. Drilling fluid disposal procedures proposed for use shall be submitted to the engineer.

Control of drilling fluids on the site is very critical. Spills of drilling fluids will not be allowed or permitted.

E. Inadvertent Returns.

The contractor shall employ his best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than the entry and exit points shall be minimized. In the event that annular circulation is lost, the contractor shall take steps to restore circulation. If inadvertent surface returns of drilling fluids occur, they shall be immediately contained with hand placed barriers (i.e. hay bales, sand bags, silt fences, etc.) and collected using pumps and other suitable equipment. If the amount of the surface return exceeds that which can be contained with hand placed barriers, small collection sumps, drilling operations shall be suspended until surface return volumes can be brought under control.

6.14 FIELD QUALITY CONTROL

A. Instrumentation.

The contractor shall at all times provide and maintain instrumentation which will accurately locate the pilot hole, measure drill string axial and torsional loads, and measure the drilling fluid discharge rate and pressure. The engineer will have access to these instruments and their readings at all times. A log of all recorded readings

shall be maintained and will become part of the “As Constructed” information to be supplied by the contractor.

B. Cleaning and Disinfection.

Cleaning and disinfection is described in Section 10.00 of the Watermain Specifications.

C. Testing.

Prior to installation, a low pressure air test shall be performed on each run to be pulled. After installation the pipe will be subjected to a Hydrostatic Pressure Test and a Trace Wire Test. The Trace Wire Test is described in the Sewer & Water Trace Wire Specifications and the Hydrostatic Testing Procedures are described below:

Fill the pipeline with water after it has been laid; bleed off any trapped air. Subject the lowest element in the system to a test pressure that is 1.5 times the design pressure or 150 PSI, whichever is greater, and check for any leakage. When, in the opinion of the engineer, local conditions require that the trenches be backfilled immediately after the pipe has been laid, apply the pressure test after backfilling has been completed but not sooner than a time which will allow sufficient curing of any concrete that may have been used. Typical minimum concrete curing times are 36 hours for early strengths and 7 days for normal strengths.

The test procedures consist of two steps; the initial expansion and the test phase. When test pressure is applied to a water filled pipe, the pipe expands. During the initial expansion of the pipe under test, sufficient make-up water must be added to the system at hourly intervals for 3 hours to maintain the test pressure. After about 4 hours, initial expansion should be complete and the actual test can start.

When the test is to begin, the pipe is full of water and is subjected to a constant test pressure of 1.5 times the system design pressure or 150 PSI, whichever is greater. The test phase should not exceed 3 hours, after which time any water deficiency must be replaced and measured. Add and measure the amount of make-up water required to return to the test pressure and compare this to the maximum allowance in the table below.

An alternate leakage test consists of maintaining the test pressure (described above) over a period of 4 hours and then dropping the pressure by 10 psi (0.69 MPa). If the pressure then remains within 5% of the target value for 1 hour, this indicates there is no leakage in the system.

ALLOWANCE FOR EXPANSION UNDER TEST PRESSURE								
NOMINAL PIPE SIZE	U.S. GALS/100FT. OF PIPE				NOMINAL PIPE SIZE	U.S. GALS/100FT. OF PIPE		
	1 HOUR	2 HOURS	3 HOURS			1 HOUR	2 HOURS	3 HOURS
2"	0.08	0.12	0.15		20"	2.80	5.50	8.00
3"	0.10	0.15	0.25		22"	3.50	7.00	10.50
4"	0.13	0.25	0.40		24"	4.50	8.90	13.30
5"	0.21	0.41	0.63		28"	5.50	11.10	16.80
6"	0.30	0.60	0.90		30"	6.20	12.60	19.10
8"	0.50	1.00	1.50		32"	7.00	14.30	21.50
10"	0.75	1.30	2.10		36"	9.00	18.00	27.00
12"	1.10	2.30	3.40		42"	12.00	24.00	36.00
14"	1.40	2.80	4.20		48"	15.00	27.00	43.00
16"	1.70	3.30	5.00		54"	18.00	30.00	50.00
18"	2.20	4.30	6.50		-	-	-	-

NOTES:

Under no circumstances shall the total time under test exceed 8 hours at 1.5 times the system pressure rating or 150 PSI. If the test is not complete within this time limit (due to leakage, equipment failure, etc.), the test section shall be permitted to “relax” for 8 hours prior to the next test sequence.

Air testing is not recommended. Additional safety precautions may be required. Additional testing may be required at the discretion of the engineer.

It shall be the responsibility of the contractor to ensure that appropriate safety precautions are observed during hydrostatic testing.

All HDPE piping shall be watertight and free from leaks. Each leak that is discovered within the correction period specified in the General Conditions shall be repaired by and at the expense of the contractor.

SECTION 7.00 - EXCAVATION AND TRENCH PREPARATION

7.01 GENERAL

The trench shall be so dug that the pipe can be laid to the alignment and depth required and shall be excavated only so far in advance of pipe laying as the engineer shall specify. The trench shall be so braced and drained that the workmen may work therein safely and efficiently. All trenches shall be sheeted and braced as per Chapter 66: Trench bracing of the Minnesota Regulations Relating to Industrial Safety to a safe angle of repose. Such angle of repose shall be no less than the repose required by the Accident Prevention Division of the Minnesota State Industrial Commission or the requirements of the Occupational Safety and Health Act (OSHA), whichever is more restrictive.

It is essential that the discharge of any required trench dewatering pumps be conducted to natural public drainage channels, drains or storm sewers.

All trenches shall be excavated so that the pipe may be laid accurately to grade with a minimum of 7½ feet of earth cover over the top of the water mains, unless otherwise noted on the drawings.

All utility installations under existing “collector” roads or newly constructed (less than 5 years old) residential streets must be jacked or directional bored as appropriate. No open trenching will be allowed.

7.02 TRENCH WIDTH AND DESCRIPTION

The trench width, at the top of the trench, may vary depending on the depth of the excavation and the nature of excavated material encountered. All trenches shall be constructed in strict accordance with requirements prescribed by the Occupational Safety and Health Act (OSHA).

The trench width at pipe grade shall be ample to permit the proper laying and jointing of the pipe and fittings and for proper backfilling and compaction. The maximum width of trench at the top of the pipe shall be not greater than the outside diameter of the pipe plus four feet.

The trench shall have a bottom conforming to the grade to which the pipe is to be laid. The pipe shall be laid upon sound soil, cut true and even so that the barrel of the pipe will have a bearing for its full length. If the excavation is inadvertently made below the bottom conforming to grade, it shall be backfilled with well tamped pit run sand or fine gravel or other material as approved by the engineer at no additional expense to the owner.

Bell holes shall be dug at the ends of each length of pipe to permit proper jointing. Excavations for manholes and other structures shall have one foot minimum clearance on all sides.

The trench shall be kept free from water until the joints have been completed.

7.03 PIPE BEDDING

When using ductile iron pipe and existing soil conditions are not acceptable for backfill and/or compaction in the pipe zone, pipe bedding and backfill shall be used as shown on standard detail plate no. 2201. Otherwise, backfill as shown on standard detail plate no. 2202 may be used. When using PVC pressure pipe bedding and backfill shall be accomplished as per Section 7.02 of the sanitary sewer specifications and standard detail plate no. 2203.

7.04 PIPE FOUNDATION IN POOR SOIL

When the bottom at subgrade is soft and in the opinion of the engineer cannot adequately support the pipe, a further depth and/or width shall be excavated and refilled to pipe foundation grade with approved material and thoroughly compacted as shown on standard detail plate nos. 2203 and 2203A; or other approved means, such as piling, shall be adopted to assure a firm foundation for the pipe with extra compensation allowed the contractor as provided elsewhere in these specifications.

The contractor shall furnish, drive, and place piling if ordered by the engineer. Piles shall be driven in exact position at locations determined by the engineer. The contractor at his/her own expense must replace piles not correctly positioned at the completion of driving.

7.05 PIPE CLEARANCE IN ROCK

Large stones shall be removed to provide a clearance of at least twelve inches (12") below outside barrel of the pipe, valves, or fittings, and to a clear width of 12" on each side of all pipe and appurtenances for pipe 16" or less in diameter; for pipes larger than 16", a clearance of 18" below and clear width of 9" on each side of pipe shall be provided. Adequate clearance for properly jointing pipe laid in rock trenches shall be provided at bell holes.

7.06 BRACED AND SHEETED TRENCHES

The contractor shall adequately brace and sheet excavations wherever necessary to prevent caving or damage to nearby property. The cost of this temporary sheeting and bracing, unless provided for otherwise, shall be considered as part of the excavation costs without additional compensation to the contractor. Trench sheeting shall remain in place until pipe has been laid, tested for defects and repaired if necessary, and the earth around it compacted to a depth of one foot over the top of the pipe. Sheeting, bracing, etc. placed in the "pipe zone" (that part of the trench below a distance of one foot [1'] above the top of the pipe) shall not be removed without the written permission or written order of the engineer; that sheeting thereby left in place shall be paid for at the unit price bid. Sheeting ordered left in place by the engineer in writing shall be paid for at the unit price bid. The contractor may also leave in place, at his/her own expense, to be embedded in the backfill of the trench any sheeting or bracing in addition to that ordered left in place by the engineer for the purpose of preventing injury or damage to persons, corporations, or property whether public or private, for which the contractor under the terms of this contract is liable.

7.07 PILING OF EXCAVATED MATERIAL

All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other satisfactory provisions made for street drainage.

7.08 BARRICADES, GUARDS AND SAFETY PROVISIONS

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, flashing lights, and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the highway. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor. The rules and regulations of the local authorities respecting safety provisions shall be observed.

7.09 TRAFFIC AND UTILITY CONTROLS

Excavations for pipe laying operations shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches, the contractor shall provide suitable bridges at street intersections and driveways. The contractor shall post, where directed by the engineer, suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, sanitary manholes, storm sewer manholes and catch basins, fire or police call boxes, trace wire access boxes, or other utility controls shall be left unobstructed and accessible during the construction period.

7.10 PRIVATE PROPERTY PROTECTION

Trees, fences, poles and all other private property shall be protected unless their removal is authorized; and any property damage shall be satisfactorily restored by the contractor, or adequate compensation therefore shall be the responsibility of the contractor.

7.11 TUNNELING, JACKING, BORING OR EXCAVATION OTHER THAN OPEN TRENCH

Where pipe cannot be placed by open trench excavation, the method for placing and payment therefore shall be stated in the special provisions.

7.12 RAILROAD AND HIGHWAY CROSSINGS

When any railroad is crossed, all precautionary construction measures required by the railroad shall be followed. See Special Provisions or Detail Drawings. The contractor shall be responsible for securing necessary crossing permits.

Before any construction is started, the successful bidder shall meet with the Minnesota Department of Transportation, County Highway Department, Railroad Maintenance Engineer,

and the Consulting Engineers where applicable to determine the construction procedure to be followed, methods of rerouting traffic, placing of barricades, flares, signs, flagmen, etc., and methods of preventing damage to the highway or railroad. If required by the railroad or highway department, the contractor shall deposit with them a certified check in an amount sufficient to cover the required repair work.

7.13 CASING PIPE

Where a casing pipe is required, further information as to the size, thickness, coatings, cathodic protection, and material shall be determined by the Engineer of Record for review and approval by the City Engineer. The casing shall meet all requirements of the authorities having jurisdiction for the crossing.

Horizontal directional drilling will not be allowed where a casing pipe is required per the City Engineer.

Stainless steel or polyethylene spacers shall be used as necessary to install the carrier pipe to the proper line and grade inside the casing pipe. Voids between carrier and casing pipes shall be completely filled with sand, or other approved material, and the casing pipe sealed at both ends with a wrap-around neoprene rubber end seal with stainless steel banding to prevent water or debris from entering the casing pipe.

CCI Piping Systems Casing Spacers & End Seals, or approved equal.

7.14 INTERRUPTION OF WATER SERVICE

No interruption of water service will be allowed unless approved by the City Engineer. The contractor will be required to provide temporary water service whenever possible. If an interruption in water service is approved, all consumers affected by the operation shall be notified by the contractor at least 48 hours before the operation and be advised of the probable time when service will be restored. All valves and hydrants that are required to be opened or closed shall be operated only by the Chanhassen Utility Department. The contractor shall notify the Chanhassen Utility Superintendent 48 hours in advance to request opening or closing of all gate valves and hydrants.

SECTION 8.00 - PIPE LAYING

8.01 INSTALLATION OF WATER MAIN AND APPURTENANCES

Proper implements, tools and facilities satisfactory to the engineer shall be provided and used by the contractor for the safe and convenient prosecution of the work.

Pipe and other materials shall be unloaded and distributed on the job in a manner approved by the engineer. In no case shall materials be thrown or dumped from the truck. All materials unloaded in an unsatisfactory manner shall be rejected and work shall be stopped until such materials have been examined by the inspector and approved. The contractor shall furnish the necessary assistance in such examination of materials.

Water main materials shall be carefully lowered into trench piece by piece by means of a derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage to materials and protective coatings and lining. Under no circumstances shall water main materials be dumped into the trench.

8.02 LAYING OF PIPE AND FITTINGS

Before lowering and while suspended, the pipe and fittings shall be inspected for defects to detect any cracks. Any defective, damaged or unsound material shall be rejected.

All foreign matter or dirt shall be removed from the inside of the pipe and fittings before it is lowered into its position in the trench, and shall be kept clean by approved means during and after laying. All openings along the line of the main shall be securely closed as directed, and in the suspension of work at any time, suitable stoppers shall be placed to prevent earth or other substances from entering the main.

No pipe shall be laid in water or when the trench conditions are unsuitable for such work, except by written permission of the engineers.

8.03 JOINTING OF PIPE AND FITTINGS

- A. Ductile Iron.** Jointing of mechanical joint pipe, push-on joint pipe, and fittings shall be done in accordance with A.W.W.A. Section 9b and 9c of A.W.W.A. Specification C600, latest revision and section 2.02 & 2.03 of this specification. Mega-lugs shall be used to secure all mechanical joint pipe and fittings.

When pipes are cut in the field, the cut or straight end shall have all sharp or rough edges removed before assembly.

- B. PVC.** The jointing of PVC pipe shall be in accordance with section 2.02 & 2.04 of this specification.

Restraints for C900 PVC pipe shall, be Ebba Iron Mega-Lug Series 2000 PV or approved equal.

8.04 SETTING HYDRANTS

Hydrants shall be placed in locations as staked by the engineer.

All hydrants shall be supported on an 18" x 18" x 4" solid concrete block or equal concrete base. Each hydrant shall be tied as shown on the detail drawings. After each hydrant has been set, there shall be placed around the base of the hydrant, not less than one (1) cubic yard of 1 ½" clear washed river rock from which all fine material has been removed. A layer of polyethylene, minimum 4 mil thickness, shall be carefully placed over the rock to prevent the backfill from entering the voids in the drain rock. All hydrants must be maintained in a plumb position during the backfilling operation. All hydrants must be protected during transport and backfilling operations to mitigate damage to original paint.

8.05 CONDUCTIVITY

When using D.I.P. conductivity shall be provided throughout the water system by use of copper straps or approved conductive gaskets with copper inserts. All mechanical joint fittings shall be equipped with copper straps. Lead tipped gaskets will not be approved for conductivity.

Copper jumper straps between sections of pipe shall be not less than 1/16" x 3/4" strap bolted to shop welded pipe straps of the same size. Bolts shall be 5/16" diameter bronze. **For all locations where shop welded straps are not available, consult the Engineer for an approved alternate method of conductivity.** He/she may approve the use of a trace wire method with stainless strapping, conductive gaskets or field welds. Field welds shall be made using the Cadweld method with size 32 cartridge. Each field weld shall be properly made after filing the surface of the pipe to a clean bare metal over the entire area of the weld. Straps bolted to mechanical joint fittings shall be not less than 1/16" x 1-1/2". All straps shall be securely fastened and backfill placed so as to not damage the conductivity.

8.06 SEWER CROSSINGS

Water mains crossing sanitary sewers shall be laid to provide a separation of at least 18" between the bottom of the water main and the top of the sewer. When local conditions prevent a vertical separation as described, the following construction shall be used:

- A. Sewers passing over or under water mains shall be constructed of materials equal to water main standards of construction.
- B. A length of water pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.

8.07 VALVES, BOXES, MANHOLES, VAULTS AND FITTINGS

Valves and fittings shall be placed where shown on the plans or as designated by the engineer. Jointing shall be done as previously specified herein.

Unless otherwise specified or shown on the drawings, cast iron valve boxes shall be installed with all gate valves eighteen inches (18") or smaller. Valve boxes shall be firmly supported with a valve box adapter to maintain centered and plumb alignment over the wrench nut of the valve, with box cover one-quarter to one-half inch (1/4" - 1/2") below the surface of the finished pavement or at such other level as may be directed by the engineer.

All bends, tees, hydrants and plugs shall be securely braced against undisturbed soil using pre-cast concrete block or poured-in-place concrete thrust blocks. The method of anchorage must be reviewed and approved by the engineer prior to backfilling. In addition, Mega-lugs shall be installed at all bends.

8.08 BUILDING SERVICES

Curb stops and boxes shall be installed as shown on the standard plates. The curb stop and box shall be located on the property line, unless specified otherwise.

Ties to water services must be provided at the lateral, all vertical and horizontal bends and at right-of-way.

Corporation stops shall be tapped into the main only when full of water under pressure. No taps shall be made into a dry pipe. Corporation stops shall be turned into the saddle until tight and shall not be turned back to facilitate having the operating nut on the top.

The plastic service lines as placed between the water mains and the curb boxes shall have a minimum of 7.5 feet of cover except at the goose neck which shall have 6½-foot minimum cover. Therefore, service lines must be placed (incidental to the project) beneath any obstruction which would prohibit the required cover if the service line was placed on top of said obstruction. The method of tunneling under an obstruction shall be approved by the engineer.

Each curb box shall be marked by a steel fence posts located two feet behind the curb box cover. The top 6 inches of the steel fence post shall be painted blue.

SECTION 9.00 - BACKFILLING

9.01 GENERAL

All excavation in trenches shall be backfilled to the original ground surface or to such grades as specified or shown on the plans. The backfilling shall begin as soon as practicable after the pipe has been placed. Prior to any backfilling, the excavation shall be cleaned of all trash, debris, organic material, and other undesirable material.

9.02 BACKFILL PROCEDURE AT PIPE ZONE

Backfilling and compacting shall be done as thoroughly as possible so as to prevent after settlement. Depositing of the backfill shall be done so the shock of falling material will not injure the pipe or structures. Grading over and around all parts of the work shall be done as directed by the engineer.

All water main pipe shall be installed in accordance with Standard Detail Plate No. 2203 and bedded in a granular material meeting the requirements of MnDOT specification 3140.2A Granular Borrow in which all shall pass a three-quarters inch (3/4") sieve and not more than 20% shall pass a #200 sieve. Embedment materials shall be compacted in six-inch (6") lifts to a point twelve inches (12") above the pipe and to a density of at least 95% of standard proctor density as described by ASTM methods D698. All embedment materials shall be tested for compliance with the above specification and test results shall be supplied to the Engineer. If materials are purchased, weight slips should also be provided.

9.03 BACKFILL PROCEDURE ABOVE THE PIPE ZONE

Unless otherwise specified, suitable backfill material shall be furnished and the following backfill procedures shall apply and be used above the "pipe zone" to either the existing surface elevation or design grade, as specified, with the cost of such considered incidental to the installation of the pipe unless specified for a particular section of the project by the special provisions and/or plans, or allowed in writing by the engineer, and a unit price has been established.

All trenches shall be backfilled to obtain the necessary compaction, with the lift thickness as required, dependent upon type of roller. The backfill material shall be compacted to 95% of the standard moisture density relationship of soils (ASTM D698-70) except the top three feet (3') of the trench which shall be compacted to 100% density. Moisture content of these soils shall be within a range of $\pm 3\%$ of optimum moisture content. If the existing moisture content of the backfill material below three feet of subgrade is greater than 3 percentage points above the optimum moisture content, the soil shall be compacted to a minimum density of 3 pounds per cubic feet less than the standard Proctor curve at that moisture content. At no time shall the density be less than 90 percent of the standard Proctor density. This modification of the compaction specification shall at no time be used or applied to the upper 3 feet of the subgrade or the aggregate base. In the event the contractor fails to meet these compaction requirements, corrective measures such as spreading/discing/farming, etc. shall be implemented or the

contractor may elect to replace backfill with a more suitable material taken from another source. All of these corrective measures shall be at the contractor's expense.

Any settlement greater than one inch (1") as measured with a string line from one edge of the settlement to the other within the warranty period of this contract shall be considered failure of the mechanical compaction and all street surfaces, driveways, boulevard and ditch areas shall be repaired by the contractor at no cost to the City.

Under state or county highways and road, the contractor shall obtain the necessary permits at his/her expense after commencing and type of work upon a state or county highway or roadway. All such work, especially backfilling, shall conform to state and county standards and specifications.

9.04 DISPOSAL OF EXCESS MATERIALS AND DEBRIS

Unless otherwise specified, excavated material either not suitable or not required for fill material shall be disposed of by the contractor outside of the right-of-way at his/her expense in any manner s/he may elect subject to the provisions of the following paragraph.

Before dumping such materials or debris on a private or public land, the contractor must obtain from the owner of such land written permission for such dumping and a waiver of all claims against the owner for any damage to such land which may result therefrom together with all permits required by law for such dumping. A copy of such permission, waiver of claims and permits shall be filed with the engineer before said disposal is made.

In addition, be advised City Ordinance may require the property owner apply and receive a grading permit prior to any earthwork activities commencing.

9.05 FILL MATERIAL

Normal, allowable "fill material" used in backfilling outside of the pipe encasement shall be sand, gravel, or clay, free from pieces of rock, concrete or clay lumps more than one-third cubic foot in volume, roots, stumps, organic soil, vegetation, tin cans, rubbish, frozen materials, and similar articles and substances whose presence in the backfill would cause excessive settlement. In that portion of the backfill which is within six inches (6") of a road subgrade, there shall be no stones which will be retained on a three-inch (3") sieve.

9.06 DENSITY TESTS

Density tests will be performed by an approved soils testing firm at various locations and depths throughout the project as directed by the engineer. The contractor shall cooperate fully and provide assistance as necessary to complete these tests with no additional compensation being made to the contractor. A minimum of one test at an elevation approximately two feet above the top of pipe, one test in the top three feet and one test at an intermediate elevation per 100 feet of pipe. A minimum of 50% of the individual water and sewer service trenches shall be tested at elevations listed above.

SECTION 10.00 - TESTING AND DISINFECTING MAINS

10.01 PRESSURE TESTING

All water main including fittings, valves, services and hydrants shall be tested in accordance with and shall meet the requirements set forth in American Water Works Association (A.W.W.A.) Specifications C600-10 and C605-13, latest revision.

The contractor shall have the option of using an alternative testing procedure as identified below:

After the pipe has been laid including fittings, valves, hydrants, and service and the line has been backfilled in accordance with these specifications, all newly laid pipe, or any valved section thereof, unless otherwise directed by the engineer, shall be subjected to a hydrostatic pressure of 150 pounds per square inch. The duration of each such test shall be two (2) hours. The allowable pressure drop shall not exceed one (1) PSI in the said two (2) hour period.

Each valved section of pipe shall be slowly filled with water and the specified test pressure, measured at the lowest point of elevation, shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection, gauges and all necessary apparatus shall be furnished by the contractor. Gauges and measuring devices must meet with the approval of the engineer and the necessary pipe taps made as directed. Before applying the specified test pressure, all air shall be expelled from pipe. To accomplish this, taps shall be made, if necessary, at points of highest elevations, and afterward tightly plugged.

Each valved section shall be subjected to the pressure test and, if required, the leakage test prescribed herein. Testing for the two hour duration shall be with hydrants closed, and valves on hydrant leads and dead end water lines open. Once this portion of the test is completed, the valve on the hydrant leads and dead end water lines shall be closed, and hydrants opened. The specified test pressure shall be applied, and the test repeated for 15 minutes to establish the condition of the hydrant lead valves. This shall apply to both the pressure and leakage test.

When tying into existing water main system, the contractor shall be responsible for pressure testing from the point of starting the new water main and including all newly constructed pipe and valves. If the contractor elects to test the existing water main, the City will not be responsible for any testing costs if the existing water main is the cause of any failing tests.

Any cracked or defective pipes, fittings, valves or hydrants discovered in consequence of the pressure test shall be removed and replaced by the contractor with sound material in the manner provided and the shall be repeated until satisfactory to the engineer.

The pressure gauge for the tests shall be an Ashcroft Model 1082 with a 4½-inch dial face with one (1) psi increments or approved equal.

10.02 DISINFECTING MAINS AND TEMPORARY WATER SERVICES

All new and repaired water main will be chlorinated in accordance with A.W.W.A. Standard C651-14. Laboratories supplying test results shall be accredited by MDH and EPA. All sampling shall be conducted by a city approved third party vendor. This vendor is responsible for both taking the sample and delivering the sample to the laboratory conducting the testing. The contractor shall be responsible for assisting the third party vendor in collecting the sample as needed.

SECTION 11.00 - SURFACE RESTORATION, CLEANUP AND GUARANTEE

11.01 RESTORATION OF SURFACE

All surfaces disturbed during the construction period including adjacent streets used to access the site, whether caused by actual excavation, deposition of excavated material, or by the construction equipment, shall be returned to its original conditions or better. Exceptions to the above, if any, or special instructions pertaining to any particular section of the project will be outlined in the "Special Provisions". Any excess dirt shall be removed by the contractor in accordance with Section 9.04 of these specifications.

11.02 DUST CONTROL DURING CONSTRUCTION

The contractor shall at his/her own expense maintain dust control as necessary and in a manner satisfactory to the engineer until final acceptance of the project or until restoration has been completed.

11.03 MAILBOX RESTORATION

The contractor, at his/her expense, shall replace and restore mailboxes disturbed by the work.

11.04 MAINTENANCE OF STREETS UNTIL SURFACED

After backfilling according to the above specifications, the contractor shall maintain the streets as required and blade as necessary to provide a passable surface for traffic until the surfacing is completed or to the date of final acceptance.

11.05 CLEAN UP

Surplus pipe material, tools, and temporary structures shall be removed by the contractor and all dirt and/or rubbish caused by his/her operations and excess earth from excavations shall be hauled to a dump provided by the contractor, and the construction site shall be left in a condition satisfactory to the engineer.

11.06 GUARANTEE

The contractor shall be held responsible for any and all defects in workmanship and materials which may develop in any part of the entire installation furnished by him and upon written notice from the engineer shall immediately replace and make good, without expense to the owner, any such faulty part or parts and damage done by reason of same, during the warranty period as prescribed by the conditions of the contract.

11.07 FAILURE TO REPLACE DEFECTIVE PARTS

Should the contractor fail to make good the defective parts within a period of thirty (30) days of such notification, after written notice has been given him, the owner may replace these parts, charging the expense of the same to the contractor.

SECTION 12.00 - TURF ESTABLISHMENT

12.01 GENERAL

All turf establishment shall be in accordance with Section 4.14, Turf Establishment, of the street specifications which is included as part of this standard specification.

SECTION 13.00 – VALVE BOLT REPLACEMENT

13.01 Bolt Replacement

Where called for in the plans, existing gate valves, butterfly valves and hydrant valves will require replacement bolts. All valve types will be part of this item.

Existing bolt material is unknown. The replacement bolts are to be stainless steel (SS-304) bolts. The existing gate valve box shall be protected in place or salvaged and installed at no additional cost. If the Contractor damages the existing valve box, a new valve box meeting specification shall be installed at the Contractor's expense and no additional cost to the City. If the existing valve box has existing damage those specific damaged parts shall be replaced at the direction of the Engineer and paid as Remove and Replace GV Box Section at the contract unit bid price per Pound.

The replacement bolts are to be replaced one bolt at a time. The bolts to be replaced shall include the valve gland bolts, all valve body bolts and valve flange T-bolts on both sides of the valve. This work will require excavation, shoring, materials, labor and backfilling with an approved granular bedding material and all necessary valve box adjustments to meet final grade. Valves shall be operated by the Contractor prior to bolt replacement to make certain they can be operated.

If the body to bonnet or packing gland seals appears to be defective or leaking, and/or if the top valve nut is missing, "rounded-off" or otherwise defective, the Contractor shall notify the field engineer and replace these items as required per valve and this will be considered extra work. The City shall supply necessary replacement parts.

The gate valve and exposed pipe shall be bedded in sand or coarse aggregate bedding (1.5" clear rock) at the direction of the Engineer if unstable bedding conditions exist to 12-inches above top of pipe. The trench shall then be backfilled with dry, compactable clay from the excavation and compacted in no larger than eight-inch (8") lifts to the top of the subgrade. If the in situ soil is not suitable for backfill per the Engineer, the Contractor shall dispose of the material at their own expense and import suitable grading material (Clay) for utility trench backfill. All import suitable grading material will be paid as Common Embankment at the contract unit bid price per Cubic Yard. Aggregate base shall be placed in each utility excavation to match the existing roadway aggregate base thickness and shall be paid as Aggregate Base at the contract unit bid price per Cubic Yard. All material required for the completion of this work not specifically paid under a separate bid item will be incidental. The Engineer in the field must be onsite to verify compaction. No open trenches or piles of dirt on the street may be left overnight.

Gate valves and plugs will be reused. If the Contractor believes they are unusable, the Engineer onsite must field verify the problem and determine corrective action. If any damage is caused by the Contractor, repairs or replacement will be done at the Contractor's expense and no additional cost to the City.

The sizes of the nuts and bolts may vary. No additional compensation will be allowed for unexpected sizes. Some valves may be butterfly valves in which case bolts on the valve itself to be replaced will be determined in the field by the engineer. The contract bid price per each includes replacement of all bolts for each valve regardless of the number of bolts.

13.02 Sacrificial Anode Bag

Anode bags shall be installed at all bolt replacement valves (one per location). Never lay the anode in contact with the pipe or with any abandoned or foreign system. After the anode has been laid in the trench it should be backfilled with well compacted moist soil. Once compacted, to ensure the soil is moist, a five-gallon (5) bucket of water should be added to the soil directly around the sacrificial anode. Water is to be supplied by the Contractor and is incidental. The use of water from residential properties is not allowed.

The anode shall be installed to provide a minimum of five feet (5') of horizontal separation and sixteen- inches (16") below the watermain. This shall be incidental to the price of the Valve Bolt Replacement item.

13.03 Valve Box Adaptor

Valve box adaptors shall be installed on all bolt replacement gate and butterfly valves as manufactured by Adapter, Inc. or approved equal. This shall be incidental to the price of the Valve Bolt Replacement item.

SECTION 14.00 - METHOD OF PAYMENT

The work shall be measured and the compensation determined in the following manner:

14.01 WATER MAIN PIPE

Water main pipe will be paid for at the contract price per lineal foot for each diameter of pipe furnished, which shall include the cost of furnishing the pipe, rubber gasket, joints, insulation and other material and of delivering, handling, laying, trenching, backfilling, testing, disinfecting, and all material or work necessary to install the pipe complete in place at the depth above specified.

The length of the pipe for which payment is made shall be the actual overall length measured along the axis of the pipe without regard to intervening valves or specials.

Lengths of branches will be measured from the centers of connecting pipes to center of valves or hydrants. All lengths will be measured in a horizontal plain unless the grade of the pipe is more than 15%.

14.02 COMPACT DUCTILE IRON FITTINGS

Ductile iron fittings shall be class 350 for sizes up to and including twelve inches (12") in diameter and shall conform to AWWA Specification C153 covering compact fitting. Ductile iron fittings shall be measured by weight in pounds (kilograms) according to the published weights of mechanical joint fittings as listed in the following table. Retainer glands shall be incidental to the fitting installation.

COMPACT MECHANICAL JOINT DUCTILE IRON FITTINGS							
MJ TEES			MJ-MJ REDUCERS			MJ PLUGS	
Run*	Branch*	Weight-Lb/Kg	Size*	Weight-Lb/Kg	Size*	Weight-Lb/Kg	
4	4	32/14.5	6 x 4	24/10.9	4	15/6.8	
6	4	46/20.9	8 x 4	32/14.5	6	25/11.3	
	6	56/25.4	8 x 6	36/16.3	8	45/20.4	
8	4	60/27.2	10 x 4	46/20.9	10	65/29.5	
	6	72/32.7	10 x 6	47/21.3	12	85/38.6	
	8	86/39.0	10 x 8	50/22.7	16	150/68.0	
10	4	78/35.4	12 x 4	58/26.3	20	215/97.5	
	6	90/40.8	12 x 6	60/27.2	24	350/158.8	
	8	105/47.6	12 x 8	60/27.2	MJ CROSSES		
	10	120/54.4	12 x 10	64/29.0	Size*	Weight-Lb/Kg	
12	4	94/42.6	16 x 6	124/56.2	4 x 4	40/18.1	
	6	110/49.9	16 x 8	124/56.2	6 x 4	62/28.1	
	8	125/56.7	16 x 10	124/56.2	6 x 6	80/36.3	
	10	140/63.5	16 x 12	124/56.2	8 x 6	108/49.0	
	12	160/72.6	20 x 10	220/99.8	8 x 8	105/47.6	
16	6	228/103.4	20 x 12	205/93.0	12 x 8	162/73.5	
	8	248/112.5	20 x 16	200/90.7	12 x 12	215/97.5	
	10	264/119.7	24 x 12	305/138.3	16 x 16	385/174.6	
	12	280/127.0	24 x 16	320/145.1			
	14	316/143.3	24 x 20	300/136.1			
	16	322/146.1	MJ-MJ BENDS				
20	6	315/142.9	Size*	Weight-Lb/Kg			
20	8	345/156.5		90E	45E	222E	113E
	10	370/167.8	4	27/12.2	23/10.4	18/8.2	16/7.3
20	12	395/179.2	6	39/17.7	32/14.5	32/14.5	30/13.6
	16	465/210.9	8	57/25.9	46/20.9	46/20.9	42/19.1
	20	535/242.7	10	89/40.4	70/31.8	64/29.0	58/26.3
24	6	415/188.2	12	408/49.0	86/39.0	84/38.1	74/33.6
	8	445/201.8	16	264/119.7	202/91.6	178/80.7	158/71.7
	10	470/213.2	20	400/181.4	305/138.3	310/140.6	245/111.1
	12	500/226.8	24	565/256.3	405/183.7	412/186.9	315/142.9

COMPACT MECHANICAL JOINT DUCTILE IRON FITTINGS (cont.)		
MJ TEES		
Run*	Branch*	Weight-Lb/Kg
	16	580/263.1
	20	660/299.4
	24	720/326.6
MJ SLEEVES		
	Weight-Lb/Kg	
Size*	Short	Long
4	17/7.7	20/9.1
6	28/12.7	36/16.3
8	38/17.2	46/20.9
10	49/22.2	61/28.1
12	56/25.4	76/34.5
16	130/59.0	172/78.0
20	195/88.4	255/115.7
24	255/115.7	335/152.0
*Multiply by 25 to convert to millimeters		

14.03 HYDRANTS

Hydrants will be paid for at the contract unit price per hydrant installed complete with drainage pit, gravel, concrete base, anode bag, and field welds including the exothermic weld protector. Hydrant extensions, if needed, shall be incidental to the hydrant installation. The unit price for the hydrant does not include the auxiliary hydrant valve which shall be paid for under another item of these specifications, unless they are combined in the bid proposal.

14.04 VALVES AND BOXES

Valves, boxes, and valve adapters (including extensions or valve stem risers) will be paid for at the contract unit price bid for each size valve and box furnished and installed complete.

14.05 WATER SERVICE PIPE

Water service pipe will be paid for at the contract unit price per lineal foot, for each diameter of pipe furnished, measured from the centerline of pipe to the centerline of curb box. The unit price shall include all pipe, fittings, trace wire, laying, excavation, backfilling, bedding material, insulating and testing.

14.06 CORPORATION COCKS

Corporation cocks will be paid for at the contract unit price for each size furnished and installed and shall include the saddle and the tap or connection to the water main.

14.07 SERVICE SADDLES

Service saddles shall be considered incidental to the corporation cocks as per section 13.06.

14.08 CURB STOPS AND BOXES

Curb stops, boxes and extensions will be paid for at the contract unit price for each size furnished and installed and shall include necessary fill when required.

14.09 AIR RELIEF MANHOLES

Air relief manholes will be paid for at the contract unit price per manhole installed complete as detailed including saddle, corporation cock, piping, shut offs and air release valve.

14.10 PILING

Piling up to 20 feet long including caps shall be paid for at the contract unit price for each single pile bent in place. No additional payment will be made for cradles.

Any piling required over 20 feet in length shall be paid for as excess length of piling. Cut off lengths will not be paid.

Double pile bents shall be paid for according to the length of each individual pile. There shall be no additional compensation for lumber or hardware used to tie the piles together.

14.11 SPECIAL CONDITIONS

Material used for refilling to pipe foundation grade to assure firm foundation for pipe shall be paid for at the contract unit price per ton in place. No foundation material will be paid for that is installed without the knowledge or consent of the engineer nor will payment be made for rock installed only for dewatering purposes. Payment shall include cost of excavation and placement.

14.12 SPECIAL SECTIONS

Special sections will be paid for at the contract price on a lump sum basis for all work and material necessary for the complete installation of construction.

14.13 SHEETING ORDERED LEFT IN PLACE

Sheeting ordered left in place shall be paid for at the contract unit price per 1000 board feet.

14.14 JACKING

Payment for jacking will be paid for at the contract unit price per lineal foot. Water main used in jacking will be paid separately at bid unit prices for that diameter water main.

14.15 VALVE BOLT REPLACEMENT

Payment for Valve Bolt Replacement will be paid for at the contract unit price per each which shall be compensation in full for all work included under Section 13.00.

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SANITARY AND STORM SEWER CONSTRUCTION SPECIFICATIONS

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SECTION 1.00 - SCOPE

1.01 GENERAL

It is the intent of these specification requirements to provide the requirements for sanitary and storm sewer construction in the City of Chanhassen, Minnesota.

1.02 WORK INCLUDED

The contractor shall, unless specified otherwise, furnish all materials, equipment, tools and labor necessary to do the work required under his/her contract and unload, haul and distribute all pipe, castings, fittings, manholes and accessories. The contractor shall also remove any street surfacing as required; excavate the trenches and pits to the required dimensions; construct and maintain all bridges for traffic control; sheet, brace and support the adjoining ground or structures where necessary; handle all drainage or ground water; provide barricades, guards and warning lights; lay and test the pipe, castings, fittings, manholes and accessories, backfill and consolidate the trenches and pits; maintain the street or other surface over the trench until surface restoration; restore the roadway surface unless otherwise stipulated; remove surplus excavated material; and clean the site of the work.

The contractor shall also furnish all equipment, tools, labor and materials required to rearrange sewers, conduits, ducts, pipes or other structures encountered in the installation of the work. All the above work to completely construct the sewer facilities shall be done in strict accordance with the project's contract documents to which these specifications are a part thereof.

1.03 LOCATION OF WORK

The location of this work is as shown on the plans.

1.04 COORDINATION OF WORK

The contractor shall be responsible for the satisfactory coordination of the construction of the sewer facilities with other construction and activities in the area affected. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties.

1.05 WORKING HOURS

Refer to Section 7.02 of the General Conditions.

1.06 REFERENCE REQUIREMENTS

In the specification requirements, reference to "MnDOT Specifications" shall mean the "Standard Specifications for Construction" of the Minnesota Department of Transportation, most current edition, and all subsequent amendments. If any portion of the City's Specifications are in conflict with the MnDOT Specifications, the City's Specification shall control.

SECTION 2.00 - MATERIALS

2.01 GENERAL

The materials used in this work shall be all new, and conform to the requirements for class, kind, size and materials as specified below. All materials permanently incorporated in the work shall be domestically manufactured in the U.S.A. The contractor shall submit in writing a list of materials showing the manufacturer designation of all materials. The City may review the Contractor's supporting documentation to verify compliance that all materials are domestically manufactured in the U.S.A. The burden of proof to meet this requirement rest with the Contractor. If the supporting documentation does not demonstrate to the City that the materials were produced in the United States, then the materials will be considered unauthorized Work and must be removed and replaced according to MnDOT Specification 1512.2, "Unauthorized Work". Only one manufacturer shall be approved for each material used. This list must be approved by the City Engineer.

2.02 REINFORCED CONCRETE PIPE (RCP)

Reinforced concrete pipe and fittings including bends, tee sections and specials shall conform to the requirements of the Standard Specification for Reinforced Concrete Sewer Pipe, ASTM Designation C76 with circular reinforcing for the class of pipe specified. Pipe required for piling shall be reinforced concrete pipe furnished in eight-foot (8') lengths and shall be of special design in accordance with Section 10, ASTM Designation C76, latest revision. Concrete pipe to be jacked shall be Class V or greater. Reinforced concrete pipe less than 15" will not be allowed.

Concrete pipe bends called for on the plans shall be 7½° pipe bends with a 4'-0" center line laying length and a 30.5' radius of curve, and with wall thicknesses and steel reinforcing in accordance with ASTM Specifications C76. The bends shall be of the same pipe class as the pipe on either side of the bend.

2.03 HIGH DENSITY POLYETHYLENE (HDPE)

- A.** HDPE smooth interior, dual-walled pipe may be used for storm sewer sizes up to and including 18 inches in diameter, EXCEPT for paved street areas. Pipe to be N-12 as manufactured by Advanced Drainage Systems or approved equal.
- B.** General Requirements: ASTM F894 & AASHTO M-294 (Type S)
- C.** Materials: PE plastic compound meeting the requirements of Type III, Class C, Category 5, Grade P-34 as defined in ASTM D1248 with an established hydrostatic design basis (HDB) of not less than 1250 psi for water at 73.48F determined in accordance with ASTM D2837.

- D. Each pipe shall be identified with the manufacturer's name, trade name or trademark and code from plant location, machine, and date of manufacture; nominal pipe size, in inches; the Ring Stiffness Constant Classification and ASTM F894.
- E. No polyethylene fittings (tees, elbows, flared-end sections, etc.) will be allowed. Flared-end sections are required to be reinforced concrete pipe. Bell-to-bell pipe couplers must be water tight, non-cleated with an o-ring gasket.

2.04 CORRUGATED METAL PIPE (CMP)

There will be no corrugated metal pipe allowed within public right-of-way unless reviewed and pre-approved by the City Engineer.

2.05 PIPE FITTINGS

Fittings shall be Class 250 for sizes up to and including 12" and Class 150 for sizes 14" and larger. Fittings shall conform to the requirements of AWWA Specification C110. Ductile Iron Fittings shall have mechanical joints and shall be Class 350 for sizes up to and including 12" diameter and shall conform to AWWA Specification C153, covering compact fittings.

All pipe and fittings shall be epoxy coated and furnished with either 316 stainless or NSS Cor-Blue nuts and bolts.

2.06 DUCTILE IRON PIPE (DIP)

Ductile iron pipe shall be designed for a minimum working pressure of 150 pounds per square inch and shall conform to the applicable dimensions, weights and tolerances of Federal Specification WW-P-421b for cast iron pipe. Ductile iron shall be Grade 60-42-10 with 40/90 metal strength and shall be tested in accordance with ASTM Specification A339-55. All pipe shall be cement-lined inside and tar-coated outside.

The class of ductile iron pipe shall be as specified by the engineer.

2.07 POLYVINYL CHLORIDE SEWER PIPE (PVC)

Polyvinyl chloride sewer pipe shall be produced by a continuous extrusion process using Type 1, Grade 1 material, material as defined in the latest revision of ASTM Specification D-1784. The design, dimensions and wall thickness shall conform to ASTM Standard Specifications D-3034, SDR 35. Pipe classification by burial depth from finish grade to pipe invert shall conform to the following:

<u>Burial Depth</u>	<u>Pipe Class</u>
0-16 feet	SDR 35
16-26 feet	SDR 26
> 26 feet	C900

2.08 STEEL CASING PIPE FOR JACKING-BORING

Steel casing pipe for jacking-boring shall conform to ASTM Designation A252, Grade 2 or ASTM Designation A139, Grade B. The casing pipe shall have minimum thickness as follows:

Nominal Casing Size	Outside Diameter (Inches)	Minimum Shell Thickness (Inches)
12	12-3/4	0.250
14	14	0.282
16	16	0.282
18	18	0.312
20	20	0.343
22	22	0.375
24	24	0.403
26	26	0.438
28	28	0.469
30	30	0.469
32	32	0.500
34	34	0.532
36	36	0.532
38	38	0.532
40	40	0.563
42	42	0.563

2.09 JOINTING MATERIAL

The jointing material for each type of pipe specified here before shall be as follows:

- A. Reinforced Concrete Pipe.** Reinforced concrete pipe joints shall be bell and spigot style. Rubber gasket shall be per ASTM C1619 class C or E and can be either O-ring or Profile in cross section. Joints shall meet requirements of ASTM C443.
- B. Corrugated Metal Pipe.** If corrugated metal pipe is pre-approved by the City Engineer, corrugated metal pipe joints shall employ coupling bands as per MnDOT Specification 3226.
- C. High Density Polyethylene (HDPE).** Joints shall conform to ASTM D3212. Joints shall be push-on type only with the bell-end grooved to receive a gasket. Elastomeric seal (gasket) shall have a basic polymer of synthetic rubber conforming to ASTM F477 and be factory installed and chemically bonded to the bell-end of the pipe. Natural, field installed rubber gaskets will not be accepted. Joints must provide a water tight connection.

- D. Ductile Iron Pipe.** Ductile iron pipe joints shall be of the push-on type which complies with AWWA Specification C-111, latest revision. If used as a pressure line, an electrical contact must be provided through every joint.
- E. Polyvinyl Chloride Pipe (PVC) and Fittings.** Polyvinyl chloride pipe joints shall be the bell and spigot type using solvent cement supplied by the pipe manufacturer and applied according to his/her instructions. Rubber gasketed push-on type joints are permitted only on mainline sewers. Typical sanitary house services shall be SDR 26 (or as directed by the Engineer), solvent, non-gasketed weld joints, and the service wye shall be gasketed.

2.10 MANHOLES AND CATCH BASINS

Manholes and catch basins shall be constructed using precast sections conforming to ASTM Specification C478. Manhole section joints shall meet the requirements of ASTM C443. Rubber gaskets for each joint shall be per ASTM C1619 class C or E.

Sanitary sewer manholes shall be supplied with pre-formed inverts and flexible sleeve connections for all lateral lines 15" in diameter or less unless otherwise noted on the construction plans. The flexible connection shall be Press Seal PSX Direct Drive or approved equal. No speed crete will be allowed for manhole sealing. Precast joints shall be sealed using "Cretex" internal manhole joint seals or equal in high ground water areas.

When approved by the engineer and shown on the detail plates or drawings, manholes may be built using blocks laid up on full mortar beds and vertical joints shall be completely filled with mortar. The base of the unit shall be shaped to form a smooth transition section from inlet to outlet either formed directly in the concrete or built up of brickwork and mortar or by running a half section of pipe through the manhole. The exterior of all block manholes shall be plastered with one half inch (1/2") mortar.

2.11 MANHOLE AND CATCH BASIN - FRAMES AND COVERS

Cast iron for both manholes and catch basin frames and covers shall be of the best grade of cast iron, free from all injurious defects and flaws, and shall conform to the following specifications: Federal AA-1-652, ASTM A48-56, AASHTO M105-49 and ASA 6.25101948.

The standard manhole casting shall be Neenah #R-1642 with "self-sealing" lids and two concealed pick holes as shown on Detail Plate No. 2111, or approved equal.

All castings shall be adjusted in accordance with Detail Plate No. 2110 prior to acceptance by the City of any utilities on the project.

Adjusting rings shall be precast concrete, HDPE rings as manufactured by Ladtech, Inc. or approved equal, or EPP rings as manufactured by Cretex Specialty Products or approved equal. HDPE adjusting ring sealant shall be a butyl caulk as manufactured by Ladtech sealant or approved equal and shall be installed as per the manufacturer's specifications. EPP adjusting ring

sealant shall be M-1 Structural Adhesive/Sealant or approved equal and shall be installed as per the manufacture's specifications.

The manufacture's specifications for wear course steel adjusting insert shall be provided to the Engineer for review and approval.

Lettering on the manhole castings shall be as shown on the detail plate.

Storm sewer inlet castings shall be Neenah Foundry No. R-3067 V or R3067VB (at low points) as shown on the detail plates. Inlet casting R-3501TB may be used if approved by the Engineer on a low point inlet that lies within a driveway. All castings shall conform to the requirements and dimensions shown on the drawings. All covers must fit closely in the rings in any and all positions and, when placed in the rings, must fit the ring solidly in all positions so that there will be no rocking from pressure applied on any point of the cover.

2.12 MANHOLE STEPS

All manhole steps in sewer structures shall conform to Neenah Foundry Step No. R-1981J in dimension and strength. Manhole steps shall be spaced 12" on center on the downstream face of the manhole. Manhole steps shall be installed on the upstream face of the manhole only if the manhole is a dead-end manhole. Manhole steps shall be installed on either side of the downstream pipe invert if the pipe diameter(s) is 18" or larger.

Cast iron. Cast iron manhole steps shall be manufactured from high test metal having a minimum tensile strength of 35,000 pounds per square inch.

Aluminum. Aluminum manhole steps of a design similar to the cast iron steps specified may be used. Aluminum manhole steps shall be made of Apex Ternalloy No. 5 aluminum alloy.

Plastic. Copolymer Polypropylene plastic manhole steps (PSI-PF) may be used or equal.

2.13 MORTAR

Mortar shall be Spec Mix Masonry Cement and Sand Mortar Type M, or approved equal. The mortar shall be mixed to the manufacturer's specifications.

2.14 INFILTRATION BARRIERS

- A. Conetop Infiltration.** All castings, rings, and adjustments shall include furnishing and installing an external seal on all sanitary manholes. The permanent seal shall externally seal the adjustment ring area of the manhole. Sealing systems shall be installed per manufacturer's specifications. The Contractor shall use an Infi-Shield External Uni-Band or CCI Piping Systems WrapidSeal or approved equal external sealing method and shall include an integral seal with the casting assembly.

B. Manhole Joint Wrap. All sanitary manholes, and only storm manholes directed by the Engineer, shall have joints sealed with a minimum external 6” tall rubber sleeve as manufactured by Infi-Shield Seal Wrap, Sealing Systems, Inc. or approved equal. The seal shall be made of EPDM (Ethylene Propylene Diene Monomer) rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with mastic. The mastic shall be non-hardening butyl rubber sealant, with a minimum thickness of 85 mils. The seal shall be designed to prevent leakage of water through the joint sections of a manhole, catch basin or concrete pipe.

- **Seal Wrap 6”**

Height	6 inches
Length	16 or 50 foot rolls
Thickness	125 Mils
Height tolerances	6 inches +/- .188”
Length tolerances	50 feet + 6” /- .000
Rubber Thickness tolerances	30 mils
Mastic Thickness	85 mils
Mastic Width	5 1/2”
Mastic off set from edge	1/4”

- **EPDM Rubber E70-6614-4B Color Black**

Physical Properties	ASTM Test Method	Typical Value
Durometer, Shore A	D2240	61
Tensile, PSI	D412	1510 PSI
Elongation %	D412	460 %
Compression set %	D395 22 Hrs @ 77 degrees C	26 %
Tear Resistance PPI	D624 Die B	165 ppi
Heat Aging		
D573 70 Hrs. @ 70 degrees C		
Change in hardness (Durometer)		65 (+4 pts)
Change in Tensile %		1390 psi (-14 %)
Change in Elongation %		345 % (-25 %)
Ozone Resistance	D1149 72 Hrs @ 50 pphm	no cracks
Water Resistance (Volume)	D471 70 Hrs @ 100 degrees C	+ 1.8 %
Low Temperature Brittleness	D2137 -40 degrees C	Pass

Material: Rubber meets ASTM C923 / Mastic meets ASTM C990

All costs for furnishing and installing barriers shall be included in the unit price bid for storm or sanitary manholes.

2.15 PRE-CAST SEGMENTAL BLOCK

Eight-inch (8") pre-cast segmental radial block may be used for the lower portion of manhole over large diameter pipe and for shallow manholes and catch basins. Concrete used in the manufacturing of these blocks shall conform to the requirements of ASTM "Specifications for Concrete & Masonry Units for Construction of Catch Basins & Manholes", Serial Designation C-139.

The exterior of all block manholes shall be plastered with one-half inch ($\frac{1}{2}$ ") of mortar.

2.16 CONCRETE

Concrete to be used shall be MnDOT 3F52 Mix Design, or approved equal.

2.17 STEEL REINFORCING BARS

Steel reinforcing bars shall be deformed steel bars for concrete reinforcement to conformance with ASTM Designation A-305 and ASTM Designation A-15 Intermediate Grade Billet Steel.

2.18 SOIL MATERIALS

- A. Normal Fill Material.** Is defined under the Sewer Specification No. 13.05.
- B. Select Granular Material.** MnDOT Specification 3149 shall be used for select granular material as shown and specified under the pipe bedding classification or an equivalent natural granular soil (100% passing a $\frac{3}{4}$ " sieve and maximum of 10% passing a #200 sieve);
- C. Granular Borrow Fill Material.** MnDOT Specification 3149 shall be used for granular borrow material as shown and specified under the pipe bedding classification or an equivalent natural granular soil (100% passing a $\frac{3}{4}$ " sieve and a maximum of 20% passing a #200 sieve);
- D. Class 5 Aggregate.** Class 5 crushed aggregate shall be in conformance with MnDOT Specification 3138.
- E. Crushed Rock.** The material shall consist of durable crushed quarry rock of which 100% passes a two-inch (2") sieve and of which 95% is retained on a #4 sieve size. It shall not contain soil overburden, sod, roots, plants, and other organic matter, or any other materials considered objectionable by the engineer.
- F. Pit Run Gravel.** The material shall consist of sound, durable particles of gravel and sand with which may be included limited amounts of fine soil particles as binding material, and of which 100% passes a two-inch (2") sieve and of which 90% is retained on the #200 sieve size. It shall not contain sod, roots, plants and other organic matter, or any other objectionable materials.

- G. Coarse Filter Aggregate.** Coarse granular pipe bedding material shall be a well-graded crushed rock or pea gravel and shall meet the requirements of MnDOT Specification 3149 of which 100% passes a one-inch (1") sieve and a maximum of 10% passes a #4 sieve. It shall not contain sod, roots, plants and other organic matter, or any other objectionable materials.
- H. Rock Stabilization.** Rock stabilization shall consist of three-fourth inch (3/4") minus rock installed in the trench bottom at the discretion of the engineer.
- I. Lightweight Aggregate.** Lightweight aggregate shall consist of an aggregate having a density of 48 to 54 pounds per cubic foot installed in the trench bottom at the direction of the engineer.

2.19 SUBSURFACE DRAINTILE

Subsurface drains shall be in accordance with the applicable provisions of MnDOT 2502 and 3245 and in accordance with the Detail Plate Nos. 5232 and 5233, whichever is applicable. This drain is intended to collect and discharge infiltration that may accumulate in the bottom of granular backfilled subcuts.

Subsurface drain pipe shall be 4-inch perforated thermoplastic (TP) pipe. To prevent infiltration into the perforated pipe, the trench shall be wrapped with geotextile, MnDOT 3733, Type I. Trench backfill shall be Coarse Filter Aggregate, MnDOT 3149.

Subcut drains shall connect directly to permanent drainage structures (catch basins). Connections to drainage structures shall be incidental work and shall meet the approval of the Engineer.

Pipe shall generally be placed according to the detail plates, but other configurations may be approved by the Engineer to accomplish the desired results. Unless otherwise specified, drain grades shall conform to subcut grades having positive drainage throughout the line to the drainage structure (no high or low points). When dRAINTILE outlets exceed 100 feet, cleanouts shall be provided at 200-foot intervals and at the upper end of the pipe as per standard Detail Plate No. 5234.

The Contractor shall place 4-inch perforated TP pipe in the bottom of the subcut according to the design typical. The coarse filter aggregate and at least 12 inches of subcut backfill shall be placed above the pipe and wrapped in MnDOT 3733 Geotextile (Type 1) before any compactive effort is applied. Perforations shall be laid down. Connections to drainage structures shall be composed of angle fittings not to exceed 22-1/2 degrees. Openings in structures to receive the fitting shall be fabricated at the plant or core drilled in the field. The use of jackhammers or sledge hammering will not be allowed.

2.20 TRACE WIRE

All requirements for trace wire materials, installation and testing in the City of Chanhassen, Minnesota shall be in accordance with the most recent edition of the City of Chanhassen's Sewer & Water Trace Wire Specifications.

2.21 INSULATION

Sheet insulation shall be a total of four-inches thick, four-foot wide Direct Bury insulation. Sheets shall be centered on the pipe and installed above or below the pipe in accordance with typical Detail Plate No. 2204.

Sheet insulation shall be extruded rigid board material having a thermal conductivity of 0.23 BTU/hour/square foot/degree Fahrenheit/per inch thickness, maximum, at 40°F mean, a comprehensive strength of thirty-five (35) psi minimum, and water absorption of one quarter percent (0.25%) by volume minimum.

Site specific requirements shall be determined by the Engineer and shall be preapproved prior to construction.

SECTION 3.00 - INSPECTION AND TESTING OF MATERIALS

3.01 SHOP INSPECTIONS AND TESTING

All materials furnished by the contractor are subject, at the discretion of the engineer, to inspection and/or testing by accepted methods at the plant of the manufacturer. This inspection and/or testing is to be made at the cost of the Owner. The material supplier shall provide the City with copies of test results on materials that are furnished to the contractor.

3.02 FIELD INSPECTION AND TESTING

All materials furnished by or for the contractor for incorporation into the work under contract shall, at the discretion of the engineer, be subject to inspection and/or testing by methods acceptable to the engineer and at the expense of the contractor.

3.03 DISPOSITION OF DEFECTIVE MATERIAL

All material found during the process of inspecting and testing to be defective, or defective material encountered at any time during the progress of the work, will be rejected by the engineer and the contractor shall promptly remove from the site all such material.

3.04 CONCRETE TEST CYLINDERS

The contractor shall furnish without charge all concrete samples needed for concrete test cylinders, slump tests, air entertainment tests, and any other tests ordered by the engineer.

On all types of concrete construction, up to 4 test cylinders may be taken from each section of the structure cast in one pouring operation. The actual cost of testing shall be paid by the owner.

SECTION 4.00 - CONTRACTOR'S RESPONSIBILITY FOR MATERIALS

4.01 MATERIAL FURNISHED BY CONTRACTOR

The contractor shall be responsible for all material furnished, and shall replace at his/her own expense all such material that is found to be defective in manufacture or that has become damaged in handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work or during the warranty period.

4.02 MATERIAL FURNISHED BY THE OWNER

The contractor's responsibility for material furnished by the owner shall begin at the point of delivery by the manufacturer, or owner, and upon acceptance of the material by the contractor. The contractor shall examine all material furnished by the owner at the time and place of delivery and shall reject all defective material. The point of delivery shall be stated in the special provisions.

4.03 REPLACEMENT OF DAMAGED MATERIAL

Any material furnished by the owner that becomes damaged after acceptance by the contractor shall be replaced by the contractor at his/her own expense.

4.04 RESPONSIBILITY FOR SAFE STORAGE

The contractor shall be responsible for the safe storage of material furnished by or to him, and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter at all times.

SECTION 5.00 - MATERIAL HANDLING, ALIGNMENT AND GRADE

5.01 MATERIAL HANDLING

Pipe and other accessories shall, unless otherwise directed in the special provisions, be unloaded at the point of delivery, hauled to and distributed at the site of the project by the contractor. They shall at all times be handled with care to avoid damage. In distributing the material at the site, each piece shall be unloaded opposite or near the place where it is to be laid in the trench. Any adjustments to pipe lengths including R.C.P. shall be accomplished by the use of a saw or cutting device. The use of hammers or mauls will not be permitted. Pipe shall be so handled that the coating and lining will not be damaged. If, however, any part of the lining or coating is damaged, the repair shall be made by the contractor at his/her expense in a manner satisfactory to the engineer.

5.02 PIPE ALIGNMENT AND GRADE

All pipe shall be laid and maintained to the required lines and grades, with manholes, catch basins and fittings at the required locations. The owner will furnish one set of line and grade stakes necessary for the work. It shall be the contractor's responsibility to preserve these stakes from loss or displacement. The engineer may order replaced any stakes s/he deems necessary for the proper prosecution of the work. Any replacements shall be at the contractor's expense. All pipes shall be laid to the grade shown on the contract drawings.

5.03 DEVIATION WITH ENGINEER'S CONSENT

No deviation shall be made from the required line or grade except with the written consent of the engineer.

SECTION 6.00 - UNDERGROUND SURFACE AND OVERHEAD UTILITIES

6.01 EXISTING UTILITIES

Existing water and sewer mains, and other underground utilities, are shown on the plans only by general location. The owner does not guarantee the locations as shown on the plans, and the contractor shall be solely responsible for verifying the exact location of each of these utilities, without additional compensation. Prior to the start of any construction, the contractor shall notify all utility companies having utilities in the project area.

The contractor shall have sole responsibility for providing temporary support and for protecting and maintaining all existing utilities in the project area during the entire period of construction, including but not limited to the period of excavation, backfill and compaction. In carrying out this responsibility, the contractor shall exercise particular care, whenever gas mains or other utility lines are crossed, to provide compacted backfill or other stable support for such lines to prevent any detrimental displacement, rupture or other failure.

6.02 SUBSURFACE EXPLORATION

It shall be the contractor's responsibility to determine and verify the location of existing pipes, valves or other underground structures as necessary to progress with the work with no additional compensation allowed. The engineer shall make all known records available. All known utilities are designated on the plans in a general way only as stated above.

6.03 OVERHEAD UTILITIES AND OBSTRUCTIONS

Overhead utilities, poles, etc. shall be protected against damages by the contractor and if damaged by the contractor, shall be replaced by him. Should it become necessary during the progress of the work to remove or relocate existing poles, overhead utilities and obstructions, the contractor shall cause the same to be done at no expense to the owner unless otherwise provided for in the special provisions. This requirement is not intended to allow utility companies to charge for expenses incurred for work performed where their utilities lie within the street right-of-way or dedicated easement.

It will be the duty of the contractor to visit the site and make exact determination of the existence of any such facilities prior to the submission of his/her bid.

SECTION 7.00 - EXCAVATION AND TRENCH PREPARATION

7.01 GENERAL

The trench shall be so dug that the pipe can be laid to the alignment and depth required and shall be excavated only so far in advance of pipe laying as the Engineer shall specify. The trench shall be so braced and drained that the workmen may work wherein safely and efficiently. All trenches shall be sheeted and braced as per Chapter Sixty-Six: Trench bracing of the Minnesota Regulations relating to industrial safety to a safe angle of repose. Such angle of repose shall be no less than that repose required by the Accident Prevention Division of the Minnesota State Industrial Commission or the requirements of the Occupational Safety and Health Act (OSHA), whichever is more restrictive.

It is essential that the discharge of any required trench dewatering pumps FOLLOW Best Management Practices and be conducted to natural public drainage channels, drains or storm sewers. **This dewatering must be approved by the engineer prior to dewatering activities.**

All utility installations under existing "collector" roads or newly constructed (less than 5 years old) residential streets shall be jacked or directional bored as appropriate. No open trenching will be allowed.

7.02 PIPE BEDDING

Pipe bedding as shown on the standard detail plates shall be used as directed on the plans or specified in the special provision. PVC, HDPE, and ABS pipe shall be bedded in accordance with the specifications described below. Any special bedding shall be in accordance with the special provisions.

A. Polyvinyl Chloride Pipe (PVC)

All PVC pipe shall be installed and bedded in accordance with ASTM Specification D-2321, "Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe." Embedment materials shall be in accordance with MnDOT specification 3149 as shown on Detail Plate No. 2203. Embedment materials shall be compacted in six-inch (6") lifts to a point twelve inches (12") above the pipe and to a density of at least 95% of standard proctor density as described by ASTM methods D698. All embedment materials shall be tested for compliance with the above specification and test results shall be supplied to the Engineer. If materials are purchased, weight slips should also be provided.

The contractor shall check for excess deflection in all portions of the PVC sanitary sewer line after placement of the backfill materials in the trench. The deflection will be checked by means of a Mandrel prior to final acceptance of the sanitary sewer line and after 30 days of its installation, whichever is the greater. Televising inspections in accordance with Section 19.00 shall be conducted after the deflection is checked. The owner reserves the right to measure pipe deflection at any time during the warranty period. Deflections greater than 5% of the inside diameter of the pipe shall be

considered failure of the bedding procedure. The test shall be performed without using mechanical pulling devices.

The contractor shall be required to re-excavate the trench, recompact the backfill material and restore the surface at no additional compensation with the re-laid pipe meeting the 5% requirement. An air pressure retest shall be performed at the direction of the City Engineer.

B. High Density Polyethylene (HDPE)

All HDPE pipe shall be installed and bedded in accordance with ASTM Specification D-2321, "Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe." Embedment materials shall be in accordance with MnDOT specification 3149 as shown on Detail Plate No. 2203. Embedment materials shall be compacted in six-inch (6") lifts to a point twelve inches (12") above the pipe and to a density of at least 95% of standard proctor density as described by ASTM methods D698. All embedment materials shall be tested for compliance with the above specification and test results shall be supplied to the Engineer. If materials are purchased, weight slips should also be provided.

The contractor shall check for excess deflection in all portions of the HDPE storm sewer line after placement of the backfill materials in the trench. The deflection will be checked by means of a visual, lamping inspection prior to final acceptance of the storm sewer line and after installation is complete. The owner reserves the right to measure pipe deflection at any time during the warranty period. Deflections greater than 5% of the inside diameter of the pipe shall be considered failure of the bedding procedure. The test shall be performed without using mechanical pulling devices.

The contractor shall be required to re-excavate the trench, recompact the backfill material and restore the surface at no additional compensation with the re-laid pipe meeting the 5% requirement.

C. Reinforced Concrete (RCP) or Ductile Iron (DIP)

When existing soil conditions are not acceptable for backfill and/or compaction in the pipe zone, pipe bedding and backfill shall be used as shown on Detail Plate No. 2201. Otherwise, backfill as shown on Detail Plate No. 2202 may be used.

7.03 TRENCH WIDTH AND DESCRIPTION

The trench width at the top of the excavation may vary depending upon the depth of the trench and the nature of material encountered. However, the maximum allowable width of trench shall be in strict accordance with MnDOT Specifications. The width of the trench shall also be kept at a minimum to prevent excess destruction of the existing street or highway pavement.

For trench width at the top of pipe greater than specified in the paragraph above, the contractor may propose alternate strength of pipe to depth of cover relationships other than those listed on the form of proposal, or shown on the plans. Such proposals must be submitted to the engineer

for approval in writing and with pertinent pipe strength and soil weight data at least 14 days prior to the desired construction date. No extra compensation shall be allowed for any increase in material or construction costs created by alternate plans.

7.04 CORRECTING FAULTY GRADE

Any part of the trench excavated below grade shall be corrected with approved material and thoroughly compacted without additional compensation to the contractor.

7.05 PIPE FOUNDATION IN POOR SOIL

When the bottom at subgrade is soft and in the opinion of the engineer cannot adequately support the pipe, a further depth and/or width shall be excavated and refilled to pipe foundation grade with approved material and thoroughly compacted; or other approved means, such as piling, shall be adopted to assure a firm foundation for the pipe with extra compensation allowed the contractor as provided elsewhere in these specifications.

The contractor shall furnish, drive, and place piling if ordered by the engineer. Piles shall be driven in exact position at locations determined by the engineer. The contractor at his/her own expense must replace piles not correctly positioned at the completion of driving.

7.06 PIPE FOUNDATION IN ROCK

The space between the bottom of the trench and rock and the bottom of the pipe shall be backfilled with granular base material thoroughly tamped. Generally speaking the material from the trench excavation, other than rock or boulders, shall be considered suitable material. No additional compensation for placing or tamping this material shall be allowed. However, in the event that additional material must be hauled in, the hauling of the suitable granular material for the pipe bed shall be paid for on a weight basis when ordered by the engineer. Weight slips shall be delivered to the engineer daily.

7.07 BRACED AND SHEETED TRENCHES

The contractor shall adequately brace and sheet excavations wherever necessary to prevent caving or damage to nearby property. The cost of this temporary sheeting and bracing, unless provided for otherwise, shall be considered as part of the excavation costs without additional compensation to the contractor. Trench sheeting shall remain in place until pipe has been laid, tested for defects and repaired if necessary, and the earth around it compacted to a depth of one foot (1') over the top of the pipe. Sheeting, bracing, etc. placed in the "pipe zone", that part of the trench below a distance of one foot (1') above the top of the pipe, shall not be removed without the written permission or written order of the engineer; that sheeting thereby left in place shall be paid for at the unit price bid. Sheeting ordered left in place by the engineer in writing shall be paid for at the unit price bid. The contractor may also leave in place, at his/her own expense, to be embedded in the backfill of the trench, any sheeting or bracing in addition to that ordered left in place by the engineer for the purpose of preventing injury or damage to persons, corporations, or property, whether public or private, for which the contractor under the terms of this contract is liable.

7.08 PILING OF EXCAVATED MATERIAL

All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other satisfactory provisions made for street drainage.

7.09 BARRICADES, GUARDS AND SAFETY PROVISIONS

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, flashers, and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the highway. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor. The rules and regulations of the local authorities respecting safety provisions shall be observed.

7.10 TRAFFIC AND UTILITY CONTROLS

Excavations for pipe laying operations shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches, the contractor shall provide suitable bridges at street intersections and driveways. The contractor shall post, where directed by the engineer, suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, sanitary manholes, storm sewer manholes and catch basins, fire or police call boxes, trace wire access boxes, or other utility controls shall be left unobstructed and accessible during the construction period.

7.11 PRIVATE PROPERTY PROTECTION

Trees, fences, poles and all other private property shall be protected unless their removal is authorized; and any property damage shall be satisfactorily restored by the contractor, or adequate compensation therefore shall be the responsibility of the contractor.

7.12 TUNNELING, JACKING, BORING OR EXCAVATION OTHER THAN OPEN TRENCH

Where pipe cannot be placed by open trench excavation, the method for placing and payment therefore shall be stated in the special provisions.

7.13 RAILROAD AND HIGHWAY CROSSINGS

When any railroad is crossed, all precautionary construction measures required by the railroad shall be followed and as specified in the special provisions and/or details. The contractor shall be responsible for the securing of necessary crossing permits.

Before any construction is started, the successful bidder shall meet with the Minnesota Department of Transportation, County Highway Department, Railroad Maintenance Engineer, and the consulting engineers to determine the construction procedure to be followed, methods of rerouting traffic, placing of barricades, flares, signs, flagmen, etc., and methods of preventing damage to the highway or railroad. If required by the railroad or highway department, the contractor shall deposit with them a certified check in the amount specified by them to cover the required repair work.

SECTION 8.00 - LAYING OF PIPE

8.01 TRENCH PREPARATION

Prior to the laying of the pipe, the trench shall be excavated and prepared in accordance with the previous specifications and the class of bedding specified.

8.02 TYPE, SIZE AND CLASS OF PIPE

The type, size and class of pipe installed shall be in conformance with that specified on the bid proposal, plans and/or detail plates.

8.03 CLASS OF BEDDING

The class of bedding shall be in conformance with that specified on the plans or detail plates.

8.04 CLEANING PIPE

All foreign matter or dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench, and it shall be kept clean by approved means during and after laying. The outside of the tongue or spigot end of the pipe shall be wire brushed and wiped clean and dry and free from oil and grease before the pipe is laid.

8.05 LAYING PIPE

The contractor shall plug the pipe under construction at any existing manhole until the system is finalized. Pipe laying shall proceed with the tongue or spigot ends pointed in the direction of flow. The laying of pipe shall conform to the class of bedding specified. Pipe shall not be laid in water or when the trench conditions are unsuitable for such work except by written permission of the engineer. The excavation of trenches shall be fully completed a sufficient distance in advance of the pipe laying and the exposed ends of all pipe shall be fully protected with a board or approved stopper to prevent earth or other substances from entering the pipe.

The interior of the sewer shall be carefully cleaned from all dirt, cement, or superfluous material of every description as the work progresses. If necessary, pipe shall be thoroughly flushed at the completion of the work at the expense of the contractor as directed by the engineer.

8.06 GRADE CONTROL

The contractor shall maintain the line and grade of the pipe in the trench by means of the laser. The batter board method will not be allowed.

SECTION 9.00 - PIPE JOINTING

9.01 GENERAL

Joints for concrete pipe shall be installed per gasket manufacturer's recommendation. When inserting the spigot end into the bell ensure sufficient force to properly seal the pipes.

Joints for poly-vinyl chloride pipe on mainline sewer shall be made by the use of a push-on rubber gaskets. **Fernco fittings will not be allowed.**

Typical residential or commercial sanitary services shall be solvent weld joints and the wye shall be gasketed. All jointing procedures shall be in accordance with the recommendations of the pipe manufacturer.

Wherever sanitary service line connections to the main sewer are required to be made after the original construction of the main line sewer, remove a section of the main line sewer pipe and replace it with a wye section connected by means of a gasketed sleeve/coupling approved by the City Engineer.

9.02 PIPE JOINTS

Pipe joints shall be made using the materials specified under Section 2.00. All sliding surfaces of the joint shall be cleaned and installed per gasket manufacturer's recommendation immediately before the pipe is brought home.

9.03 STORM SEWER RCP PIPE - TIES ON STEEP GRADES

RCP storm sewer pipe joints shall be tied using 2 tie bolt fasteners per joint and installed at 60 degrees from top of pipe when the pipe being laid is on a grade greater than 7%.

SECTION 10.00 - SERVICE CONNECTIONS, WYES

10.01 GENERAL

As indicated on the plans and detail plates, six-inch (6") gasketed wyes shall be installed for building connections at such intervals as the size of the lots may demand. Where the depth of the trench exceeds sixteen (16') feet, the contractor shall use a riser, and shall be extended to a minimum of nine (9') feet below the surface at the property line (see Detail Plate No. 2001), or as shown on the plan for the invert of sewer services. Sewer service material including pipe, wyes and fittings shall be in accordance with Section 2.07 based on depth or as directed by the Engineer. **Fernco fittings and ductile iron pipe fittings shall not be allowed unless approved by the City Engineer. Tees shall not be allowed.**

The joints and bedding shall be made as previously specified. The tops of all risers and openings to wye branches shall be capped by solvent weld plug to prevent any water from entering the service until the connection is placed in service.

Wherever sanitary service line connections to the main sewer are required to be made after the original construction of the main line sewer, remove a section of the main line sewer pipe and replace it with a wye section connected by means of a gasketed sleeve/coupling approved by the City Engineer.

10.02 RECORD AND LOCATION OF SERVICE CONNECTIONS

It shall be the duty of the contractor to keep an accurate record of service connections as to location at lateral, vertical and horizontal bends and right-of-way, depth to top of riser, type of connection provided, etc. Location shall be made in respect to the nearest manhole center downgrade from the service. Curb stops shall be tied to definable landmarks such as manholes, catch basins, gate valves, hydrants and building corners. The length of ties shall be no longer than 100 feet between tie points. If a permanent structure is not available within the 100-foot length, a third tie point of not more than 150 feet shall be supplied. Property corners, trees, power poles, light poles, telephone or utility boxes are not acceptable ties. This record shall be turned over to the engineer for his/her records at time intervals specified by the engineer.

At the end of all house connections, the contractor shall furnish and set a steel t-post vertically to three feet (3') above the ground surface in accordance with Detail Plate No. 2001. In areas of newly platted land where the houses have not yet been built on the lots serviced, the contractor shall furnish and set steel fence posts and extend three feet (3') above the ground surface. The t-post shall extend from the invert of the service stub to three feet (3') above the ground surface.

SECTION 11.00 - SANITARY SEWER LEAKAGE TESTING

11.01 GENERAL

Disposition of abandoned facilities and reconnection of existing facilities shall be as provided for in the Plans, Specifications, and Special Provisions.

11.02 SANITARY SEWER LEAKAGE TESTING

All sanitary sewer lines, including service connections, shall be substantially watertight and shall be tested for excessive leakage upon completion and before connections are made to the service by others. Each test section of the sewer shall be subjected to exfiltration testing, either by hydrostatic or air test method as described below and at the Contractor's option. The requirements set forth for maximum leakage shall be met as a condition for acceptance of the sewer section represented by the test.

If the ground water level is greater than three feet above the invert elevation of the upper manhole and the Engineer so approves, infiltration testing may be allowed in lieu of the exfiltration testing, in which case the allowable leakage shall be the same as would be allowed for the Hydrostatic Test.

All testing shall be performed by the Contractor without any direct compensation being made therefore, and the Contractor shall furnish all necessary equipment and materials, including plugs and standpipes as required.

11.03 AIR TEST METHOD

The sewer pipe section under test shall be clean at the time of testing but the pipe may be wetted. Pneumatic balls shall be used to plug the pipe ends at manholes. Low pressure air shall be introduced into the plugged line until the internal air pressure reaches 4.0 psi greater than the average back pressure of any ground water pressure that may submerge the pipe. At least two minutes shall be allowed for the air temperature to stabilize before readings are taken and the timing started. During this time the Contractor shall check all plugs with soap solution to detect plug leakage. If plugs are found to leak, air shall be bled off, the plugs shall be retightened, and the air shall be reintroduced into the line.

The sewer section under test will be accepted as having passed the air leakage test if it does not lose air at a rate to cause the pressure to drop from 3.6 to 3.0 psi in less time than one-half minute per inch in diameter of the pipe tested.

Pipe Diameter in Inches	Minutes
4	2.0
6	3.0
8	4.0
10	5.0
12	6.0
15	7.5
18	9.0
21	10.5

11.04 HYDROSTATIC TEST METHOD

After bulkheading the test section, the pipe shall be subjected to a hydrostatic pressure produced by a head of water at a depth of three feet above the invert elevation of the sewer at the manhole of the test section. In areas where ground water exists, this head of water shall be three feet above the existing water table.

The water head shall be maintained for a period of one hour during which time it will be presumed that full absorption of the pipe body has taken place, and thereafter for an extended period of one hour the water head shall be maintained as the test period. During the one hour test period, the measured water loss within the test section, including service stubs, shall not exceed the Maximum Allowable Loss (in Gallons Per Hour per 100 Feet of Pipe) given below for the applicable Main Sewer Diameter.

Main Sewer Diameter (In Inches)	Maximum Allowable Loss* (In Gallons Per Hour Per 100 Feet)
6	0.5
8	0.6
10	0.8
12	1.0
15	1.2
18	1.4
21	1.7
24 & Larger	1.9

*Based on 100 Gallons Per Day Per Pipe Diameter Inch Per Mile

If measurements indicate exfiltration within a test action section is not greater than the allowable maximum, the section will be accepted as passing the test.

11.05 DEFLECTION TEST

Deflection tests shall be performed on all plastic gravity sanitary sewer pipes. The test shall be conducted after the sewer trench has been backfilled to the desired Grading Grade (Grading Grade is defined as top of subgrade) and has been in place for 30 days.

The deflection test shall be performed by pulling a rigid ball or pointed mandrel through the pipe without the aid of mechanical pulling devices. The ball or mandrel shall have a minimum diameter equal to 95% of the actual inside diameter of the pipe. The maximum allowable deflection shall not exceed five percent of the pipe's internal diameter. The time of the test, method of testing, and the equipment to be used for the test shall be subject to the approval of the Engineer. The contractor shall check for excess deflection in all portions of the PVC sanitary sewer line after placement of the backfill materials in the trench. The deflection will be checked by means of a Mandrel prior to final acceptance of the sanitary sewer line or after 30 days of its installation, whichever is the greater. The owner reserves the right to measure pipe deflection at any time during the warranty period. Deflections greater than 5% of the inside diameter of the pipe shall be considered failure of the bedding procedure. The test shall be performed without using mechanical pulling devices.

The contractor shall be required to re-excavate the trench, recompact the backfill material and restore the surface at no additional compensation with the re-laid pipe meeting the 5% requirement. An air pressure retest to be performed at the direction of the City Engineer.

All testing shall be performed by the Contractor at his/her expense without any direct compensation being made therefore, and s/he shall furnish all necessary equipment and materials required.

11.06 TEST FAILURE AND REMEDY

In the event of test failure on any test section, testing shall be continued until all leakage has been detected and corrected to meet the requirements. All repair work shall be subject to approval of the Engineer. Introduction of sealant substances by means of the test water will not be permitted.

Unsatisfactory repairs or test results may result in an order to remove and replace pipe as the Engineer considers necessary for test conformance. All repair and replacement work shall be at the Contractor's expense.

SECTION 12.00 - SETTING MANHOLES AND CATCH BASINS

12.01 GENERAL

Manholes and catch basins shall be set and jointed to the line in the manner specified for laying and jointing pipe.

12.02 LOCATION

Manholes shall be located as shown on the plan or as directed by the engineer. Catch basins shall be located a minimum of 10 feet away from any pedestrian ramp as shown on the plan or as directed by the engineer

12.03 TYPE OF CONSTRUCTION

Wherever possible, and unless otherwise specified, the manholes and catch basins shall be constructed of precast sections. Where precast sections cannot be used, the Engineer may dictate these sections be constructed of brick, block, concrete, or a combination of such materials. Unless otherwise specified, the manholes and catch basins if necessary shall be constructed with steps in accordance with the detail plates of this specification.

12.04 CONSTRUCTION DETAILS

The details of construction of each individual structure shall conform to the drawings and specifications as designated. Frames and covers shall be set to the designated elevation in a full mortar bed. The bottom of all manholes shall be constructed of half section of equivalent size pipe shaped to conform to the inlet and outlet pipe so as to allow a free, uninterrupted flow.

12.05 ADJUSTING RINGS AND BLOCKS

A minimum of two 2" rings and a maximum of three adjusting rings shall be provided between the cast iron cover frame and the top concrete manhole section. The maximum stack height of adjusting rings shall be 12" total for all new construction. The rings shall be adjusted per Detail Plate No. 2110.

12.06 WATERPROOFING AND PRECAST SECTION JOINT CONSTRUCTION

Manholes and catch basins shall be constructed in such a manner that they are waterproof. Joints between manhole sections shall be made using rubber gaskets as specified previously. 12" Gatorwrap external seals shall be constructed at barrel and cone section joints on sanitary applications, or approved equal.

12.07 LIFTING HOLES

Not more than two (2) lifting holes will be allowed in any precast manhole section. All lifting holes shall be plugged with non-shrinking mortar to ensure a waterproof installation.

12.08 MANHOLE AND CATCH BASIN BASE

Concrete base shall be of size and depth as shown on the drawings. Concrete used shall have a 28-day compressive strength of at least 3,000 pounds per square inch.

Precast base must be placed on a minimum of six inches (6") of granular material which has been thoroughly compacted and leveled off across the entire width of the base.

Where the foundation is unstable, the Engineer may order the contractor to install manholes on piling. Manhole base reinforcement and timber piles shall be as shown on the drawings.

12.09 MANHOLE INSIDE DROP SECTIONS

Inside drop sections are required if pipe inverts differential is greater than 20”.

Manhole drop sections shall be constructed where shown on the plans according to Detail Plate No. 2104 and shall be the following:

Reliner Inside Drop Bowl, or approved equal.

Anchoring, straps, and fasteners of Reliner Inside Drop Bowl and drop sections shall utilize stainless steel.

12.10 MANHOLE DEBRIS

In order to limit the amount of debris and deleterious material that enters the sanitary system while working on sanitary manholes a manhole debris catcher, or “parachute”, shall be used at the direction of the Engineer. The catcher must be able to open to a minimum diameter of 48 inches and have a capacity of 50 pounds and extend to the bottom of the manhole. The catcher shall allow unobstructed flow of the sanitary system at all times. If debris enters the sanitary system, the system shall be adequately cleaned, jetted, and televised within 48-hours to the satisfaction of the Engineer at no cost to the Owner.

SECTION 13.00 - BACKFILLING

13.01 GENERAL

All excavation in trenches shall be backfilled to the original ground surface or to such grades as specified or shown on the plans. The backfilling shall begin as soon as practicable after the pipe has been placed. Prior to any backfilling, the excavation shall be cleaned of all trash, debris, organic material and other undesirable material.

13.02 BACKFILL PROCEDURE AT PIPE ZONE

Backfilling and compacting shall be done as thoroughly as possible so as to prevent after settlement. Depositing of the backfill shall be done so the shock of falling material will not injure the pipe or structures. Grading over and around all parts of the work shall be done as directed by the engineer.

Bedding material as specified in Sewer Specification 7.02 or other suitable material as determined by the engineer, free from rocks and boulders, shall be deposited in the trench simultaneously on both sides of the pipe for the full width of the trench to a height above the top of the pipe as specified shovel placed and hand tamped to fill completely all spaces under and adjacent to the pipe. In the event that natural, suitable, granular material is not encountered during the normal excavation of the trench, or when the material encountered is determined unsuitable by the engineer, for backfilling around the pipe as required above; the contractor shall provide and place such approved material obtainable from other sources. (This procedure and specification is applicable to all sanitary sewer and storm sewer installations.)

13.03 BACKFILL PROCEDURE ABOVE THE PIPE ZONE

Unless otherwise specified, suitable backfill material shall be furnished and the following backfill procedures shall apply and be used above the "pipe zone" to either the existing surface elevation or design grade, as specified, with the cost of such considered incidental to the installation of the pipe unless specified for a particular section of the project by the special provisions and/or plans, or allowed in writing by the engineer, and a unit price has been established.

A. Type I.

The trench shall be backfilled to obtain the necessary compaction, with the lift thickness as required, dependent upon type of roller. The backfill material shall be compacted to 95% of the standard moisture density relationship of soils (ASTM D698-70) except the top three feet (3') of the subgrade which shall be compacted to 100% density. The moisture contents of these backfill materials shall be within a range of $\pm 3\%$ of optimum moisture content. If the existing moisture content of the backfill material below three feet of subgrade is greater than 3 percentage points above the optimum moisture content, the soil shall be compacted to a minimum density of 3 pounds per cubic feet less than the standard Proctor curve at that moisture content. At no time shall the density be less than 90 percent of the standard Proctor density. This modification of the compaction specification shall at no time be

used or applied to the upper 3 feet of the subgrade or the aggregate base. In the event the contractor fails to meet these compaction requirements, corrective measures such as spreading/discing/farming, etc. shall be undertaken or the Contractor may elect to backfill with a more suitable material taken from another source. All of these corrective measures shall be at the Contractor's expense.

Any settlements greater than one inch (1") as measured with a string line from one edge of the settlement to the other within the warranty period of this contract shall be considered failure of the mechanical compaction and all street surfaces, driveways, boulevard and ditch areas shall be repaired by the contractor at no cost to the City.

B. Type II.

Under state or county highways and road, the contractor shall obtain the necessary permits at his/her expense after commencing any type of work upon a state or county highway or roadway. All such work, especially backfilling, shall conform to state and county standards and specifications.

13.04 DISPOSAL OF EXCESS MATERIALS AND DEBRIS

Unless otherwise specified, excavated material either not suitable or not required for fill material shall be disposed of by the contractor outside of the right-of-way at his/her expense in any manner s/he may elect subject to the provisions of the following paragraph.

Before dumping such materials or debris on a private or public land, the contractor must obtain from the owner of such land written permission for such dumping and a waiver of all claims against the owner for any damage to such land which may result therefore together with all permits required by law for such dumping. A copy of such permission, waiver of claims and permit shall be filed with the engineer before said disposal is made.

13.05 FILL MATERIAL

Normal, allowable "fill material" used in backfilling outside of the pipe zone encasement shall be sand, gravel, or clay free from pieces of rock, concrete or clay lumps more than 1/3 cubic foot in volume, roots, stumps, organic soil, vegetation, tin cans, rubbish, frozen materials, and similar articles and substances whose presence in the backfill would cause excessive settlement. In that portion of the backfill which is within six inches (6") of a road subgrade, there shall be no stones which will be retained on a three-inch (3") sieve.

13.06 DENSITY TESTS

Density tests will be performed by an approved soils testing firm at various locations and depths throughout the project as directed by the engineer. The contractor shall cooperate fully and provide assistance as necessary to complete these tests with no additional compensation being made to the contractor. A minimum of one test at an elevation approximately two feet above the top of pipe, one test in the top three feet and one test at an intermediate elevation per 100 feet of

pipe. A minimum of 50% of the individual water and sewer service trenches shall be tested at elevations listed above.

13.07 TEST & PROOF ROLLING

Test and proof rolling when requested by the Engineer shall be in accordance with MnDOT Specification 2111 except as modified herein under Sections 1.03 and 1.04 Subgrade Preparation & Correction of the Street Construction Specifications.

SECTION 14.00 - SURFACE RESTORATION, CLEANUP AND GUARANTEE

14.01 RESTORATION OF SURFACE

All surfaces disturbed during the construction period, including adjacent streets used to access the project, whether caused by actual excavation, deposition of excavated material, or by the construction equipment, shall be returned to its original conditions or better. Exceptions to the above, if any, or special instructions pertaining to any particular section of the project will be outlined in the special provisions. Any excess dirt shall be removed by the contractor in accordance with Section 13.04 of these specifications.

14.02 DUST CONTROL DURING CONSTRUCTION

The contractor shall at his/her own expense maintain dust control as necessary and in a manner satisfactory to the engineer until final acceptance of the project or until restoration has been completed.

14.03 MAILBOX RESTORATION

The contractor, at his/her expense, shall replace and restore mailboxes disturbed by the work unless specified by the engineer.

14.04 MAINTENANCE OF STREETS UNTIL SURFACED

After backfilling according to the above specifications, the contractor shall maintain the streets as required and blade as necessary to provide a passable surface for traffic until the surfacing is completed or to the date of final acceptance.

14.05 CLEANING UP

Surplus pipe material, tools, and temporary structures shall be removed by the contractor, and all dirt and/or rubbish caused by his/her operations and excess earth from excavations shall be hauled to a dump provided by the contractor, and the construction site shall be left in a condition satisfactory to the engineer.

14.06 GUARANTEE

The contractor shall be held responsible for any and all defects in workmanship and materials which may be developed in any part of the entire installation furnished by him and upon written notice from the engineer shall immediately replace and make good, without expense to the owner, any such faulty part or parts and damage done by reason of same, during the two-year period as prescribed in the conditions of the contract.

14.07 FAILURE TO REPLACE DEFECTIVE PARTS

Should the contractor fail to make good the defective parts within a period of 30 days of such notification, after written notice has been given him, the owner may replace these parts, charging the expense of same to the contractor.

SECTION 15.00 - TURF ESTABLISHMENT

15.01 GENERAL

All turf establishment shall be in accordance with Section 4.14, Turf Establishment, of the street specifications which is included as part of this Standard Specification.

SECTION 16.00 - OPEN DITCH CONSTRUCTION

16.01 GENERAL

The work covered by this specification may be performed with any means and equipment capable of doing a proper job.

16.02 EXCAVATION

The contractor shall excavate whatever substances are encountered to the size and dimensions shown by the drawings, plans, profiles, and cross-sections, or as instructed by the engineer.

Wherever seeding or sodding has been specified, the topsoil shall be selectively stripped and stockpiled to both sides of the right-of-way or use as topsoil for the seeding and sodding portion of the project.

The side slopes and bottom of the ditch are to be dressed as smooth and even as can be done by the skillful operation of the machinery employed to do the work. All waste material shall be removed therefrom to the satisfaction of the engineer.

During the course of construction, the contractor shall conduct his/her operation in such a way that the completed work shall be in reasonable facsimile to that shown on the plans for any particular section. Extra excavation and cost incurred for this purpose shall be at the expense of the contractor.

16.03 WASTE BANKS

Unless otherwise directed, the contractor shall place the waste banks on both sides of the ditch and level them to correspond with the slope of the ground surface as closely as possible. The material shall be finished smooth by a bulldozer, grader or dragline to the satisfaction of the engineer. Openings shall be left in the waste banks for the drainage of adjacent land, crossings or waterways.

16.04 OBSTRUCTIONS

The contractor shall remove all bridges, trees, stumps, rocks, brush, culverts, and other obstruction to his/her work within the right-of-way. Bridge or culvert material which may be usable again shall be piled outside of the right-of-way.

16.05 SILT REMOVAL

The ditch will be checked for grade and widths as the work progresses. Any work not to grade or of proper width shall be corrected. All work shall be maintained to the proper depth and width in which that part of the ditch is constructed until the end of the working season.

In case silt washes into the ditch or the banks cave into it later, the silt or cave in shall be removed, if necessary, for which the contractor shall be paid on an equipment rental basis, or some other method of compensation, if the same is agreed upon by the contractor, engineer, and representative of the owner.

SECTION 17.00 - RIPRAP AND EROSION CONTROL MATERIALS

17.01 GENERAL

The contractor shall furnish and install riprap as designated by the plans or as directed by the engineer to prevent the possibility of erosion.

17.02 RIPRAP MATERIALS

The riprap material shall conform to Minnesota Department of Transportation Standard Specifications 3601. The stone shall be durable field or quarry stone of approved quality, sound, hard, and free from seams, cracks or other structural defects. Unless otherwise specified, the stone may be round, flat, or other shapes in between.

A. Class or Size of Hand Placed and Grouted Riprap

The individual stones, except those used for chinking, shall not weigh less than 50 pounds each.

B. Size of Rock Versus Weight.

As a guide, the following table is included which compares the approximate average diameter with the various weights of round stone. Of course, flat stones of an equivalent weight would have a greater diameter.

Weight (Lbs.)	Average Diameter (Inches)	Weight (Lbs.)	Average Diameter (Inches)
10	6	150	15
30	9	180	16
50	10	250	18
80	12	300	19
110	14	400	21

17.03 RANDOM RIPRAP

This work shall conform to MnDOT Specification 2511.

17.04 HAND PLACED RIPRAP

This work shall conform to MnDOT Specification 2511.

17.05 GROUTED RIPRAP

This work shall conform to MnDOT Specification 2511.

17.06 EROSION CONTROL

The contractor shall install and maintain fabric fences, conforming to special provisions or as approved by the City Engineer or other appropriate erosion control materials at all storm sewer outlets and other potential erosion problem areas along lakes, streams or ponds as noted on the plans or as directed by the engineer.

The BMPs shown on the plans are the minimum requirements for the anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, the contractor shall anticipate that more BMPs will be necessary to ensure erosion and sediment control on the site. During the course of construction it is the responsibility of the contractor to address any new conditions that may be created by construction activities and/or climatic events and to provide additional BMPs over and above the minimum requirements shown on the plans that may be needed to provide effective protection of soil and water resources.

17.07 FILTER BLANKET MATERIAL

Filter blanket material shall conform to MnDOT Specification 3601, and shall be placed beneath the riprap material at each storm sewer outlet.

17.08 LINER MATERIAL

Erosion control liner material shall be placed beneath the filter blanket material at each storm sewer outlet as described on the detail plate.

SECTION 18.00 - FORCEMAIN

18.01 HIGH DENSITY POLY ETHYLENE (HDPE)

High Density Poly Ethylene pipe (HDPE) used for a forcemain shall be installed and tested per Section 21.00, Directional Bore of High Density Poly Ethylene, of this specification.

18.02 POLYVINYL CHLORIDE PIPE (PVC)

Polyvinyl chloride pressure pipe (PVC) for a forcemain shall conform to A.W.W.A. C900 and shall be installed per Section 2.04, Polyvinyl Chloride Pipe, of the Watermain Specifications which is included as part of this Standard Specification. All pipe shall have a minimum dimension ratio (DR) of 18 corresponding to a working pressure of 150 PSI for PVC type 1120 pipe. The pipe shall be manufactured to ductile iron outside dimensions in accordance with A.W.W.A. C900.

A. Rubber Gasket Joints.

Joint restraint for C900 PVC pipe and fitting systems shall be effected by an internal self-restraining system such as RieberLok or an approved equal. Such a system shall be rated by the manufacturer to pressures that meet or exceed the rating of the C900 PVC pipe being restrained (e.g. DR 18 is rated for service at 235 psi). No degradation of the pipe's performance is allowed.

The pipe bell shall consist of an integral wall section with a factory-installed RieberLok gasket. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C900. Gasket material shall be SBR or approved equal. Installation shall be in accordance with ANSI/AWWA C605 and the restraint manufacturer's recommendations. Joints shall be kept clean and properly lubricated prior to installation.

B. Fittings.

Fittings shall be epoxy coated ductile iron, having a minimum working pressure rating of 150 PSI and shall conform to the requirements of AWWA C110 (ANSI A21.10) or AWWA C153 (ANSI 21.53) Ductile Iron Compact Fittings. Valves, tees, crosses, hydrant barrels or any other ductile iron fitting shall be wrapped with a flat sheet or split length polyethylene tube by passing the sheet under the appurtenance and bringing it up around the body. Make seams by bringing the edges of the polyethylene sheet together, folding over twice and taping down. All buried nuts and bolts shall be Cor-Blue or stainless.

18.03 AIR AND VACUUM VALVES

Sewage automatic air and vacuum valves shall be 2" H-TEC sewage valves, Model Number 986, or approved equal.

The valve shall be furnished with a two-inch (2") inlet, a two-inch (2") stainless shut off (ball valve) and all other accessories needed for back flushing such as blow off valve, a stainless shut off (ball valve) and a quick disconnect coupling with back flushing hose.

An operating and maintenance instruction manual shall be included with the valve.

18.04 AIR RELIEF MANHOLE

Air relief manholes shall be constructed of precast concrete sections with R-4 joints as designated on the plans and shown on the detail plate in accordance with ASTM designation C-139.

18.05 PIPE INSTALLATION

All pipes shall be laid to the depth shown on the contract drawings. The contractor shall satisfactorily maintain the specified cover by means he/she deem necessary. If additional bends are required, where not shown on the drawings to maintain alignment around curves, the contractor shall provide the required number to the Engineer for approval and be compensated at the unit price as proposed on the bid form.

18.06 LAYING PIPE

A. Handling of Force Main Material Into Trench.

Proper tools and facilities satisfactory to the engineer shall be provided and used by the contractor for the safe and convenient prosecution of the work. All pipe, fittings and valves shall be carefully lowered into the trench in such a manner as to prevent damage to force main materials and protective coatings and linings. Under no circumstances shall force main materials be dropped or dumped into the trench.

B. Jointing.

All types of joints shall be made in strict accordance with manufacturer's specifications. All pipe ends shall be brushed, wiped clean, and kept clean until joints are made.

C. Cutting Pipe.

Untapered spigot ends may be encountered when pipes are cut in the field. Before assembly, the cut end should be beveled with a heavy file or other suitable apparatus, removing any sharp or rough edges to protect the gasket from injury and ensure ease of assembly.

D. Blocking.

All fittings, at points of bends in the line, shall be solidly braced against the end or sides of the trench. All fittings shall be blocked with concrete. The concrete to have a minimum compressive strength of 2000 psi and the block to be of sufficient size so as not to exert more than 2000 lbs. per square foot pressure against the soil.

18.07 TESTING FORCEMAINS

A. Hydrostatic Tests Required.

A pressure test shall be required for all installations of force main and all appurtenances.

B. Pressure Test.

The pressure test for HDPE pipe shall be per Section 6.12, Field Quality Control, of the Watermain Specifications. PVC pipe pressure tests shall be completed as per section 10.01, Pressure Testing, of the Watermain Specifications.

C. Procedure.

Each valved section of pipe shall be slowly filled with water from a safe source, and the specified test pressure, measured at the lowest point of elevation, shall be applied by means of a water pump connected to the pipe in a manner satisfactory to the engineer. Where valves do not exist the contractor shall plug the end of the line in a manner satisfactory to the engineer. The pump, pipe connections, gauge and all necessary apparatus shall be furnished by the contractor and shall be approved by the engineer before any test is made. All necessary pipe taps shall be made by the contractor as may be directed by the engineer.

D. Expelling Air Before Test.

Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this in those instances where air relief manholes exist, the pipe shall be filled with water until all air has been expelled through the air relief valve. Then the shut off valve between the force main and air relief valve shall be closed and the air relief valve disconnected from the system. The pressure test on the force main can then proceed as outlined above.

E. Examination Under Pressure.

Any cracked or defective pipes, valves and fittings discovered in consequence of the pressure test shall be removed and replaced by the contractor with sound material and the test shall be repeated until satisfactory to the engineer. The pressure test shall be performed in a manner approved by the engineer. The contractor shall correct all faulty materials or workmanship discovered during the tests and all such corrections shall be made to the satisfaction of the engineer at the contractor's expense.

SECTION 19.00 - TELEVISION INSPECTION

Televising shall be performed on all newly constructed or repaired gravity sanitary sewer lines after successful leak testing and deflection testing have been completed and accepted. Contractors and developers shall follow all requirements for televising as outlined in current City specifications at the time of project.

19.01 TELEVISION EQUIPMENT

Television equipment shall include television camera, television monitor, cables, power source, lights, and other equipment. The television camera shall be specifically designed and constructed for operation in connection with sewer rehabilitation inspection. The Contractor shall utilize a self-propelled type camera where shown on the plans or required by the Engineer.

The camera, television monitor, and other components of the recording system, will be capable of producing a color picture in high definition resolution.

The camera will be mounted so as to center the lens for each pipe diameter to be investigated. The Contractor shall accurately measure pipe diameters of both main and service laterals as well as pipe defects to the satisfaction of the Engineer.

The camera will be operative in 100% humidity conditions. Lighting for the camera will minimize reflective glare. Lighting and camera quality will be suitable to provide a clear, in-focus picture of the entire inside periphery of the sewer pipe for all conditions encountered during the work. Focal distance will be adjustable through a range of from 6" to infinity.

The remote reading footage counter will be accurate to one percent over the length of the particular section being inspected and will appear superimposed on the image shown on the television monitor.

At the Contractor's option, a push-type camera can be used to televise laterals.

19.02 TELEVISION INSPECTION PROCEDURES

The camera shall be moved through the line in either direction at a uniform rate, stopping when necessary to ensure proper documentation of the sewer's condition. In no case will the television camera traverse the line being inspected for the line length at an average speed greater than 30 feet per minute. The contractor will stop at each service or defect a minimum of 10 seconds and using the pan and tilt of the camera fully view each service connection/defect. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor will reset their equipment in a manner so that the inspection can be performed from the opposite manhole. A reset or back out charge due to debris in the lines will be considered incidental to the televising pay item.

All lines shall be jetted and vacuumed so that all debris has been removed prior to televising.

A small quantity of water is to be introduced into the line prior to televising. The amount shall be determined by the Engineer and coordinated with the City's Water and Sewer Department. The amount of water shall be sufficient enough to distinguish any sags or alignment problems with the pipe.

A fan/vacuum shall be utilized if steam given off by the sanitary sewer affects the camera visibility.

Examine starting and ending doghouses for quality of mortar work.

While at the bottom of the manhole, the camera will examine all joints as high as it can see around the entire manhole circumference. Joints shall be examined for infiltration and excessive gaps.

All outside drops shall be noted and visually examined looking down from the top.

Provide starting and ending manhole depths to the nearest 0.5'.

Include the location relative to the zero starting point, the side (left of right), and the clockwise position of the wye (i.e. 10:00). Note any problems associated with the service wye.

In the event the section being televised has substantial flow entering the sewer between manholes, such that 20% or 25% of the pipe diameter is flowing for 6"-10" pipe and 12"-24" pipe, respectively, the Contractor will be responsible to have such flow temporarily stopped or bypassed, and/or reschedule television inspection of the particular section to a time when such flow is reduced to permit proceeding with the television inspection. Temporary by-passing shall be coordinated with the City Engineer. Any required by-passing or "pigging" is considered incidental.

When sewer line depth of flow at the upstream manhole of the section being televised is above the maximum allowable for television inspection, the Contractor will reduce the flow to permit proceeding with the television inspection.

Accuracy of the measurement meters will be checked daily. Footage measurements will begin at the sewer line point of penetration of the upstream manhole, unless specific permission is given to do otherwise. Footage will be shown on the data view/monitor at all times.

19.03 DOCUMENTATION OF THE TELEVISION RESULTS

Television inspection logs will be typed in format acceptable to the City. Samples of the video and inspection log and PACP certification shall be submitted prior to bid acceptance, unacceptable submittals shall be rejected. Two written reports are required along with a brief summary report of noted items in each segment recorded on the project at the front of the report log. Printed location reports will clearly show the location, in relation to adjacent manholes, of each source of infiltration discovered. In addition, other data of significance, including the location of buildings and house service connections, joints, unusual conditions, roots, storm sewer connections, collapsed sections, presence of scale and corrosion, and other discernible

features, will be recorded. A voice recording embedded in the digital video recording will make brief and informative comments on the sewer conditions at the time of recording.

Color digital video recordings of the data on the television monitor will be made by the Contractor. One copy of each video, in certified PACP format, and a PACP compliant database on a digital hard drive containing all video, printable reports, database and still photos will be provided to the City.

Digital video recording playback will be the same speed that it was recorded.

Title and ownership of the digital hard drive will remain with the City. The Contractor will have all video and necessary playback equipment readily accessible for review by the City during the project. Recording speed will be noted on the recorded digital video.

Digital hard drive submittals will include the following information:

A. Data view:

1. Report number.
2. Date and time of TV inspection.
3. Upstream and downstream manhole numbers.
4. Current distance along reach (distance counter footage).
5. Printed labels on DVD hard case and DVD disk with location information, date, format information, and other descriptive information.
6. All televising data must match the GIS asset ID's provided by the City.

B. Audio:

1. Date and time of TV inspection, operator name and name of adjacent streets or descriptive narration of easement.
2. Verbal confirmation of upstream and downstream manhole numbers and TV viewing direction in relation to direction of flow.
3. Verbal or electronic description of pipe size, type, and pipe joint length.

C. Typed logs: will include, but are not limited to, the following information:

1. Location of each point of leakage.
2. Location of each service connection.
3. Location of any damaged sections, nature of damage, and location with respect to pipe axis.
4. Deflection in alignment of grade of pipe.
5. Record of repairs and quantity of sealing material used (if applicable).
6. Date, time, city, street or easement, basin, manhole section, reference manhole number, name of operator, inspector, and weather conditions.
7. Pipe diameter, pipe material, section length, and corresponding DVD identification.

SECTION 20.00 - METHOD OF PAYMENT

The work shall be measured and the compensation determined in the following manner:

20.01 SEWER PIPE

Sewer pipe shall be paid for at the contract price per lineal foot, which shall include the cost of furnishing all pipe, pipe bend sections, jointing material, tie bolt fasteners, bedding material and other material and of delivering, handling, laying, dewatering, trenching, sheeting and backfilling, testing, restoring of the surface, necessary permits, and all material or work necessary to install the pipe complete in place at the depth specified. The length of pipe for which payment is made shall be the actual overall length measured along the axis of the pipe to the centerline of the manhole. Lengths of branches will be measured from the centers of connecting manholes to the center of manhole. All lengths will be measured in a horizontal plane unless the grade of the pipe is more than 15%. The depth of cut for payment shall be defined as the distance between the invert of the pipe at a particular point and the intersection of a vertical or plumb line extended from the said point to the point of intersection of the line with the ground surface as it exists at time of construction.

20.02 DUCTILE IRON PIPE IN LIEU OF OTHER SEWER PIPE

D.I.P. not shown on the plans but placed upon direction of engineer in lieu of other sewer pipe shall be paid for as sewer pipe in accordance with Section 20.01 above plus the contract unit price per lineal foot bid as "Additional cost per foot for substituting D.I.P. in lieu of other sewer pipe" as listed on the proposal form for the diameter of pipe furnished.

20.03 MANHOLES

The standard manholes and drop manholes shall be paid for at the contract unit price which shall include the cost of furnishing all pipe, tees, horseshoes, precast sections, sewer block, concrete slabs, granular foundation material, adjusting rings, mortar, castings, chimney seals, water proofing, jointing and other material and of delivering, handling, excavating, sheeting, backfilling, dewatering, restoring of the surface and all material or work necessary to install the units complete in place at the depth specified on the plans.

A. Inside Drop Manholes.

The risers for drop manholes, including pipe support and all appurtenances, will be paid for at the contract unit price per lineal foot. Length of riser shall be computed as distance from invert of pipe discharging into drop bowl to invert of sweep elbow at discharge point.

20.04 WYES, TEES AND SPECIAL FITTINGS

Wyes, tees and special fittings will be paid for at the contract price for each unit furnished of the size and classification specified in the proposal form.

20.05 CATCH BASINS

Catch basins will be paid for at the contract unit price, including precast base, granular foundation material and casting.

20.06 FLARED-END SECTIONS IN PLACE

End sections will be paid for at the contract unit price for each size furnished and shall include placing costs, trash guard and marker post. Riprap materials will be paid at the contract unit price. Flared-end sections will not be included in the lineal footage of pipe being measured.

20.07 PILING

Piling up to 20-feet long including caps shall be paid for at the contract unit price for each single pile bent in place. No additional payment will be made for cradles.

Any piling required over 20 feet in length shall be paid for as excess length of piling. Payment will not be made for cut off lengths.

Double pile bents shall be paid for according to the length of each individual pile. There shall be no additional compensation for lumber or hardware used to tie the piles together.

20.08 FOUNDATION MATERIAL

Material used for refilling to pipe foundation grade to assure firm foundation for pipe shall be paid for at the contract unit price per ton in place. Payment shall include cost of excavation and placement.

20.09 SPECIAL SECTIONS

Special sections will be paid for at the contract price on a lump sum basis for all work and material necessary for the complete installation or construction.

20.10 PILING FOUNDATION FOR MANHOLES

Payment for "Piling Foundation for Manholes" will be paid at the unit price bid and shall include steel reinforcement of the base, together with four (4) 20-foot piles each.

Piling over 20 feet in length will be paid at the contract unit price per linear foot for each foot of length over 20 feet driven in place below cut-off.

20.11 SHEETING ORDERED IN PLACE

Sheeting ordered left in place shall be paid for at the contract unit price per 1000 board feet.

20.12 JACKING

Payment for jacking will be paid for at the contract unit price per lineal foot. Sewer used in jacking will be paid at the bid unit price for that diameter sewer in the 0-8' cut category or as otherwise specified.

20.13 INCIDENTAL ITEMS

The cost of all material and labor required to complete this project as specified as shown on the plans, but not specifically included as a pay item, shall be incidental to the various unit prices bid.

20.14 TELEVISION INSPECTION

Payment for televising of sanitary and/or storm sewer lines will be paid for at the contract unit price per linear foot.

20.15 SUBSURFACE DRAINTILE

Measurement will be made by the length of furnished and satisfactorily installed Subsurface Drintile approved by the Engineer. Payment will be made at the contract bid price per linear foot which shall be full compensation for trenching, fabric wrapped trench and installation, cleanouts, aggregate backfill, cap, fittings, compaction, connecting to catch basins/manholes, and all other associated work.

SECTION 21.00 – DIRECTIONAL BORE OF HIGH DENSITY POLY ETHYLENE

21.01 GENERAL

This section covers the directional bore of High Density Poly Ethylene pipe (HDPE). The HDPE pipe shall be designed, furnished, and installed complete with all fittings, jointing materials, anchors, blocking, encasement, and other necessary appurtenances. All materials and equipment used in the drilling systems shall be of high quality and generally accepted in the industry. The services furnished by the contractor shall be performed in accordance with standard HDD industry practice and these documents and shall include all labor, equipment, and consumables necessary to accomplish the following tasks:

- Clearing, grading, and general site/access preparation necessary for construction operations.
- Transportation of all equipment, labor, materials, and consumables to and from the jobsite.
- Erection of horizontal drilling equipment at the rig site indicated on the drawings.
- Drilling of a pilot hole to a diameter suitable for installation of the prefabricated pull section.
- Reaming the pilot hole along the path indicated on the drawings.
- Prefabrication of the pull section including thermal butt fusion of the individual HDPE pipes in accordance with the applicable specification.
- Installation of the prefabricated pull section in the reamed hole.
- Fusion of HDPE fittings to the ends of each individual HDPE pipe following installation of the pull section.
- Pre-installation and post-installation hydrostatic testing of each individual HDPE pipe in accordance with the applicable specification.
- Clean-up and restoration of all work areas.

21.02 GOVERNING STANDARD

Except as modified or supplemented herein, all HDPE pressure pipe shall conform to the applicable requirements of ANSI/AWWA C906.

The supplementary information required in the foreword of the governing standard is as follows:

Affidavit of Compliance (Sec. 6.3)	Required
Plant Inspection (Sec. 5.9)	Not Required
Special Markings (Sec. 6.1.4)	Not Required
Special Preparation for Shipment (Sec. 6.2)	Not Required
Special Quality Assurance Testing (Sec. 5)	Required

21.03 SUBMITTALS

All procedures or material descriptions requiring the engineer's approval shall be submitted not less than 3 weeks prior to commencing any horizontal directional drilling activities. Submittals shall include but are not limited to the following:

1. Composition of drilling fluid.
2. Description of the drilling fluid solids control system (plan for minimization and disposal of excess drilling fluids).
3. Buoyancy control plan (if applicable).
4. Drilling fluid disposal plan.

21.04 PROTECTION OF UNDERGROUND FACILITIES

The contractor shall undertake the following steps prior to commencing drilling operations.

1. Contact the utility location/notification service and all other utilities not covered by this service for the construction area.
2. Positively locate and stake all existing lines, cables, or other underground facilities including exposing any facilities which are horizontally located within 10 feet of the designed drilled path.
3. Modify drilling practices and downhole assemblies to prevent damage to existing facilities.

The contractor shall be responsible for locating any and all underground facilities regardless of the engineer's previous efforts in this regard. The contractor shall be responsible for all losses and repairs to underground facilities resulting from drilling operations.

21.05 PERMITS AND APPROVALS

The Contractor shall obtain all other necessary permits and approvals. All work performed shall comply with the requirements of the permits obtained.

21.06 QUALITY ASSURANCE

A. Qualifications.

The pipe manufacturer shall provide the services of an experienced, competent, and authorized representative to visit the site of the work to advise and consult with the contractor during joining and installation of the pipe. The manufacturer's representative shall not directly supervise the contractor's personnel, and the contractor shall remain responsible for the pipeline work.

B. Storage and Handling.

Pipe, fittings, and accessories shall be handled in a manner that will ensure installation in sound, undamaged condition. Pipe shall not be stored uncovered in direct sunlight.

21.07 DESIGN

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21.08 MATERIALS

- A. **Pipe/Fittings.** Chevron "Plexco" or Phillips "Driscopipe", ANSI/AWWA C906; material designation (ASTM D3350), PE 3408, minimum cell classification 334434C, DIPS (Ductile Iron Pipe Size) OD, SDR 11.0.
- B. **Joints.** Thermal butt fusion joints, ASTM D3261.
- C. **Couplings.** Electrofusion Couplers.
- D. **Connections with DIP.** Connections shall be made using fittings suitable for such purposes. Mechanical joining to the ductile iron pipe shall be made using polyethylene flange adapter and metal backup ring. The adjoining ductile iron fitting shall be of an equivalent internal diameter as the polyethylene piping.

21.09 RESERVED

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21.10 ACCESS

The contractor shall work within the designated Right of Way. Resident access and access to the work site shall be acceptable to all governing agencies.

21.11 INSTALLATION

A. Laying Pipe.

Pipe shall not be laid in water or under unsuitable weather or trench conditions, and shall be protected against entry of foreign matter.

During cold weather, particular care shall be taken in handling and laying pipe to prevent damage by impact.

Whenever pipe laying is stopped, the open end of the line shall be closed with a tight-fitting end board to keep out sand and earth. The end board shall have several perforations near its center to permit water into the pipe, thus preventing flotation in the event that the trench is flooded. Standing water in the trench shall be removed before the end board is removed.

Pipe shall be protected from exposure to sunlight, shall be kept as cool as possible during installation, and shall be covered with backfill immediately after installation.

B. Cleaning.

The interior of all pipe and fittings shall be thoroughly cleaned before installation and shall be kept clean until work has been accepted.

C. Directional Tolerance.

The pilot hole shall be drilled along the path shown on the drawings to the tolerances listed below:

1. Alignment - Plus or minus 5 feet.
2. Entry Point Location - The pilot hole shall initially penetrate the ground surface at the exact location shown on the drawings. The contractor shall determine the entry side of the pilot hole drilling depending on the pipe grade, availability of right-of-way, room to string the pipeline, and other factors.
3. Exit Point Location - The pilot hole shall finally exit the ground surface at the exact location shown on the drawings.

In all cases, right-of-way restrictions shall take precedence over the listed tolerances. Regardless of the tolerance achieved, no pilot hole will be accepted if it will result in any or all of the pipeline being installed in violation of right-of-way restrictions. In all cases, concern for adjacent utilities and/or structures shall take precedence over the listed tolerances. Listing of tolerances does not relieve the contractor from responsibility for safe operations or damage to adjacent utilities and structures.

D. Cutting Pipe.

Cutting shall comply with the pipe manufacturer's recommendations. Cuts shall be smooth, straight, and at a right angle to the pipe axis. After cutting, the end of the pipe shall be dressed to remove all roughness and sharp corners and shall be beveled in accordance with the manufacturer's instructions.

E. Jointing.

Jointing shall conform to the instructions and recommendations of the pipe manufacturer. Sections of HDPE pipe shall be joined into continuous lengths above

ground by the thermal butt fusion method in accordance with the pipe manufacturer's recommendations for the specified service. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but shall not be limited to, temperature requirements of 400° F, alignment, and 75 psi interfacial fusion pressure. Butt fusion joining shall be 100% efficient offering a joint weld strength equal to or greater than the tensile strength of the pipe.

Socket fusion and extrusion welding or hot gas welding will not be acceptable.

All joining procedures shall be acceptable to the engineer.

F. Inspection.

Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation, with special attention to pipe ends. All defective pipe and fittings shall be removed from the site of the work.

G. Connections with Other Piping.

Connections between HDPE pipe and other piping shall be made using suitable fittings. Each connection with other piping shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by the City. The pipe shall remain in the drilled hole at least 24 hours before any connections or cutting of pipe shall be made. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.

Special care shall be taken to prevent contamination of potable water lines when dewatering, cutting into, and making connections with other pipe. No trench water, mud, or other contaminating substances shall be permitted to get into the lines. The interior of all pipe, fittings, and valves installed in such connections shall be thoroughly cleaned and then swabbed with, or dipped in, a 200 mg/L chlorine solution.

H. Reaction Anchorage and Blocking.

All tees and plugs installed in piping subject to internal hydrostatic heads in excess of 30 feet shall be provided with suitable reaction blocking, anchors, joint harnesses, or other acceptable means of preventing movement of the pipe caused by internal pressure.

Concrete blocking shall extend from the fitting to solid undisturbed earth and shall be installed so that all joints are accessible for repair. The dimensions of concrete reaction blocking shall be as indicated on the drawings or as directed by the engineer.

Reaction blocking, anchorages, or other supports for fittings installed in fill or other unstable ground shall be provided as indicated on the drawings or as directed by the engineer.

I. Protective Coating.

All steel clamps, rods, bolts, and other metal components of tapping saddles or reaction anchorages subject to submergence, or in contact with earth or other fill material, and not encased in concrete, shall be protected from corrosion. The first coat shall be dry and hard before the second coat is applied.

21.12 REAMING AND PULL BACK

A. Pre-reaming.

Pre-reaming operations shall be conducted at the discretion of the contractor. The contractor shall insure that a hole sufficient to accommodate the pull section has been produced. Any damage to the pipe resulting from inadequate pre-reaming shall be the responsibility of the contractor. All provisions of this specification relating to simultaneous reaming and pulling back operations shall also pertain to pre-reaming operations.

B. Pulling Loads.

The maximum allowable tensile load imposed on the pipe section shall be equal to 50 percent (50%) of the product of the HDPE pipe's specified tensile yield strength and the area of the pipe section.

C. Torsional Stress.

A swivel shall be used to connect the pull section to the reaming assembly to minimize torsional stress imposed on the section.

D. Pull Section Support.

The pull section shall be supported as it proceeds during pull back so that it moves freely and the pipe is not damaged.

E. External Collapse Pressure.

The pull section shall be installed in the reamed hole in such a manner that external pressures are minimized and an appropriate counter-balancing internal pressure is maintained. Any damage to the pipe resulting from external pressure during installation shall be the responsibility of the contractor.

F. Buoyancy Modification.

Buoyancy modification shall be used at the discretion of the contractor. Any buoyancy modification procedure proposed for use shall be submitted to the engineer for approval. No procedure shall be used which has not been reviewed and approved by the engineer. The contractor is responsible for any damage to the pull section resulting from buoyancy modification.

21.13 DRILLING FLUIDS

A. Composition.

The composition of all drilling fluids proposed for use shall be submitted to the engineer for review and approval. No fluid will be approved or utilized that does not comply with permit requirements or environmental regulations.

B. Water.

The contractor is responsible for obtaining, transporting, and storing any water required for drilling fluids. Connecting to fire hydrants is not acceptable. Contact the City to determine acceptable water locations.

C. Recirculation.

The contractor shall maximize recirculation of drilling fluid surface returns. The contractor shall provide solids control and fluid cleaning equipment of a configuration and capacity that can process surface returns and produce drilling fluid suitable for reuse.

A description of solids control and cleaning equipment proposed for use shall be submitted to the engineer.

D. Disposal.

Disposal of excess drilling fluids is the responsibility of the contractor and shall be conducted in compliance with all environmental regulations, right-of-way and workspace agreements, and permit requirements. Drilling fluid disposal procedures proposed for use shall be submitted to the engineer.

Control of drilling fluids on the site is very critical. Spills of drilling fluids will not be allowed or permitted.

E. Inadvertent Returns.

The contractor shall employ his best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than the entry and exit points shall be minimized. In the event that annular circulation is lost, the contractor shall take steps to restore circulation. If inadvertent surface returns of drilling fluids occur, they shall be immediately contained with hand placed barriers (i.e. hay bales, sand bags, silt fences, etc.) and collected using pumps and other suitable equipment. If the amount of the surface return exceeds that which can be contained with hand placed barriers, small collection sumps, drilling operations shall be suspended until surface return volumes can be brought under control.

21.14 FIELD QUALITY CONTROL

A. Instrumentation.

The contractor shall at all times provide and maintain instrumentation which will accurately locate the pilot hole, measure drill string axial and torsional loads, and measure the drilling fluid discharge rate and pressure. The Engineer will have access to these instruments and their readings at all times. A log of all recorded readings

shall be maintained and will become part of the “As Constructed” information to be supplied by the contractor.

B. Cleaning and Disinfection.

Cleaning and disinfection is described in Section 10.00 of the Watermain Specifications.

C. Testing.

Prior to installation, a low pressure air test shall be performed on each run to be pulled. After installation the pipe will be subjected to a Hydrostatic Pressure Test and a Trace Wire Test. The Trace Wire Test is described above in Section 21.09 and the Hydrostatic Testing Procedures are described below:

Fill the pipeline with water after it has been laid; bleed off any trapped air. Subject the lowest element in the system to a test pressure that is 1.5 times the design pressure or 150 PSI, whichever is greater, and check for any leakage. When, in the opinion of the engineer, local conditions require that the trenches be backfilled immediately after the pipe has been laid, apply the pressure test after backfilling has been completed but not sooner than a time which will allow sufficient curing of any concrete that may have been used. Typical minimum concrete curing times are 36 hours for early strengths and 7 days for normal strengths.

The test procedures consist of two steps; the initial expansion and the test phase. When test pressure is applied to a water filled pipe, the pipe expands. During the initial expansion of the pipe under test, sufficient make-up water must be added to the system at hourly intervals for 3 hours to maintain the test pressure. After a minimum of 4 hours, initial expansion will be considered complete and the actual test can start.

When the test is to begin, the pipe is full of water and is subjected to a constant test pressure of 1.5 times the system design pressure or 150 PSI, whichever is greater. The test phase should not exceed 3 hours, after which time any water deficiency must be replaced and measured. Add and measure the amount of make-up water required to return to the test pressure and compare this to the maximum allowance in the table below.

ALLOWANCE FOR EXPANSION UNDER TEST PRESSURE							
NOMINAL PIPE SIZE	U.S. GALS/100FT. OF PIPE			NOMINAL PIPE SIZE	U.S. GALS/100FT. OF PIPE		
	1 HOUR	2 HOURS	3 HOURS		1 HOUR	2 HOURS	3 HOURS
2"	0.08	0.12	0.15	20"	2.80	5.50	8.00
3"	0.10	0.15	0.25	22"	3.50	7.00	10.50
4"	0.13	0.25	0.40	24"	4.50	8.90	13.30
5"	0.21	0.41	0.63	28"	5.50	11.10	16.80
6"	0.30	0.60	0.90	30"	6.20	12.60	19.10
8"	0.50	1.00	1.50	32"	7.00	14.30	21.50
10"	0.75	1.30	2.10	36"	9.00	18.00	27.00
12"	1.10	2.30	3.40	42"	12.00	24.00	36.00
14"	1.40	2.80	4.20	48"	15.00	27.00	43.00
16"	1.70	3.30	5.00	54"	18.00	30.00	50.00
18"	2.20	4.30	6.50	-	-	-	-

NOTES:

Under no circumstances shall the total time under test exceed 8 hours at 1.5 times the system pressure rating or 150 PSI. If the test is not complete within this time limit (due to leakage, equipment failure, etc.), the test section shall be permitted to “relax” for 8 hours prior to the next test sequence.

Air testing is not recommended. Additional safety precautions may be required. Additional testing may be required at the discretion of the Engineer.

It shall be the responsibility of the contractor to ensure that appropriate safety precautions are observed during hydrostatic testing.

All HDPE piping shall be watertight and free from leaks. Each leak that is discovered within the correction period specified in the General Conditions shall be repaired by and at the expense of the contractor.

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SANITARY SEWER REHABILITATION SPECIFICATIONS

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SECTION 1.00 - SCOPE

1.01 GENERAL

It is the intent of these specification requirements to provide the requirements for sanitary sewer rehabilitation work in the City of Chanhassen, Minnesota.

1.02 WORK INCLUDED

The contractor shall, unless specified otherwise, furnish all materials, equipment, tools and labor necessary to do the work required under his/her contract consisting of the trenchless pipe lining, spot repair, cleaning and joint testing and sealing of existing sanitary sewer mains. The sewer main spot repair work shall be performing utilizing plant fabricated pipe and other appurtenant materials installed for the conveyance of sewage. The trenchless pipe lining, testing and sealing, and cleaning work shall be performed using the specified procedures and also includes the rehabilitation of sanitary sewer manholes and other related items.

1.03 LOCATION OF WORK

The location of this work is as shown on the plans.

1.04 COORDINATION OF WORK

The contractor shall be responsible for the satisfactory coordination of the sanitary sewer rehabilitation with other construction and activities in the area affected. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties.

1.05 WORKING HOURS

Refer to Section 7.02 of the General Conditions.

SECTION 2.00 - SEWER LINE CLEANING

2.01 SEWER LINE CLEANING

Since the success of the other phases of rehabilitation depends a great deal on the cleanliness of the sewer lines, the importance of this phase of the operation is emphasized.

A. Cleaning Equipment

All sections of sewer main or service line to be air tested at joints and sealed shall be cleaned using an approved cleaning method. Selection of equipment shall be based on field conditions such as access to manholes, type and quantity of debris to be removed, physical condition of line, size of sewer, and depth of flow.

Hydraulically propelled equipment will be of the movable dam type and be constructed in such a way that a portion of the dam may be collapsed at any time during the cleaning operations to protect against flooding of the sewer. The movable dam will be equal in diameter to the pipe being cleaned and will provide a flexible scraper around the outer periphery to insure removal of grease. If sewer cleaning balls or other equipment which cannot be collapsed is used, special precautions to prevent flooding of the sewers and public or private property will be taken.

High-Velocity Jet (Hydro cleaning) equipment shall be constructed for ease of safety and operation. The equipment will have a selection of two (2) or more high-velocity nozzles. The nozzles will be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. The equipment will include a high-velocity gun for washing and scouring manhole walls and floors. The gun will be capable of producing flows from a fan spray to a solid stream. The equipment will carry its own water tank, auxiliary engines, pumps and hydraulically driven hose reel.

Mechanically powered equipment such as bucket machines will be in pairs with sufficient power to perform the work in an efficient manner. Machines will be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipeline are not permitted. A power rodding machine will be either a sectional or continuous rod type capable of holding a minimum of 750.0-feet of rod. The rod will be specifically heat-treated steel. The machine will be fully enclosed and have an automatic safety clutch or relief valve.

After cleaning, sanitary sewer and manholes shall be free of sludge, mud, sand, gravel, rock, grass, roots, or any other objects which may prevent the Contractor from properly testing and sealing joints. All material removed during the cleaning operations shall become the property of the Contractor. It shall be the Contractor's responsibility to properly pay for and dispose of this material. The Contractor will be solely responsible for any damage caused to public infrastructure due to improper use or negligence of the Contractor when completing the documented cleaning procedures.

In this section of sewer main or service line which requires cleaning, testing, and sealing or spot repair work, payment for cleaning will be made for the LF of sewer main or service line actually worked on, including the portion(s) to be spot repaired.

B. Root Removal

Special attention should be used during the cleaning operation to assure the removal of all roots from the joints. Any roots which could prevent the proposed construction methods shall be removed. Payment for root removal shall be incidental to the contract unit price per lineal foot for sewer main or service line cleaning.

C. Protruding Tap Removal

The Contractor shall remove any protruding taps located in the sewer main prior to testing and sealing operations. Removal shall be accomplished by remote controlled saws or other methods as approved by the Engineer. Payment for removal of protruding taps shall be paid per item as shown on the bid tab, if no item is shown then it shall be considered as incidental to the contract unit price per lineal foot for sewer main cleaning.

D. Cleaning Precautions

During sewer cleaning operations, satisfactory precautions will be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools or tools which retard the flow in the sewer lines are used, precautions will be taken to ensure that the water pressure created does not damage or cause flooding or public or private property being served by the sewer. The Contractor will be fully responsible for any property damage caused by the cleaning operations

SECTION 3.00 - SEWER FLOW CONTROL

3.01 SEWER FLOW CONTROL

When a sewer line depth of flow at the upstream manhole of the manhole section being worked is above the maximum allowable for television inspection, joint testing and/or sealing, the flow shall be reduced to the level shown below by operation of pump stations, plugging or blocking of flow, or by pumping and bypassing of the flow.

Maximum Depth of Flow	Television Inspection
6"-10" Pipe	20% of pipe diameter
12"-24" Pipe	25% of pipe diameter
Maximum Depth of Flow	Joint Testing/Sealing
6"-12" Pipe	25% of pipe diameter
12"-24" Pipe	30% of pipe diameter

A. Plugging

A sewer line plug may be installed upstream of the section being worked. The plug is always to be installed in the upstream (incoming) pipe of the manhole. The plug shall be so designed that all or any portion of the sewage can be released.

B. Pumping and Bypassing

When pumping and bypassing is required, the Contractor shall supply and operate the pumps, conduits, and other equipment (of sufficient capacity) to divert the flow of sewage around the manhole section in which work is to be performed. Under no circumstances will the dumping of raw sewage onto the ground and streets or into the storm sewer be allowed.

C. Precautions

When the flow in a sewer line is reduced, plugged, or bypassed, precautions must be taken to ensure that damage due to flooding does not result from these operations. The Contractor shall monitor sewer surcharging upstream of the manhole section being worked in to protect the sewer lines from unnecessary damage. Any damage shall be the responsibility of the Contractor.

SECTION 4.00 SEWER PIPE JOINT TEST AND SEAL

4.01 SEWER PIPE JOINT TESTING

The intent of sewer pipe joint testing is to test the integrity of individual pipe joints.

A. Test Medium

Both liquid (usually water) and air are acceptable, but the test procedure is different for each.

B. Equipment.

The basic equipment used shall consist of a television camera, joint testing device, and test monitoring equipment. The equipment shall be constructed in such a way as to provide means for introducing the test medium, under pressure, into the VOID area created by the expanded ends of the joint testing device. A means for continuously measuring the actual static pressure of the test medium and within the VOID area only shall also be provided. The pressure-metering device shall display pressure to within 1/2 of one psi.

VOID pressure data shall be transmitted electrically from the VOID to the monitoring equipment. Example: Via a TV picture of a pressure gauge located at the VOID, or via an electrical pressure transducer located at the VOID.

C. Test Pressure.

Joint test pressure must be higher than the groundwater pressure outside the pipe. A test pressure 2-4 psi higher than the groundwater pressure is recommended. In the absence of groundwater pressure data, the test pressure should be at least equal to 1/2 psi per vertical foot of pipe depth plus 2 psi (not exceeding 10 psi).

D. Liquid Test Procedure

1. The testing device shall be positioned within the line in such a manner as to straddle the pipe joint to be tested.
2. The testing device ends (end elements, sleeves) shall be expanded so as to isolate the joint from the remainder of the line and create a VOID area between the testing device and the pipe joint. The ends of the testing device shall be expanded against the pipe with sufficient pressure to contain a minimum of 10 psi within the VOID area without leakage past the expanded ends.
3. Water or an equivalent liquid shall then be introduced into the VOID area until a pressure equal to or greater than the required test pressure is observed with the VOID pressure monitoring equipment. If the required test pressure cannot be developed (due to joint leakage), the joint will have failed the test and shall be resealed.

4. The flow rate of the test liquid shall then be regulated to a rate at which the VOID pressure is observed to be the required test pressure. A reading of test liquid flow meter shall then be taken. If the flow rate exceeds 1/4 gallon per minute (due to joint leakage), the joint will have failed the test and shall be resealed.

E. Air Test Procedure

1. The testing device shall be positioned within the line in such a manner as to straddle the pipe joint to be tested.

2. The testing device ends (end elements, sleeves) shall be expanded so as to isolate the joint from remainder of the line and create a VOID area between the testing device and the pipe joint. The ends of the testing device shall be expanded against the pipe with sufficient pressure to contain a minimum of 10 psi within the VOID area without leakage past the expanded ends.

3. Air shall then be introduced into the VOID area until a pressure equal to or greater than the required test pressure is observed with the VOID area pressure monitoring equipment. If the required test pressure cannot be developed (due to joint leakage), the joint will have failed the test and shall be resealed.

4. After the VOID pressure is observed to be equal to or greater than the required test pressure, the airflow shall be stopped. If the VOID pressure decays by more than 1 psi within 30 seconds (due to joint leakage), the joint will have failed the test and shall be resealed.

F. Control Test. Prior to starting, the pipe joint testing phase of the work, a two-part control test, shall be performed as follows:

1. To ensure the accuracy, integrity, and performance capabilities of the testing equipment, a demonstration test is to be performed in a test cylinder constructed in such a manner that a minimum of two known leak sizes can be simulated.

This technique is to establish the test equipment performance capability in relationship to the test criteria and ensure that there is no leakage of the test medium from the system or other equipment defects that could affect the joint testing results. If this test cannot be performed successfully, the Contractor shall be instructed to repair or otherwise modify his/her equipment and re-perform the test until the results are satisfactory to the Engineer.

2. After entering each manhole section with the test equipment, but prior to the commencement of joint testing, the test equipment shall be positioned on a section of sound sewer pipe between pipe joints, and a test performed as specified. This procedure is to demonstrate the reality of the test requirement, as no joint does test in excess of the pipe barrel capability. Should it be found that the barrel of the sewer pipe does not meet the joint test requirements, the test requirements will be modified by the Engineer.

3. Set Up: All work required to set up joint testing and sealing equipment in the required manholes shall be incidental to the joint testing and sealing work with no separate compensation given.

4.02 SEWER PIPE JOINT SEALING

It is the intent of the sewer pipe joint sealing work to seal sewer pipe joints which have been indicated to be a source of infiltration into the system, utilizing the internal joint sealing method. It is realized that this method may only be used on sewer pipe sections that are clean and in sound physical condition.

A. Equipment.

The basic equipment shall consist of a closed-circuit television system, necessary chemical sealant containers, sealant, pumps, regulators, valves, hoses, etc., and joint sealing packers for the various sizes of sewer pipes. The packer shall be cylindrical and have a diameter less than the pipe size and have cables attached at each end to pull it through the line. Jetting or driving pipes from the surface to apply grout is prohibited. Uncovering pipes via excavation for grout application is prohibited.

The system shall be sized to deliver a mixed volume of grout at a minimum of 3 GPM and 30 gallons of uninterrupted flow within 10 minutes.

The packer device shall be constructed in a manner to allow a restricted amount of sewage to flow. Generally, the equipment shall be capable of performing the specified operations in lines where flows do not exceed the maximum line flows for joint testing/sealing.

B. Joint Sealing Procedure.

1. Cleaning of Sewer Line: Prior to any joint testing or sealing within a pipe section designated to be joint sealed, it shall be the responsibility of the Contractor to clean the sewer line as specified.
2. Flow Control: The Contractor is responsible for diversion of wastewater in accordance with the applicable specification section.
3. Testing and Sealing: When a manhole section is designated to be joint sealed on the plans, all the joints within that section shall be tested and then sealed if and/as required.

Mix, place and cure grout in accordance with the manufacturer's recommendations. Joint sealing shall be accomplished by forcing chemical sealing materials into or through faulty joints by a system of pumps, hoses, and a sealing packer. The packer shall be positioned over the faulty joint by means of a measuring device and the television camera in the line. The packer ends (end elements, sleeves) shall be expanded using controlled

pressure. The expanded ends shall seal against the inside periphery of the pipe to form a VOID area at the faulty joint, now completely isolated from the remainder of the pipeline. Into this isolated area, sealant materials shall be pumped through the hose system at controlled pressures which are in excess of groundwater pressures. The grout must be injected beyond the joint interface in to the soil surrounding the joint.

If a mainline or lateral joint requires more than 0.5 gallons of grout per inch of diameter of pipe, the grouting procedure shall be modified to stage grouting. Additional grout shall be pumped at 4 gallon increments. Wait time between stages is the greater of 1 gel set cycle or 1 full minute. The maximum number of stages shall not exceed 2 stages of 4 gallons each unless approved by the Engineer.

C. Joint Sealing Verification.

Upon completing the sealing of each individual joint, the packer shall be deflated until the VOID pressure meter reads zero pressure, then reinflated and the joint retested as specified. Should the VOID pressure meter not read zero, the Contractor shall clean his/her equipment or residual grout material or make the necessary equipment repairs/adjustments to produce accurate VOID pressure readings. Joints that fail to meet the specified test criteria shall be resealed and retested until the test criteria can be met in order to receive payment.

D. Residual Sealing Material.

Residual sealing materials that extend into the pipe, reduce the pipe diameter, or restrict the flow shall be removed from the joint. The sealed joints shall be left reasonably “flush” with the existing pipe surface. If excessive residual sealing materials accumulate in the line, the manhole section shall be cleaned to remove the residual materials. Payment for any cleaning operations performed to remove residual materials shall be incidental to the contract unit price for joint sealing.

E. Records.

Complete records, including pre- and post- joint sealing televising video, shall be kept of joint testing and sealing performed in each manhole section. The records shall identify the manhole section which the testing and sealing was done, the location of each joint tested and sealed, the test pressure used, the joint sealing verification results (pass or fail), and the quantity of chemical sealing material used at each faulty joint. The Contractor shall supply a copy of these records to the Engineer upon conclusion of the sealing work.

F. Guaranty.

All sewer pipe joint sealing work performed shall be guaranteed against faulty workmanship and/or materials for a period of two years after the completion of work.

Prior to the expiration of the guaranty period, an initial inspection area consisting of specific pipe sections will be selected by the Engineer. Pipe sections to be inspected will

be randomly selected throughout the project area and will be representative of the majority of the sealing work originally performed. The initial inspection area will consist of at least 10%, but not exceed 20% of the joints sealed in the original project.

Within the initial inspection area, the Contractor shall TV-inspect all previously sealed joints. All joints that are visibly leaking shall be resealed. If the number of leaking joints is less than 5% of the joints inspected, the work shall be considered satisfactory and no further inspection shall be required. Payment for the TV inspection shall be incidental to the joint test and joint seal bid items. No compensation will be provided for resealing joints that are leaking. If, in the initial inspection area, the number of leaking joints exceeds 5% of the joints inspected, an additional area of equivalent size will be selected and all previously sealed joints shall be inspected. This additional inspection and sealing, if necessary, shall continue until the number of leaking joints is less than 5%. Any additional inspection/sealing required beyond the initial inspection area shall be accomplished with no compensation to the Contractor.

G. Payment.

Payment for all labor set-ups and materials for line testing and seal operations will be paid under the pay item Joint Sealing at the unit price bid each. Grout will be paid at the unit price bid per gallon.

SECTION 5.00 - MANHOLE IMPROVEMENTS

5.01 SEWER MANHOLE SEALING

The intent of manhole sealing is to provide for the elimination of extraneous water leakage into the manholes that are structurally sound. The Contractor shall seal the manholes specified on the plans.

A. Equipment.

The basic equipment shall consist of chemical pumps, chemical containers, injection packers, hoses, valves, and all necessary equipment and tools required to seal manholes.

B. Manhole Sealing Procedures.

At each point of leakage within the manhole structure, the sealing procedure shall be performed using current best practices following product manufacturer's specifications.

C. Payment.

Payment for all labor set-ups and materials for sealing manholes will be paid under the pay item Grout Manhole at the unit price bid each. Grout will be paid at the unit price bid per gallon.

D. Final Acceptance.

After the manhole sealing operation has been completed, the manhole will be visually inspected for the elimination of excessive infiltration by the Engineer in the presence of the Contractor, and the work must be found satisfactory to the Engineer.

5.02 REBUILD MANHOLE INVERT

The intent of the rebuild manhole invert work is the complete removal, disposal, and reconstruction of existing manhole inverts. The Contractor shall rebuild the inverts for the manholes specified on the plans.

A. Procedure.

1. The Contractor shall bypass sewage around the manholes which are to have rebuilt inverts. All labor and materials necessary to perform the bypass shall be the responsibility of the Contractor, and payment shall be incidental to the rebuild manhole invert contract unit price.
2. The bottom of the sewer manhole shall be cleaned of all foreign material and matter prior to beginning the rebuilding work. Cleaning may be accomplished by waterblasting, sandblasting, or applying an acid solution. If an acid solution is used, it shall be washed off

and the manhole allowed to dry. Mixing, application and removal of the acid shall be done in strict accordance with the manufacturer's recommendations.

3. The manhole invert shall be rebuilt with quick-set non-shrinking cement type grout such that the trough is compatible with all incoming and outgoing pipe and their inverts.

B. Payment.

Payment for all labor and materials to bypass sewage, clean, remove, and rebuild existing manhole inverts shall be made on a per each basis under the bid item rebuild manhole invert.

C. Final Acceptance.

After the manhole invert has been rebuilt, the manhole shall be visually inspected by the Engineer in the presence of the Contractor, and all work must be found satisfactory to the Engineer.

5.03 MANHOLE DEBRIS

In order to limit the amount of debris and deleterious material that enters the sanitary system while working on sanitary manholes a manhole debris catcher, or "parachute", shall be used at the direction of the Engineer. The catcher must be able to open to a minimum diameter of 48 inches and have a capacity of 50 pounds and extend to the bottom of the manhole. The catcher shall allow unobstructed flow of the sanitary system at all times. If debris enters the sanitary system, the system shall be adequately cleaned and jetted to the satisfaction of the Engineer at no cost to the Owner.

6.00 CHEMICAL SEALING MATERIALS

6.01 CHEMICAL SEALING MATERIALS

The intent of this section is to define the properties and characteristics that a sealing material must have to perform effectively in the intended application and under expected field conditions. This material specification applies to both manhole sealing and sewer main joint sealing. Intended sealing products to be used shall be submitted to the engineer, for approval, a minimum of two weeks prior to the start of any work.

- A.** While being injected, the chemical sealant must be able to react/perform in the presence of water.
- B.** The cured material must be capable of withstanding submergence in water without degradation.
- C.** The resultant sealant formation must prevent the passage of water.
- D.** The sealant material, after curing, must be flexible as opposed to brittle or rigid.
- E.** In place, the resultant sealant formation should be able to withstand freeze/thaw and wet/dry cycles without adversely affecting the seal.
- F.** The sealant formation must not be biodegradable. Additives may be used to meet this requirement.
- G.** The cured sealant should be chemically stable and resistant to concentrations of acids, alkalis, and organics found in normal sewage.
- H.** Packaging of component materials must be compatible with field storage and handling requirements. Package must provide for worker safety and minimize spillage during handling.
- I.** Mixing of component materials must be compatible with field operations and not require precise measurements.
- J.** Cleanup must be done without inordinate use of flammable or hazardous chemicals.
- K.** Residual sealing materials must be removable from the sewer after injection to ensure no flow reduction, restriction, or blockage of normal sewage flows.
- L.** The grout material must have the ability to increase mix viscosity, density, and gel strength by increased concentration of constituents or the use of approved additives.

SECTION 7.00 – CIPP - MAINLINE TRENCHLESS PIPE RELINING/SHORT LINER

7.01 GENERAL REQUIREMENTS

A. Intent.

It is the intent of this specification to provide requirements for furnishing of all labor, materials, tools, design, transportation, equipment and performances of all work and services incidental to the installation of a resin-impregnated flexible liner which is inserted into the original conduit by use of a hydrostatic head. Methods that are pulled in and inflated rather than inverted will be considered, providing they meet the other provisions of this specification. When cured, the finished Cured-in-Place-Pipe (CIPP) will be continuous and tight fitting.

B. Reference Specifications.

This specification references American Society for Testing and Materials (ASTM) standard specifications, which are made a part hereof by such reference and shall be the latest edition and revision thereof.

- F-1216 Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
- F – 1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pull in and inflate and Curing of a Resin-Impregnated Tube.
- F-2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastics (GRP) Cured-In-Place Pipe (CIPP)
- F - 2561 Standard Practice for Rehabilitation of a Sewer Service Lateral and its Connection to the Main Using a One-Piece Main and Lateral Cured-in-Place Liner.
- D - 543 Test Method for Resistance of Plastics to Chemical Reagents
- D - 578 Standard Specification Glass Fiber Strands
- D – 638 Standard Test Method for Tensile Properties of Plastics
- D - 790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- D - 2122 Standard 1 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

- D - 2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
- D - 3567 Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber Reinforced Thermosetting Resin) Pipe and Fittings
- D - 5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe

C. Design Considerations.

The minimum length of the pipe liner shall be that deemed necessary by the Contractor to produce a finished pipe tightly formed to the existing pipe and which effectively spans the distance from the inlet to the outlet of the respective manholes. Individual insertion runs can be made over one or more manhole sections as determined in the field by the Contractor and approved by the Engineer.

The wall color of the interior pipe surface of the pipe after installation shall be a light-reflective color so that a clear detail examination with closed-circuit television inspection equipment may be made.

The Contractor shall be responsible for all aspects of the design of the rehabilitation pipe. The Contractor shall guarantee that the installed pipe is capable of sustaining outside loads, resisting chemical attack that normally occurs in sanitary sewer, and will maintain hydraulic characteristics over a fifty-year design life. No design shall rely on bonding to the existing pipe or rely on the remaining strength of the existing pipe.

The following is requested from the low bidder:

1. Certified test results from the manufacturers which indicate that all materials conform to the applicable requirements.
2. A copy of the license or certificate verifying the manufacturer’s or licensor’s approval of the Installer.
3. The Contractor shall submit test results of the resin proposed that meet the chemical resistance requirements of ASTM F2019, Section 5.2.6. The chemical resistance tests will be completed in accordance with Test Method D543.
4. Field samples shall be submitted and shall be in accordance with ASTM – F2019 and ASTM - D5813.
5. The Contractor shall submit Material Safety Data Sheets for all resins, and other additives such as accelerants, colorants, and lubricants utilized in the pipe liner/lining process.

6. The Contractor shall submit an informational handout that describes the materials, processes, installation, pressures, temperature limitations, and recommended post curing documentation.
7. The Contractor shall submit an informational hand out that described the materials, processes, installation, pressures, temperature limitations, and odors associated with the lining process that shall be provided at the request of concerned individuals.
8. The Contractor shall submit liner pipe thickness design for each pipe segment. No liner will be approved for installation until liner thickness calculations have been submitted and reviewed for conformance with this specification.
9. The Contractor shall submit a plan for temporary conveyance of sewer flows and bypass monitoring.
10. The Contractor shall submit a construction schedule and maintain its operation to meet the provided schedule.
11. The Contractor shall submit evidence of the installer's experience including a list of similar projects completed within the previous 2 years. Final decision regarding a Contractors qualification will be made solely by the City or its Engineer.
12. The Contractor shall submit a description of the cure method(s) proposed by the contractor.

A copy of the design parameters and the calculations used to calculate liner thickness and strength shall be submitted to the Engineer. Standard formulas as used in the design of flexible pipes shall be used for the design calculations. The following design parameters shall be included in the submittal:

	Standard	CIPP Value	UV Value
Flexural Strength	ASTM - D790	4,500 psi	6,500 psi
Modulus of Elasticity	ASTM - D790	250,000-400,000 psi	725,000 psi

Pipe diameter		Inches
Maximum depth from finished ground to invert		Feet
Minimum depth from finished ground to invert		Feet
Groundwater Depth		Feet
Cover density (assumed)	120	Lbs/cf
Design Safety Factor (1.5 for pipes 36 inches and larger)	2.0	Value
Ovality	2% - 5%	Percent
Enhancement Factor (K)	7.0	Value
Poisson's Ratio	0.3	Value
Level of Deterioration	Fully Det	Value

Creep Retention Factor	50%	Value
Soil Modulus	1,000 PSI (Less than 15 feet deep), 1,500 PSI (More than 15 feet deep)	Value
Host Pipe Loading	H2O Highway	Value

The minimum acceptable design criteria shall be as follows:

The pipe liner shall be designed to fit the existing sanitary sewer. The pipe liner shall be fabricated to a size that, when installed, will tightly fit the internal circumference and length of the original pipe.

The existing sewer shall be considered to be in a fully deteriorated gravity condition and that the original pipe is not structurally sound and cannot support soil and live loads. The cured-in-place-pipe shall be designed to support hydraulic, soil, and live loads.

The pipe liner shall have a minimum flexural strength of 4,500 psi and a minimum modulus of elasticity of 250,000 psi, however a modulus of elasticity of 400,000 psi is preferred to limit the liner thickness. When using a CIPP liner with a UV cure, the minimum flexural strength becomes 6,500psi and the minimum modulus of elasticity becomes 725,000 psi.

The Contractor shall coordinate with the Engineer and Owner to determine the height of water over the pipe. A Factor of Safety of 2.0 shall be used in all calculations. The assumed cover density shall be 120 pounds / cubic foot. An enhancement factor of 7.0 shall be used. The Poisson's Ratio shall be 0.3. The liner shall have a creep retention factor of 50%. The host pipe loading shall be assumed to be H2O Highway unless approved otherwise.

The ovality of the host pipe shall be measured when viewing existing televising of the network prior to CIPP installation. When there are no televising videos available prior to the Contract, an ovality between 2% - 5% shall be used.

1,000 PSI soil modulus can be used for pipes buried less than 15 feet deep. 1,500 PSI soil modulus can be used for pipes buried deeper than 15 feet deep.

Overall condition of the pipeline system shall be maintained with its hydraulic profile as large as possible. Offsets of two adjacent pipe sections more than 25 percent of the diameter of the pipe shall be repaired by grinding and/or straightening the offset to be a useable shape in a manner mutually acceptable between the Contractor and the Engineer.

Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material, taking into consideration its age and condition.

The Contractor shall submit the details of the proposed processing, including the steps, the pressure (specified steam air, water, or UV), the duration and the temperatures. When processing at temperatures near the melting temperature, the Contractor shall demonstrate how the pipe liner is to be contained or protected from blowouts. Any damage, either to the

pipe or property of others shall be repaired at the Contractor's expense, to the satisfaction of the parties involved.

7.02 MATERIALS

A. Cured-in-Place Pipe (CIPP)

1. The tube material and design considerations shall meet the requirements of ASTM F1216 and/or ASTM F2019. Section 5.1 and modified as follows.
2. The tubes shall have a uniform thickness that when compressed at installation pressures will equal the specified nominal tube thickness. The finished/cured thickness of the liner must exceed the design parameters specified in section 7.01.
3. The outside layer of the tube (before inversion) shall be plastic-coated with a translucent flexible material that clearly allows inspection of the resin impregnation (wetout) procedure. The plastic coating shall not be subject to delimitation after curing.
4. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No materials shall be included in the tube that is subject to delimitation in the cured pipe.
5. The resin system shall meet the requirements of ASTM F1216 and/or F2019 as specified in section 7.01. NEAT Resin or lower curing temperature shall be used on PVC pipes that are designated to be lined with this project.
6. A certificate of compliance with these specifications shall be provided to the Engineer prior to manufacturing the pipe liner.

7.03 INSTALLATION

A. Incidental Items.

Safety - The installer shall carry out their operation in strict accordance with all OSHA and manufacturers' safety requirements. Particular attention is drawn to those safety requirements involving entering confined spaces.

1. Traffic Control - Traffic control shall be the responsibility of the Contractor and shall conform to latest version of the MUTCD and other portions of these specifications and the contract Special Provisions. The Contractor shall maintain traffic during work periods. During non-working periods, the Contractor shall open the entire roadway to traffic.
2. Access - It will be the responsibility of the Engineer to locate and designate all manhole access points open and accessible from the work and provide rights of access to

these points. If a street must be closed to traffic because of the orientation of the sewer, the Contractor shall institute the actions necessary to do this for the mutually agreed time period.

3. Water Usage - Water is available from designated City fill stations for cleaning, inversion, and other work requiring water. However, the Contractor shall secure permission from the Water Department and obtain the necessary permits and pay the fees associated with the permit and water usage.

4. Cleaning of Sewer Lines - The Contractor shall remove all internal debris out of the sewer line that will interfere with the installation of the pipe liner using cleaning procedures outlined elsewhere in these specifications.

5. Bypassing Sewage - The Contractor shall provide the flow of sewage around the section or sections of pipe designated for repair. The bypass shall be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be adequate capacity and size to handle the flow. The Engineer shall be furnished a detail of the bypass plan.

6. Inspection of Pipelines – Televised inspections of the pipeline shall occur before and after the insertion of the liner. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any condition which may prevent proper installation of the pipe liner into the pipelines and it shall be noted so that these conditions can be corrected. After the liner is installed, the interior of the pipeline shall be re-inspected to determine the location of any damages or issues that occurred during the lining process so that these conditions can be corrected.

A DVD in PACP format and suitable log shall be kept for later reference by the City of Chanhasen. The Engineer has copies of the televised sewer inspections to be relined; these are available for prospective bidders. However, since the deterioration of sewer is an ongoing process and roots, solids, and deposits can accumulate over time, the Contractor shall base the design of the liner on inspections made immediately prior to installation.

7. Line Obstructions - It shall be the responsibility of the installer to clear the line of obstructions such as solids, dropped joints, roots, protruding service connections, and collapsed pipe that will prevent the insertion of the pipeliner. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, the installer shall be required to make a point repair excavation to uncover and remove or repair the obstruction. All costs associated with this repair work and all associated restoration work including the replacement of asphalt pavement, curb and gutter, sodding, etc., shall be negotiated as a change order and reviewed/approved prior to commencing with the work.

The Contractor shall be required to remove any protruding taps to the inside wall of the pipe. In no case shall the pipe be less than 95% open to flow.

8. Service Connections

The Contractor shall certify that he has a minimum of two complete working cutter units plus spare key components on the site before each inversion.

Prior to installing the sewer liner, the Contractor shall verify which services are active via dye testing. A record of the location of all sewer lateral connections that are in questions must be maintained, which shall be submitted to the Owner. The Owner will then determine which, if any, sewer services are to be abandoned. Those services designated to be abandoned will not be reinstated.

After lining is complete, the Contractor shall re-establish all service connections except those designated by the Owner to be abandoned. This shall be done without excavation from the interior of the pipe by means of a television camera and a remotely controlled cutting device. If the Contractor is unable to re-establish the service connection from inside the pipe and an excavation is necessary, no additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work. Re-established service connections shall be clean and smooth, free of jagged edges and conform as closely as possible to the dimension of the existing service. Brush style cutters or similar devices will be required to ensure that the laterals are smooth for potential CIPP lining.

The sewer main shall be lined prior to lining service laterals, unless approved otherwise by the Engineer.

9. Finish - The reconstructed pipe shall be continuous, without joints over the entire length of the pipe. The liner shall be free of all visual and material defects except those resulting from pre-lined conditions (such conditions shall be brought to the attention of the Engineer prior to pipelining work). There shall be no pits, pinholes, cracks, or crazing. The surface shall be smooth and free of waviness throughout the pipe. Any defects (or wrinkles) that will affect the structural integrity of the reconstructed pipe shall be repaired or the pipe liner will be replaced at the Contractor's expense.

10. Final Sewer Cleaning - After the installation work and testing has been completed to the satisfaction of the Engineer as specified elsewhere in these specifications, the Contractor shall flush and clean all parts of the system. Remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system at or near the closest downstream manhole. If necessary, use water jet, mechanical rodding, or bucketing equipment.

Upon the Engineer's final manhole-to-manhole inspection of the sewer system, if any foreign matter is still present in the system, reflush and clean the sections and portions of the lines as required.

11. Final Televising of Sanitary Sewer – After all testing and cleaning is completed; the Contractor shall provide the Engineer with a DVD in PACP format with GIS assets and a

report showing the entire length of completed sewer lining work. The televising shall meet the criteria specified elsewhere in these specifications.

12. Sealing Liner at Manholes - The Contractor will be required to provide/install a LMK Insignia (or approved equal) hydrophilic end seal at the ends of the liner in each manhole to prevent water tracking between the liner and the existing pipe.

The seal shall be approved by the Owner. Payment for the installation of the seal shall be incidental to the installation of the pipeliner.

13. Notifications – At least 7 days before the start of lining, the Contractor shall provide notice to the adult residents of effected buildings and to the owner or administrator of any property directly served by the sewer to be lined. This notification must be mailed or hand delivered to the owner or administrator of a child care building, school building, commercial businesses, and/or industry. This notification shall include the approximate schedule of lining and specify the days and hours during which the sewer service will be restricted.

14. Reminder Notice – A written reminder notification shall be delivered 24 hours prior to the sewer lining to the adult residents of buildings and the owner or administrator of properties, child care buildings, school buildings, commercial businesses, and/or industry directly served by the sewer to be lined.

B. Installation of Cured-in-Place Pipe, CIPP

1. The CIPP installation shall be in accordance with ASTM F1216, Section 7, with the following additional requirements.

Resin Impregnation - The quantity of resin used for liner impregnation shall be sufficient to fill the volume of air VOIDS in the liner with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used to uniformly distribute the resin throughout the liner. A roller system shall be used to uniformly distribute the resin throughout the liner.

Liner insertion shall be performed in accordance with the manufacturer's recommendations and in such a way to fully extend the liner to its termination point, hold the liner tight against the pipe wall, and produce dimples at service connections and flared ends at maintenance holes. Lubricants may be used as necessary. Care shall be taken so as not to overstress the felt liner.

a) Unless otherwise indicated in the plans or authorized in writing by the Engineer, steam curing, water curing, and UV curing shall all be considered as an acceptable cure method for this project. Steam Cure

(1) After inversion is completed, suitable steam-generating equipment is required to distribute steam throughout the pipe.

(2) The equipment should be capable of delivering steam throughout the section to uniformly raise the temperature within the pipe above the temperature required to effect a cure of the resin.

(3) The temperature and pressure maintained in the pipe and the duration of the cure period shall be as recommended by the manufacturer.

(4) The curing of the CIPP must take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of soil).

(5) Cooling:

(a) The new pipe should be cooled to a temperature below 113 degrees Fahrenheit before relieving the internal pressure within the section.

(b) Cool-down may be accomplished by the introduction of cool water into the section to replace the mixture of air and steam being drained from a small hole made in the downstream end.

(c) Care shall be taken in the release of head so that a vacuum will not be developed that could damage the newly installed pipe.

b) Circulated Heated Water Cure

(1) After inversion is completed, suitable heat source and water recirculation equipment are required to circulate heated water throughout the pipe.

(2) The equipment should be capable of delivering hot water throughout the section to uniformly raise the water temperature above the temperature required to effect a cure of the resin.

(3) The heat source should be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply. Another such gauge should be placed between the impregnated tube and the pipe invert at the termination to determine the temperatures during cure.

(4) The temperature and pressure maintained in the pipe and the duration of the cure period shall be as recommended by the manufacturer.

(5) The curing of the CIPP must take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of soil).

(6) Cooling:

(a) The new pipe should be cooled to a temperature below 100 degrees Fahrenheit before relieving the static head in the inversion stand pipe.

(b) Cool-down may be accomplished by the introduction of cool water into the inversion stand pipe water to replace hot water being drained from a small hole made in the down-stream end.

(c) Care shall be taken in the release of head so that a vacuum will not be developed that could damage the newly installed pipe.

c) UV Cure – Follow ASTM F2019, Section 6.6 & 6.7

(1) The approved system must utilize an outer and inner film to ensure that the liner remains intact during the insertion process and to protect the resin at all times during the installation and curing process from water and debris contamination and resin migration.

(2) A winch should be used to pull the glass fiber liner into position in the pipe. The pulling speed shall not exceed 15ft/min. The liner shall have a lateral fiberglass reinforcement band which runs the entire length of the liner ensuring that the pulling force is transferred to the band and not the fiberglass liner. Once inserted, end plugs shall be used to cap each end of the glass fiber liner to prepare for pressurizing the liner. As with all CIPP products liner restraints should be used in manholes.

(3) A slip sheet shall be installed on the bottom one third to one half of the pipe prior to liner insertion, for the purpose of protecting the liner during insertion and reduce the drag, or as recommended by the liner manufacture.

(4) The glass fiber liner shall be cured with UV light sources at a constant inner pressure. When inserting the curing equipment in the liner, care should be taken to not damage the inner film material.

(5) The UV light sources should be assembled according to the manufacture's specification for the liner diameter. For the liner to achieve the required water tightness and specified mechanical properties, the following parameters must be controlled during the entire curing process, giving the Engineer a record of the curing parameters over every segment of the entire length of the liner. This demonstrates that the liner is cured properly. The recording will include:

- (a) Curing Speed
- (b) Light Source and Wattage
- (c) Inner Air Pressure
- (d) Curing Temperatures
- (e) Date and Time
- (f) Length of Liner

This will be accomplished using a computer and data base that are tamper proof. During the curing process, infrared sensors will be used to record curing data that will be submitted to the Engineer with a post CCTV inspection on the portable hard drive.

(6) The optimal curing speed, or travel speed of the energized UV light sources, is determined for each length of liner based on internal diameter, liner thickness, and exothermic reaction temperatures.

(7) The inner film material should be removed and discarded after curing to provide optimal quality of the final product.

2. Testing of the completed CIPP shall include the following:

a) CIPP field samples shall be prepared in accordance with the ASTM F1216, Section 8.1, using either method proposed.

b) The Contractor shall certify that the CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of liner and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.

c) Leakage testing of the CIPP shall be accomplished during cure while under a positive head. Products in which the pipe wall is cured while not in direct contact with the pressurizing fluid (e.g., a removable bladder) must be tested by an alternative method approved by the Owner

d) Visual inspection of the CIPP shall be in accordance with ASTM F1216, Section 8.4.

e) The Contractor shall be responsible for the testing and associated costs.

7.04 MEASUREMENT AND PAYMENT

A. Measurement & payment of sewer lining pipe shall be by the linear foot measured to the nearest foot between centers of manholes for end to end mainline CIPP lining.

B. Measurement & payment for CIPP short liners shall be paid per each (EA) for the specific length provided in the bid form.

C. Payment for sewer lining pipe by the linear foot/each for each specified liner thickness and diameter of existing sewer pipe shall include full compensation for all labor, equipment, and materials necessary to complete the work as specified and no additional compensation will be made therefore. All traffic control required for the trenchless pipe relining work shall be incidental, with no separate compensation given.

Pre-lining and post-lining televising inspections shall be incidental to the sewer lining work with no separate compensation given.

All items part of section 7.00 are to be fully guaranteed by the Contractor for a period of 2 years from the date of Final Acceptance unless otherwise stipulated in writing by the Owner prior to the date of Conditional Acceptance. During this period, all serious defects discovered by the Owner or Engineer will be removed and replaced by the Contractor in a satisfactory manner at no cost to the Owner. In addition, the Owner may conduct independent televised inspections, at its own expense, of the lining work at any time prior to the completion of the guarantee period.

SECTION 8.00 - TELEVISION INSPECTION

Televising shall be performed on all newly constructed or repaired gravity sanitary sewer lines after successful leak testing has been completed and accepted. Contractors and developers shall follow all requirements for televising as outlined in current City specifications at the time of project.

8.01 TELEVISION EQUIPMENT

Television equipment shall include television camera, television monitor, cables, power source, lights, and other equipment. The television camera shall be specifically designed and constructed for operation in connection with sewer rehabilitation inspection. The Contractor shall utilize a self-propelled type camera where shown on the plans or required by the Engineer.

The camera, television monitor, and other components of the recording system, will be capable of producing a color picture in high definition resolution. The percentage of pipe slope shall be displayed on the screen and video relative to the camera's location.

The camera will be mounted so as to center the lens for each pipe diameter to be investigated. The Contractor shall guarantee to accurately measure pipe diameters of both main and service laterals as well as pipe defects.

The camera will be operative in 100% humidity conditions. Lighting for the camera will minimize reflective glare. Lighting and camera quality will be suitable to provide a clear, in-focus picture of the entire inside periphery of the sewer pipe for all conditions encountered during the work. Focal distance will be adjustable through a range of from 6" to infinity.

The remote reading footage counter will be accurate to one percent over the length of the particular section being inspected and will appear superimposed on the image shown on the television monitor.

At the Contractor's option, a push-type camera can be used to televise laterals.

8.02 TELEVISION INSPECTION PROCEDURES

The camera shall be moved through the line in either direction at a uniform rate, stopping when necessary to ensure proper documentation of the sewer's condition. In no case will the television camera traverse the line being inspected for the line length at an average speed greater than 30 feet per minute. The contractor will stop at each service or defect a minimum of 10 seconds and using the pan and tilt of the camera fully view each service connection/defect. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor will reset their equipment in a manner so that the inspection can be performed from the opposite manhole. A reset or back out charge due to debris in the lines will be considered incidental to the televising pay item.

All lines shall be jetted and vacuumed so that all debris has been removed prior to televising.

A small quantity of water is to be introduced into the line prior to televising. The amount shall be determined by the Engineer and coordinated with the City's Water and Sewer Department. The amount of water shall be sufficient enough to distinguish any sags or alignment problems with the pipe.

A fan/vacuum shall be utilized if steam given off by the sanitary sewer affects the camera visibility.

Examine starting and ending doghouses for quality of mortar work.

While at the bottom of the manhole, the camera will examine all joints as high as it can see around the entire manhole circumference. Joints shall be examined for infiltration and excessive gaps.

All outside drops shall be noted and visually examined looking down from the top.

Provide starting and ending manhole depths to the nearest 0.5'.

Include the location relative to the zero starting point, the side (left of right), and the clockwise position of the wye (i.e. 10:00). Note any problems associated with the service wye.

In the event the section being televised has substantial flow entering the sewer between manholes, such that 20% or 25% of the pipe diameter is flowing for 6"-10" pipe and 12"-24" pipe, respectively, the Contractor will coordinate with the Engineer to have such flow temporarily stopped and/or reschedule television inspection of the particular section to a time when such flow is reduced to permit proceeding with the television inspection. Any required by-passing or "pigging" is considered incidental.

When sewer line depth of flow at the upstream manhole of the section being televised is above the maximum allowable for television inspection, the Contractor will reduce the flow to permit proceeding with the television inspection.

Accuracy of the measurement meters will be checked daily. Footage measurements will begin at the sewer line point of penetration of the upstream manhole, unless specific permission is given to do otherwise. Footage will be shown on the data view/monitor at all times.

8.03 DOCUMENTATION OF THE TELEVISION RESULTS

Television inspection logs will be typed in format acceptable to the City. Samples of the video and inspection log and PACP certification shall be submitted prior to bid acceptance, unacceptable submittals shall be rejected. Two written reports are required along with a brief summary report of noted items in each segment recorded on the project at the front of the report log. Printed location reports will clearly show the location, in relation to adjacent manholes, of each source of infiltration discovered. In addition, other data of significance, including the location of buildings and house service connections, joints, unusual conditions, roots, storm sewer connections, collapsed sections, presence of scale and corrosion, and other discernible

features, will be recorded. A voice recording embedded in the digital video recording will make brief and informative comments on the sewer conditions at the time of recording.

Color digital video recordings of the data on the television monitor will be made by the Contractor. One copy of each video, in certified PACP format, on a digital hard drive containing all video, printable reports and still photos will be provided to the City.

Digital video recording playback will be the same speed that it was recorded.

Title and ownership of the digital hard drive will remain with the City. The Contractor will have all video and necessary playback equipment readily accessible for review by the City during the project. Recording speed will be noted on the recorded digital video.

Digital hard drive submittals will include the following information:

A. Data view:

1. Report number.
2. Date and time of TV inspection.
3. Upstream and downstream manhole numbers.
4. Current distance along reach (distance counter footage).
5. Printed labels on DVD hard case and DVD disk with location information, date, format information, and other descriptive information.
6. All televising data must match the GIS asset ID's provided by the City.

B. Audio:

1. Date and time of TV inspection, operator name and name of adjacent streets or descriptive narration of easement.
2. Verbal confirmation of upstream and downstream manhole numbers and TV viewing direction in relation to direction of flow.
3. Verbal or electronic description of pipe size, type, and pipe joint length.

C. Typed logs will include, but are not limited to, the following information:

1. Location of each point of leakage.
2. Location of each service connection.
3. Location of any damaged sections, nature of damage, and location with respect to pipe axis.
4. Deflection in alignment of grade of pipe.
5. Record of repairs and quantity of sealing material used (if applicable).
6. Date, time, city, street or easement, basin, manhole section, reference manhole number, name of operator, inspector, and weather conditions.
7. Pipe diameter, pipe material, section length, and corresponding DVD identification.

8.04 MEASUREMENT AND PAYMENT

- A.** Measurement of sewer televising will be by the linear foot completed, measured to the nearest foot between centers of manholes.

- B.** Payment for sewer televising by the linear foot will include full compensation for all labor, equipment, and materials necessary to complete the work as specified and no additional compensation will be made therefore.

SECTION 9.00 – CURED-IN-PLACE-PIPE LATERAL LINER (CIPPLL)

9.01 GENERAL REQUIREMENTS

A. Intent.

These specifications include requirements for all design, materials, transportation, equipment, tools, and labor necessary to the structural re-construction of 4.0-inch thru 6.0-inch diameter service laterals and a water tight interface connection seals in 6.0-inch through 36.0-inch main line pipes, normally without excavation, by the installation of a one piece resin impregnated, flexible, non-woven felt liner installed into the existing lateral connection to the City's right-of-way line, or in the case where the public sanitary main is located in a public drainage and utility easement to the easement line, utilizing a pressure apparatus positioned in the main pipe.

B. Reference Specifications.

This specification references ASTM standard specifications, which are made a part hereof by such reference and shall be the latest edition and revision thereof.

F - 1216 Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube

F – 1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pull in and inflate and Curing of a Resin-Impregnated Tube.

F - 2561 Standard Practice for Rehabilitation of a Sewer Service Lateral and its Connection to the Main Using a One-Piece Main and Lateral Cured-in-Place Liner.

D - 5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe

C. Design Considerations.

General Corrosion Requirements: The finished pipe in place shall be fabricated from materials which will be chemically resistant to withstand internal exposure to domestic sewage.

The structural performance of the finished cured-in-place-pipe must be adequate to accommodate all anticipated loads throughout its design life. No cured-in-place-pipe reconstruction technology will be allowed that requires bonding to the existing pipe for any part of its structural strength. Only resin saturation using vacuum impregnation will be allowed.

Design methods are to be derived from traditionally accepted pipe formulas for various loading parameters and modes of failure. All equations will be modified to include ovality as a design parameter. The design method will be submitted to the Engineer for approval.

The CIPP Lateral Liner shall conform to the following properties:

1. The installed pipe meets the relevant sections of ASTM F-1216. The CIPP design shall assume no bonding to the original host pipe. Only resin saturation using vacuum impregnation will be allowed.
2. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or a point of a knife blade so that the layers separate cleanly or the probe or knife blade move freely between layers.
3. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.
4. The CIPP Short Liner shall conform to the following properties:

	Standard	Min Value
Flexural Strength	ASTM - D790	4,500 psi
Modulus of Elasticity	ASTM - D790	250,000 psi

The required structural CIPP wall thickness shall be based as a minimum, on the physical properties listed above and in accordance with the design equations in the appendix of ASTM F1216 and ASTM F2561. The 4.0-inch through 6.0-inch diameter lateral liner shall be designed assuming a fully deteriorated pipe conditions. The main line pipe liner may be considered as a partially deteriorated pipe when the mainline is previously lined. The main line pipe liner shall be considered fully deteriorated when the main line pipe is NOT lined.

Tests for compliance with this specification shall be made according to the applicable ASTM specification. A certificate of compliance with this specification shall be provided upon request. All materials used in the reconstruction process shall be made of the best respective kinds and to the satisfaction of the Owner. Any materials not approved by the Owner shall be rejected prior to the reconstruction of the sewer. The following shall be submitted to the Engineer for approval prior to any lateral lining:

1. Submittals about the Resin used shall include long term creep test data confirming the resin system's 50-year design life in accordance with ASTM D2990. A certificate of compliance with ASTM – F1216 must be included. The Contractor shall also submit any Materials Safety Data Sheets for any chemicals used in the CIPPLL.
2. The Contractor shall submit a certificate of compliance for the liner in accordance with ASTM - F1216 for inversion of tubes, and ASTM – F1743 for pull in place tubes.

These rejected materials shall then be replaced with approved materials at the Contractor's expense. The Contractor guarantees the quality of the liner during manufacturing and after

installation. The outside diameter and minimum wall thickness shall be fabricated to a size that when installed, will neatly fit the internal circumference of the conduit, with a minimum 5.0-inches on either side of the connection. Allowance will be made for circumferential stretching during the liner insertion. The installed liner will be a jointless polyester felt “tube” with sewn seams and/or a semi-rigid collar at the connection that will create a watertight seal at the mainline pipe interface. Standard dimension ratio of the liner shall be based on the evaluation of the design consideration. These considerations normally include an evaluation of 1) Flow capacity, 2) External loads (hydrostatic pressure and/or static and dynamic earth loads), and 3) internal pressure, if applicable.

9.02 MATERIALS

The liner and resin will meet the requirements of ASTM – F1216 (or ASTM – F2561), F1743, and D5813. The liner length will be a distance to effectively span from the lateral connection at the main line pipe to the City’s right-of-way line, or in the case where the public sanitary main is located in a public drainage and utility easement to the easement line, and terminate before crossing said lines, with a minimum of 3 feet into the service lateral. When required, an overlap method will be performed with a pull-in-process installation from a cleanout or access point back to the main line pipe. The lateral liner must provide a watertight seal at the main pipe and a structural repair of the lateral over the specified length. Installer will verify the lengths in the field before impregnation of the resin.

Approved products that can be installed for this project include, BLD “Service Connection Seal + Lateral” of BLD Services LLC; LMK “T-Liner” Main-to-Lateral Lining System; Perma-Liner Industries, LLC – Innerseal Lateral Liner – Full Wrap Lateral Liner; Trelleborg LCR – Full Wrap Lateral Liner; or a City Engineer approved equal.

9.03 INSTALLATION

A. Installation Procedure.

The following installation procedure shall be adhered to unless otherwise approved by the Owner’s representative.

1. Safety - The Installer shall carry out his/her operations in strict accordance with all OSHA and manufacturers’ safety requirements. Particular attention is drawn to those safety requirements involving entering confined spaces.
2. Traffic Control - Traffic control shall be the responsibility of the Contractor and shall conform to latest version of the MNMUTCD and other portions of these specifications and the contract Special Provisions. The Contractor shall maintain traffic during work periods. During non-working periods, the Contractor shall open the entire roadway to traffic.
3. Access – A cleanout is not required for installation. However, if a cleanout already exists, or is required by the Owner, it will be constructed of materials which provide a 6.0-

inch minimum diameter opening. The cleanout will conform to other parts of these specifications.

4. Notifications - Providing all required notifications as outlined in section 7.03 of this specification.

5. Dye Testing - Dye testing as required to determine active laterals where needed.

6. Cleanouts - Installation of cleanouts shall be incidental to this specification (if required and not already covered with a separate bid item). If a cleanout needs to be constructed, it shall match the size of the lateral it is connected to and include any additional restoration work to complete the installation.

7. Water Usage - Water is available from designated City fill stations for cleaning, inversion, and other work requiring water. However, the Contractor shall secure permission from the Utility Department and obtain the necessary permits and pay the fees associated with the permit and water usage.

8. Cleaning of Sewer Line - It shall be the responsibility of the Installer to remove all internal debris from the service line in accordance with Section 2.00.. The intent of this specification is for cleaning of the lateral to be accomplished from the main pipe via lateral launching equipment. If the lateral cannot be cleaned using industry standard cleaning heads that can be launched from the main pipe, then a cleanout or access point will be required. The laterals will be cleaned a sufficient length to ensure the specified length of sewer is ready for lining. Installer will be responsible to verify, prior to installation, that all internal debris has been removed from the sewer line. Internal debris consists of broken pipe sections, roots, loose gravel, etc

9. Inspection of Sewer Line - Inspection of pipelines shall be performed by experienced personnel trained in identifying breaks, obstacles and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the lateral liner pipe into the sewer line, and it shall be noted so that these conditions can be corrected. A DVD in PACP format and suitable log shall be kept for later reference by the Owner.

10. Bypassing Sewage - The Installer, when required, shall provide for the flow of sewage around the section or sections of pipe designated for lining. The bypass shall be made by plugging the line at an existing manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of an adequate capacity and size to handle the flow.

11. Line Obstructions - It shall be the responsibility of the Installer to clear the line of obstructions such as solids, roots, protruding service connections and collapsed pipe that will prevent the insertion of the CIPP lateral liner pipe.

If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, then the Installer shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered a separate cost item.

12. Wet Out - Installer will designate a location where the liner will be vacuum impregnated prior to installation. Installer will allow the Owner to inspect the materials and resin saturation (wet-out) procedure. A catalyst system compatible with the resin and liner will be used.

13. Liner Installation – It is required that the service lateral be inactive during the time of installation. This will be accomplished by turning off the homeowner's services or requesting that the homeowner relinquish using his services during the period of installation. Notifications will be handed out to impacted residents 24 hours prior to the commencement of work.

The Installer will designate a location where the liner will be vacuum impregnated prior to installation. The Installer will allow the Owner to inspect the materials and resin saturation (wet-out) procedure. A catalyst system compatible with the resin and liner will be used.

The wet-out liner will be loaded inside a pressure apparatus above ground, utilizing a hydrophilic sealant (or equivalent) on the backside of the connection applied in a ½-inch to 1.0-inch wide bead (or gasket per ASTM F2561) to enhance a watertight seal. Also, a Silicate Resin or a two-part 100 percent solid epoxy (reference ASTM C-881) will be applied at a volume no less than 6oz to the lateral interface to enhance adhesion against the host pipe. The pressure apparatus, with an end attached to a robotic device, will be winched through the main pipe to the service connection. The robotic device, together with a television camera, will be used to position the pressure apparatus' inversion elbow at the service connection opening. Air pressure, supplied to the pressure apparatus through an inversion hose, will be used to invert the wet-out liner through the lateral pipe to the cleanout/access/termination point or "Right of Way/easement" line. The inversion head will be adjusted to be of sufficient pressure to cause the impregnated liner to invert completely in the lateral pipe and hold the liner tight to the pipe wall. Care will be taken during the curing process so as not to overstress the liner.

14. Curing – Unless otherwise approved by the engineer, an ambient-temperature curing resin system will be utilized.

Initial Cure will be deemed to be completed when inspection of the exposed portions of the CIPPLL appear to be hard and sound. The cure period will be of a duration recommended by the resin manufacturer, as modified for the installation process.

15. Cooling Process - The pressure shall be increased to compensate for the heating-cooling transition and it shall be maintained until the temperature at the lowest critical point

is 100° F (38° C). This shall constitute completion of the Lateral Liner pipe processing. The pipe within the pipe shall be tight fitting and adapted to the existing sewer pipe.

16. Finish - The reconstructed pipe shall be free of all visual and material defects except those resulting from pre-lined conditions (such conditions shall be brought to the attention of the Owner prior to lining). There shall be no pits, pinholes, cracks or crazing. The surface shall be smooth and create a smooth and watertight connection to the existing pipe by the end of the repair. Any defects that will affect the structural integrity of the reconstructed pipe shall be repaired or the liner will be replaced at the Contractor's expense. This continuous one-piece structural pipe will not inhibit the closed-circuit-television (CCTV) post video inspection of the main or service lateral pipes.

17. Documentation - The submittal shall meet the criteria specified elsewhere in these specifications.

18. Backfill - At all points where the liner pipe has been exposed (such as service connection fittings, or other points where the old pipe must be removed), the liner pipe and fittings shall be encased in cement-stabilized sand or other high density material as specified by the Owner to prevent deflection due to difference in subsidence.

After the encasement material is in place and accepted by the Owner's representative, backfill is placed and compacted to require finish grade in accordance with the Owner's specifications. Particular care should be taken to ensure compaction of earth beneath the lateral pipe in order to reduce subsidence and resultant bending at the lateral connection at the sewer main.

19. Cleanup - After the installation work has been completed and all testing acceptable, the Contractor shall clean up the entire project area and return the ground cover to grade. All excess material and debris not incorporated into the permanent installation shall be disposed of by the contractor. Sidewalk, driveway and street surfaces shall be recovered under the appropriate pay item.

9.04 MEASUREMENT AND PAYMENT

A. Measurement for the CIPP Lateral Connection Liner (EA) shall be per each connection installed and shall include the connection into the mainline as well as the first 3 feet of the lateral measured from the connection to the mainline sewer.

B. Measurement of CIPP Lateral Liner pipe shall be by the linear foot (LF), not including the first 3 feet of the service lateral connection liner paid above, until the termination of the liner.

C. Payment for CIPP Lateral Liner shall include full compensation for all incidental labor, equipment, and materials necessary to complete the work as specified and no additional compensation will be made therefore.

All traffic control required for the trenchless pipe work shall be incidental, with no separate compensation given.

Payment for any repair work to remove line obstructions for the installation of the liner shall be incidental to the liner work with no separate compensation given.

Pre-lining and post-lining televising inspections shall be incidental to the sewer lining work with no separate compensation given.

All items part of section 9.00 are to be fully guaranteed by the Contractor for a period of 2 years from the date of Final Acceptance unless otherwise stipulated in writing by the Owner prior to the date of Conditional Acceptance. During this period, all serious defects discovered by the Owner or Engineer will be removed and replaced by the Contractor in a satisfactory manner at no cost to the Owner. In addition, the Owner may conduct independent televised inspections, at its own expense, of the lining work at any time prior to the completion of the guarantee period.

2024
SEWER & WATER TRACE WIRE SPECIFICATIONS

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SECTION 1.00 - SCOPE

1.01 GENERAL

- a. All requirements for trace wire materials, installation and testing in the City of Chanhassen, Minnesota shall be in accordance with the 2014 Minnesota Rural Water Association's Sewer/Water Utility – Trace Wire Specification, unless modified as per Subsection 1.01.b.
- b. Modified sections are indicated as follows:
 - Removed sections will have strikethrough font: ~~Example~~
 - Modified or added language will have underlined and italicized font: *Example*
- c. None of the Minnesota Rural Water Association Standard Details are incorporated, refer only to the City's Current Detail Plates for details pertaining to trace wire installations.

SECTION 2.00 – SEWER/WATER UTILITY – TRACE WIRE SPECIFICATIONS

Materials

General

All trace wire and trace wire products shall be domestically manufactured in the U.S.A.

All trace wire shall have HDPE insulation intended for direct bury, color coated per APWA standard for the specific utility being marked.

Trace wire

- **Open Trench** - Trace wire shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.
- **Directional Drilling/Boring** - Trace wire shall be #12 AWG Copper Clad Steel, Extra High Strength with minimum 1,150 lb. break load, with minimum 45 mil HDPE insulation thickness.
- **Pipe Bursting/Slip Lining** - Trace wire shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load, with minimum 50 ml HDPE insulation thickness.

Connectors

- All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At Crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.
- Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
- Non locking friction fit, twist on or taped connectors are prohibited.

Termination/Access

- All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
- All grade level/in-ground access boxes shall be appropriately identified with “sewer” or “water” cast into the cap and be color coded.
- A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
- All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.

- Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
- **Service Laterals on public property** - Trace wire must terminate at an approved grade level/in- ground trace wire access box, located at the edge of the road right-of-way, ~~and out of the roadway.~~ All water service lateral trace wire access boxes shall be supplied with an integrated curb and tracer box.
- Integrated Curb and Tracer Box - shall be compression tested to 3,000 pounds with no sign of damage. Tracer wire terminals, thumb nuts, and jumper shall be brass and shall be supplied with dielectric, anti-corrosive gel to protect wires. The top shall be labeled "WATER" and have a magnet securely attached in order to locate even when access point is covered by soil, sod, and/or paving material.
- Integrated Cleanout and Tracer Box – tracer wire terminals, thumb nuts, and jumper shall be brass and shall be supplied with dielectric, anti-corrosive gel to protect wires. The top shall be labeled "SEWER" and have a magnet securely attached in order to locate even when access point is covered by soil, sod, and/or paving material.
- ~~**Service Laterals on private property** – Trace wire must terminate at an approved above-ground trace wire access box, affixed to the building exterior directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above finished grade, or terminate at an approved grade level/in- ground trace wire access box, located within 2 linear feet of the building being served by the utility.~~
- **Hydrants** – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange. (affixing with tape or plastic ties shall not be acceptable)
- ~~**Long runs, in excess of 500 linear feet without service laterals or hydrants** – Trace wire access must be provided utilizing an approved grade level/in- ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway. The grade level/in- ground trace wire access box shall be delineated using a minimum 48" polyethylene marker post, color coded per APWA standard for the specific utility being marked.~~

Grounding

- Trace wire must be properly grounded at all dead ends/stubs
- Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20ft of #12 red HDPE insulated copper clad steel wire connected to anode (minimum 1.5 lb.) specifically manufactured for this purpose and buried at the same elevation as the utility.
- When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
- When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.
- Where the anode wire will be connected to a trace wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

Installation

General

- Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
- Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
- Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
- Trace wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5' intervals.
- Trace wire must be properly grounded as specified.
- Trace wire on all service laterals/stubs must terminate at an approved trace wire access box located directly above the utility, at the edge of the road right-of-way, ~~but out of the roadway.~~ (See Trace wire Termination/Access)
- At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire (see Grounding). *Bring trace wire & ground wire to grade in accordance with this Specification. If brought to grade within roadway, protect trace wire access box with a traffic rated gate valve box which shall include one extension for adjustability and filled with sand. If brought to grade within greenspace, utilize marker post plus access point.*
- Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode ~~buried at the same depth as the trace wire.~~ *and bring trace wire & ground wire to grade in accordance with this Specification.*
- All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
- In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

Sanitary Sewer System

- A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
- Lay mainline trace wire continuously, by-passing around the outside of manholes/structures on the North or East side.
- Trace wire on all sanitary service laterals must terminate at an approved trace wire access box color coded green and located directly above the service lateral at the edge of road right of way.

Water System

- A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
- Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
- Trace wire on all water service laterals must terminate at an approved trace wire access box color coded blue and located directly above the service lateral at the edge of road right of way.
- Above-ground tracer wire access boxes will be installed on all fire hydrants.
- All conductive and non-conductive service lines shall include tracer wire.

Storm Sewer System

This section shall be included at the discretion of the facility owner.

- If the storm sewer system includes service laterals for connection of private drains and tile lines, it shall be specified the same as a sanitary sewer application.
- Lay mainline trace wire continuously, by-passing around the outside of manholes/structure on the North or East side.

Prohibited Products and Methods

The following products and methods shall not be allowed or acceptable

- Uninsulated trace wire
- Trace wire insulations other than HDPE
- Trace wires not domestically manufactured
- Non locking, friction fit, twist on or taped connectors
- Brass or copper ground rods
- Wire connections utilizing taping or spray-on waterproofing
- Looped wire or continuous wire installations, that has multiple wires laid side-by-side or in close proximity to one another
- Trace wire wrapped around the corresponding utility
- Brass fittings with trace wire connection lugs
- Wire terminations within the roadway, i.e. in valve boxes, cleanouts, manholes, etc.
- Connecting trace wire to existing conductive utilities

Testing

All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, to be performed by the City and witnessed by the contractor, engineer and ~~facility owner~~ developer as applicable, prior to acceptance of ownership. The contractor shall expose all access pits in order to test the full trace wire system installation.

This verification shall be performed upon completion of rough grading and prior to any paving operations, and then again prior to final acceptance of the project.

Continuity testing in lieu of actual line tracing shall not be accepted.

Products

The following products have been deemed acceptable and appropriate. These products are a guide only to help you choose the correct applications for your tracer wire project.

- Copper clad Steel (CCS) trace wire
 - Open Trench – Copperhead #12 High Strength part # 1230*-HS**
 - Directional Drilling/Boring - Copperhead Extra High Strength part # 1245*-EHS**
 - Pipe Bursting/Slip Lining – Copperhead SoloShot Extreme Strength 7 x 7 Stranded part # PBX-50*-**
 - * Denotes color: B=Blue, G=Green, P=Purple
 - **Denotes spool size. 500' 1000' 2500'
- Connectors
 - Copperhead 3-way locking connector part # LSC1230*
 - Mainline-to-Service, 3- way Direct Bury Lug: Copperhead Part # 3WB-01
- Termination/Access
 - Non-Roadway access boxes applications: Trace wire access boxes Grade level Copperhead adjustable lite duty Part # LD14*2T-SW
 - Concrete / Driveway access box applications: Trace wire access boxes Grade level Copperhead Part # CD14*2T-SW
 - Fire hydrant trace wire access box applications: Above ground two terminal Cobra Test Station, part# T2- *-FLPKG
 - Integrated curb and tracer box for water service lateral installation: BoaBox Water Access Point.
 - Integrated cleanout and tracer box for sub-surface PVC draintile cleanout installation: BoaBox Sewer Access Point
 - Market post plus access point: Mamba Round Locate Copperhead Part #MAMBA-RND-L—TT-C72-*/*/*-CD
- Grounding
 - Drive in Magnesium Anode: Copperhead Part # ANO-12 (1.5 lb)

Manufacture product options:

The information provided by Copperhead Industries gives you product options to help you choose the correct wire—termination/access points—connectors and grounding products. Other manufactures provide these products; this information is only a guide.

All system components, including tracer wire, connectors, ground rods and access points, must be compatible. The product specifications written above is utilizing all Copperhead Industries components and note that an approved equal can be utilized if approved by the Engineer.

The component parts of the Copperhead® Complete Utility Locating System™ have been designed and engineered for compatibility to ensure end-to-end conductivity for the purpose of detecting underground utility assets.

2024
LANDSCAPE SPECIFICATIONS

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SECTION 1.00 - DESCRIPTION

This work consists of furnishing and planting trees, shrubs, vines, and perennials of the species, variety, grade, size, or age, and root category specified, complete in place at the locations designated in the plan or as directed by the Engineer. It may also consist of planting or transplanting plants furnished by the Owner. This work shall be performed in accordance with the most current MnDOT Specification 2571 or as modified in the following.

SECTION 2.00 - MATERIALS (2571.2)

2.01 NURSERY PLANT STOCK (ANSI Z60.1; MNDOT – 3861)

Nursery plant stock shall follow the current MnDOT Specification 3861 or as modified below. Plants of the species specified shall be furnished in the variety, grade, and size, or age indicated.

A. Supply of Planting Stock

By submitting a Proposal and accepting award of the contract, the Contractor acknowledges investigation of the supply of planting stock, obtaining of firm commitments from suppliers, and assurance of delivery of the specified plant stock as required for completion of the contract. The Contractor shall present a list of suppliers and the materials to be furnished by each of them at or prior to the preconstruction conference.

B. Plant Stock Documentation

As a condition for delivery and approval of the plant stock, the Contractor shall furnish the Engineer with:

1. Copies of a valid nursery stock (dealer or grower) certificate registered with the Minnesota Department of Agriculture.
2. A Certificate of Compliance.
3. A Certificate of Nursery Inspection from a state or provincial department of agriculture.
4. The Contractor shall verify that out of state nursery vendors are subject to state and federal quarantines, are free of currently regulated pests, and are under a Gypsy Moth Compliance Agreement between the Minnesota Department of Agriculture (MDA) and the U.S. Department of Agriculture or under MDA Japanese Beetle or MDA Emerald Ash Borer Quarantines. All plant material shipped from nursery vendors subject to quarantines must be accompanied by a current Certificate of Compliance for gypsy moth, Japanese beetle and Emerald Ash Borer. To determine if vendors are subject to quarantines, contact the MDA.
5. Invoices.
6. Bills of lading for all plant stock delivered to the project.

These certificates shall state that the plants are in conformance with the requirements and were consistently grown and cultivated within the boundaries shown on the Plant

Hardiness Zone map included in the plan. The Certificate of Compliance shall state the species, sizes, quantities furnished, and name and location of the original source (nursery growing operation), in accordance with Section 6.00 of the General Provisions.

The Contractor shall not start planting operations until the Engineer has reviewed and accepted the required documentation. Work performed with plants that are misrepresented on the certificates will be considered as unauthorized work. The Certificate of Compliance shall be submitted to the Engineer no later than 1 week prior to the proposed beginning of planting.

C. Substitutions

Substitutions may be allowed in accordance with Section 6.01 of the General Provisions. However, the Contractor shall provide written documentation that the specified plant is not available, from the partial list of nursery stock suppliers provided by the Engineer, and that the substitute plant meets the contract requirements. The Engineer may either approve the substitute plant or extend the contract time to ensure availability of the specified plant.

D. Plant Stock Specifications

1. All plant stock shall conform to American Standard for Nursery Stock.
2. A minimum of three structural roots reasonably distributed around the trunk shall be found in each plant. Plants with structural roots on only one side of the trunk (J roots) shall be rejected.
3. The root crown must not be more than 2” below the soil line. The top two structural roots shall be no more than 3” below the soil line when measured 4” radial to the trunk. The top of the other structural root shall be no greater than 5” below the soil line when measured 4” radial to the trunk. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all circling roots above the structural roots across the top of the structural roots.
4. The root system shall be reasonably free of root defects including potentially stem-girdling roots above the root collar and main structural roots, vertical roots, and/or kinked roots from nursery production practices, including roots on the interior of the root ball.
5. Container-grown plants, in addition to the above requirement, should comply with the following:

- a) Container-grown plants may be permitted only when indicated on the drawing or this specification.
 - b) Container-grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its potting medium together but not so long as to have developed roots that are matted or circling around the edge or interior of the main root mass. Plants shall have been root pruned at each change in container size.
 - c) Plants that fail to meet any of the above requirements shall be modified to correct deficiencies if approved by the Engineer. Modification shall include the following:
 - a. Shaving all circling roots on the exterior of the root mass deep enough so that all cut roots' ends are roughly radial to the trunk.
 - b. Removal of all roots above the top of the main structural roots and trunk flare including any roots that are imprints from previous smaller containers.
 - c. The above modifications shall not be cause to alter the warranty provisions of this specification.
6. The center of the trunk(s) or stem(s) of the plant shall be in the center of the root ball. A tolerance of 10% of the diameter of the root ball is the maximum deviation allowable. For example: For a plant with a 30" root ball, the center of the plant at ground level shall be within a 3" circle 13½" from the outer edge of the ball.
7. Measurement:
- a) Depth of the root ball is measured from the top of the ball, which in all cases shall begin at the root flare. Soil above the root flare, from being deeply planted in the nursery as a young plant, as a result of maintenance practices in the nursery, or added during harvest, shall not be included in ball depth measurement, and should be removed.
 - b) Ball depths will carry the following ratios:
 - i. Root balls with diameters less than 20": Depth not less than 65% of the diameter of the ball.
 - ii. Root balls with diameters of 20" and up: Depth not less than 60% of the diameter of the ball.
8. Plants shall be true to species and variety specified and nursery grown in accordance with good horticultural practices under climatic conditions similar to those in the

locality of the project for at least two years. They shall have been freshly dug (during the most recent favorable harvest season).

9. Plants shall be so trained in development and appearance as to be unquestionably superior in form, compactness, and symmetry. They shall be sound, healthy, vigorous, well branched and densely foliated when in leaf, and free of disease and insect adults, eggs, pupae or larvae. They shall have healthy, well-developed root systems and shall be free from physical damage or other conditions that would prevent thriving growth.
10. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged, cut, or crooked leader, included bark, abrasion of bark, sunscald, disfiguring knots, insect damage, mold, prematurely opened buds, or cuts of limbs over 3/4" diameter that are not completely callused are cause for rejection.
11. Balled and burlapped plants shall be dug with solid balls of standard size, the balls securely wrapped with non-synthetic, untreated, biodegradable burlap, and tightly bound with non-synthetic, biodegradable rope or twine. Alternatively they may be placed in a wire basket lined with non-synthetic, untreated, biodegradable burlap and tightly bound with non-synthetic, biodegradable rope or twine. Root collar shall be apparent at surface of ball. Bare root plants shall have a healthy, well branched root system characteristic of the species and with adequate spread.
12. Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the purchaser. Use of larger plants shall not increase the contract price nor allow the contractor to use smaller than specified material on other plants. If larger plants are approved, the root ball, root spread, or container shall be increased in proportion to the size of the plant.
13. Caliper measurements shall be taken on the trunk 6" above the root collar for trees up to 4" in caliper, and 12" above the root collar for trees over 4" in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip. Plants shall be measured when branches are in their normal position. If a range of size is given, no plant shall be less than the minimum size, and no less than 50% of the plants shall be as large as the maximum size specified. Plants that meet measurements but do not possess a normal balance between height and spread shall be rejected.

E. Owner Furnished Stock and Transplant Stock

Owner furnished stock and transplant stock shall be obtained from sources designated in the plan or Special Provisions.

2.02 INCIDENTAL MATERIALS

A. Soil Amendments

The Contractor may use soil amendments to modify the physical or chemical properties of the soil to enhance plant growth whether specified or not. The Owner will not pay for these soil amendments unless the Contractor can demonstrate that unspecified amendments are absolutely necessary to ensure plant growth and survival. The Contractor shall submit soil tests, analysis, and recommendations that support the need for the amendments and for compensation based upon the submitted information.

1. Select Topsoil Borrow MnDOT – 3877 (as modified by Chanhassen Street Construction Specifications Section 4.14D)
2. Fertilizer MnDOT - 3881
3. Compost MnDOT – 3890
4. Soil & Root Additives MnDOT – 3896
5. Iron Sulfate
 - a) Iron sulfate, used to lower pH, shall be ferric sulfate or ferrous sulfate in pellet or granular form containing not less than 18.5% iron expressed as metallic iron. Acceptance will be on the basis of information contained on the product label.
6. Activated Charcoal
 - a) When activated charcoal is used to neutralize or deactivate residual organic pesticide or chemical contaminants in the soil, the Contractor shall use ordinary charcoal, finely ground to increase absorptive surfaces, and electrically charged to attract the molecules or organic chemicals. The Engineer will accept the charcoal on the basis of information provided by the product label and manufacturer’s recommendations.
7. Porous ceramics and hydrophilic absorbing polymers, used to modify the physical characteristics of poor soils by balancing or managing water and oxygen in the soil will be accepted based on the information provided by the product label and the manufacturer’s recommendations.

B. Water

Water shall be free of oil, acids, alkalis, salts, and other substances harmful to plants. Water suitable for human consumption will be acceptable without testing. Water from streams and lakes shall not be used without the Engineer’s approval. When the Engineer requires testing, an approved testing laboratory shall perform the tests at no expense to the Owner.

C. Mulch

- Type 6 MnDOT - 3882

D. Rodent Protection

Rodent protection consists of .25” grid welded and galvanized wire mesh (hardware cloth) formed in a double layered 15” diameter cylinder. The Contractor shall place and secure the rodent protection with a 1 by 1” heartwood white oak stake to the height shown in the plan.

E. Wound Dressing

Wound Dressing material consists of latex base paint or other acceptable material suitable for application by brushing on bruised or cut surfaces of plants, only when directed by the Engineer. All elms and oaks wounded during April-June will require immediate wound dressing.

F. Tree Painting

Tree paint consists of undiluted exterior grade white latex base paint, as approved by the Engineer, for use as a protective coating to prevent winter injury on tree trunks.

G. Staking and Guying

Staking and guying shall be as shown in the plan. Posts and straps shall be uniform in style and color. The guying straps shall be non-abrasive to the tree and provide equal tension through the length and width of the straps.

H. Seedling Tree Shelters

Shelters for seedling trees shall be from the approved list that is on file with the MnDOT Landscape Unit. The shelter shall be a seamless, extruded, twin-wall, rigid copolymer polypropylene tube. The shelter material shall be beige in color and 30% to 40% translucent while being resistant to decomposition from sunlight for a minimum of 5 years. The shelter shall have a flared top rim, formed state recess, photo degradable mesh sleeve covering, and height and diameter as shown in the plan. The Contractor shall install the shelters with 1 by 1” heartwood white oak stakes as shown in the plan.

I. Replacements

Replacements consist of plants or incidental materials required to replace dead, defective or missing plants and incidental materials. Quality of replacements shall be equal to or better than the initially specified material.

J. Miscellaneous Materials and Equipment

Miscellaneous materials and equipment consists of preparatory work, staking items, herbicides, insecticides, fungicides, and equipment necessary to install plants as specified and maintain plants in healthy and vigorous conditions, free from weed encroachment.

SECTION 3.00 - CONSTRUCTION REQUIREMENTS (2571.3)

3.01 GENERAL

The Contractor shall conduct temporary vegetation protection measures in accordance with Section 4.12 of the Street Specifications as incidental work. However, the Owner will make payment for protection of specimen, high value, threatened, or endangered vegetation when a bid item is indicated in the plan.

The Contractor shall conduct temporary erosion control measures in accordance with Section 4.13 of the Street Specifications as incidental work. The Contractor will not receive compensation for restoring areas damaged by erosion, sedimentation, and other causes when the damage results from the Contractor's operations, neglect, or failure to implement adequate temporary erosion control measures. However, the Owner will make payment for prevention of serious erosion and sedimentation when a bid item is indicated in the plan or when the damage is not the result of Contractor's neglect or operations.

A certified Landscape Specialist shall perform or directly supervise the installation and establishment of plants, together with all other incidental work. The specialist shall have at least 2 years of landscaping experience. The Contractor shall provide experienced crews working under the direct supervision of the certified specialist. The certification is obtained by completing a 1-day MnDOT Landscape Project Installation, Inspection, and Administration training class provided by the MnDOT Landscape Unit. The certification is valid for 3 years.

3.02 DEFINITIONS

A. Preparatory Work

Preparatory work involves:

1. Securing commitments for the required materials and equipment.
2. Developing a progress schedule and obtaining the Engineer's approval.
3. Mobilizing for plant installation, including the moving of equipment and supplies to the project site.
4. Protecting or staying away from existing plants in accordance with Section 7.13 of the General Provisions and Section 4.12 of the Street Specifications during mobilization.
 - a. The Contractor shall obtain the Engineer's approval before moving supplies to the project site for later planting operations including mulch and other incidental items.

B. Preparation of Planting Holes and Beds

The preparation of planting holes and beds involves:

1. Layout staking of planting beds and isolated plant locations.
2. Applying herbicide and/or conducting other weed control procedures.
3. Cultivating the soil and incorporating amendments or materials to improve soil properties and drainage.
4. Providing temporary erosion control measures.

C. Initial Planting Operations

The initial planting operations involve acceptably:

1. Digging planting holes.
2. Installing plants.
3. Conducting initial watering.
4. Mulching.
5. Protecting plants: including placing rodent guards, staking and guying plants, painting trees, installing seedling tree shelters, and conducting continuous weed control.
6. Cleaning up the planting site.
7. Conducting repair of the planting site.

The plant establishment period does not begin until all of the initial planting operations are completed and approved by the Engineer.

D. Plant Establishment Period

The plant establishment period is two calendar years from the date all of the initial planting operations on the Project are completed and approved, unless specified otherwise. The work during this period of time involves watering, weed control, turf maintenance, replacement of unacceptable material and plants, and other incidental

plant care necessary to protect and establish plants. Turf maintenance includes the prevention or repair of rutting and other damage that may lead to soil erosion and weed infestation.

3.03 PLANT LAYOUT

The planting locations and layouts shown in the plan are approximate. The Contractor shall stake the exact locations and layout for approval by the Engineer. In order to remedy localized problems and seasonal conditions that may hinder the establishment of plants according to the species and locations specified, the Contractor may request approval to relocate plantings, to make plant substitutions, or to modify soil or drainage characteristics.

The Contractor shall locate tree plantings:

- a) Thirty feet (30') from any other tree for shade trees, twenty-five (25) feet from any other tree for ornamentals.
- b) One foot (1') from property line or right-of-way line.
- c) Outside of right-of-way, unless directed to do so by the owner of the right-of-way.
- d) Fifteen feet (15') from driveways or approach sidewalks.
- e) Not in conflict with underground utilities.
- f) An ornamental if overhead power lines are present.
- g) So that a minimum sight distance of 1,200 feet exists in front of all traffic signs and extends 50 feet beyond the sign.
- h) Outside of the clear zones and sight lines shown in the plan.

The Contractor shall not locate tree plantings:

- a) Between a sidewalk or trail and a public street unless directed to do so by the Engineer.

3.04 QUALITY AND SIZE

All single stem trees shall be balled and burlapped stock, and of average specified caliper. Multiple stem plants shall have at least three stems/plants and of average specified height.

3.05 START OF OPERATIONS

The Contractor shall not start planting hole or bed preparations, planting operations, or delivery of planting stock to the project site until the Engineer determines that weather and

soil conditions are suitable for such work and are in accordance with the dates shown in the contract.

The Contractor shall not start planting operations until the documentation requirements of Section 2.00 (2571.2) have been met.

3.06 NOTICES BY CONTRACTOR

The Contractor shall notify the Engineer at least three days prior to the planned delivery date of planting stock and replacement planting stock to the project to allow for proper inspection.

The Contractor shall notify the Engineer at least 24 hours in advance of beginning and of changing planting hole and bed preparations, plant installation, and establishment operations, including layout staking, clearing, weed spraying, material deliveries, soil cultivation, planting, watering, mulching, plant protection, dead plant removal, weeding, cleanup, and restoration work.

The Contractor shall give the notice in writing unless otherwise designated by the Engineer.

3.07 UNAUTHORIZED WORK

The Engineer will consider work performed with uncertified plant stock, without plant stock documentation, without landscape specialist certification, without notification, or in conflict with the working hours of Section 7.02 of the General Conditions as unauthorized work.

3.08 EQUIPMENT REQUIRED

The Contractor shall have on the project at all times at least:

- a) One portable compaction tester capable of measuring compaction in the soil to a minimum depth of 1 foot.
- b) One soil recovery probe.
- c) Three calipers with measurement readings in inches.
- d) One portable soil moisture meter or tensiometer capable of measuring soil moisture in root zones to a minimum depth of 1 foot.
- e) One rain gauge per mile of project.

3.09 PREPARING PLANTING HOLES AND PLANTING BEDS

The Contractor shall conform to Section 5.12 of the General Provisions before cultivating soil or excavating holes on the project.

A. Weed Control

The Contractor shall control undesirable turf and weed growth by one or both of the following methods or by alternative methods approved by the Engineer. The Contractor shall conform to weed control requirements specified under this section.

Control and prevent the spreading of State listed Noxious Weed (NW) and/or invasive weeds as per Contract or as directed by the Engineer. The current State listed NW species is determined by the Minnesota Department of Agriculture. Identify, mark, map, and monitor weed infestation areas and apply treatments at the appropriate time in order to prevent seed production and spreading.

Obtain a permit from the County Agricultural Inspector or Minnesota Department of Agriculture to transport Material or Equipment containing propagating parts of NW. Follow the permit requirements. Submit to Engineer a copy of the permit.

Submit a Plan at the pre-construction meeting for reducing the spread of NW. The Plan must include methods and sequence of Work. Plans including the use of herbicide(s), submit a copy of the commercial applicator license with categories for CORE and Right-of-way, and list of herbicides to be used. The Inspector must approve herbicides used on City Right-of-way prior to use.

Movement and reuse of topsoil from infested areas shall be limited to the confines of identified infested areas.

Delineate weed infested areas indicated on the Plan on the Project and when appropriate, fence off from any Work, vehicles, or Equipment.

Minimize the spread of weed seed and other propagules from designated infested areas by minimizing disturbance and by cleaning vehicles and Equipment. Cleaning shall remove soil and vegetation debris from vehicles and Equipment before moving out infested areas or moving into Project limits. Stockpile of NW infested soils shall be separated from non-infested stockpiles.

1. Herbicide Application Method

Before cultivating isolated plant locations and plant beds, the Contractor may kill turf and weed growth within the areas that will receive mulch by using a non-selective, non-residual post emergence herbicide containing 41% glyphosate as the active ingredient. The Contractor shall submit labels of intended herbicides to the Engineer for review and approval at least 3 days prior the date of application. The application shall be performed in accordance with manufacturer's recommendations by crews experienced and licensed in the use of chemical pesticides by the Minnesota Department of Agriculture. After evidence of vegetation kill, the Contractor shall mow the dead vegetation to a maximum height of 2". Post emergence herbicide shall be applied to actively growing, dry

vegetation. The application shall be made in August or September preceding fall or spring planting, or in May if August or September application is not possible. If measurable precipitation should occur within 6 hours after spraying, the Contractor shall re-spray the affected areas.

2. Cultivate - Fallow - Disk Method

After mowing the planting area to a maximum height of 2", the Contractor may:

- a) Deep cultivate the planting areas to a minimum depth of 10" in late summer or early fall.
- b) Disk or till the planting areas to a depth of 3" or less in the spring.

B. Planting Hole and Bed Cultivation

To prevent site compaction and damage, do not Work in planting holes and bed areas if there are saturated soil conditions.

1. Loosening and Tilling Soil

After the finished grading has been completed, the Contractor shall:

- a) Prepare planting holes by digging the holes 2-3 times as wide as the root ball or container.
- b) Cultivate planting holes and beds by thoroughly loosening and tilling the soil to a minimum depth of 10", as measured from the finished grade elevation of the soil.
- c) Thoroughly incorporate and mix the required soil amendments into the top 10" depth of soil.
- d) Loosen planting areas until compaction tester readings are less than 200 pounds per square inch.

2. Planting Soil

Planting soil for planting holes and beds shall consist of 2" of Grade 2 compost placed and thoroughly mixed with the existing soils to obtain a uniform planting soil mixture for at least a depth of 10". This mixture shall be excavated when planting holes are dug and then replaced as backfill for all planting holes.

3. Competence Test

The Contractor shall demonstrate competence to the Engineer by completing the cultivation and incorporation of soil amendments in one planting bed and in one isolated tree planting location. After obtaining approval by the Engineer that the equipment and methods are sufficient to perform the work, the Contractor may continue the planting hole and bed cultivation operations.

4. Wet Soils, Rock, and Debris

If excessively wet soils, bedrock, or excessive quantities of boulders and construction debris are encountered, the Contractor shall reconfigure, relocate, or delete the affected planting areas as approved by the Engineer.

5. Temporary Erosion Control

The Contractor shall employ temporary erosion prevention methods in cultivated planting hole and bed areas when necessary and to the satisfaction of the Engineer.

6. General

If hardpan layers or compacted soil layers are exposed below the normal planting depth, the Engineer may require an additional deep ripping or other measures to ensure proper root development and drainage. Such approved work will be paid for as Extra Work.

If it becomes evident that the Contractor's operation is causing compaction of the planting soil, the Engineer will require additional cultivation or rototilling to re-aerate and loosen the affected planting soil.

Planting hole cultivation will not be required for machine (hydraulic spade) transplanted stock.

The Contractor shall not stockpile soil, compost, or other materials on the project until approval is given by the Engineer.

If the Contractor wishes to place woodchip mulch in prepared planting areas as temporary erosion control prior to planting and the Engineer approves of the proposed work; the woodchip mulch must be raked off all prepared planting areas prior to digging planting holes. Woodchip mulch that is contaminated with soil must be removed from the project. Planting holes contaminated with woodchip mulch will not be accepted.

3.10 DELIVERY AND STORAGE OF PLANTS

Plant stock shall be installed on the day of delivery to the project site unless properly stored. Plants may be stored on the project site in a refrigerated storage truck or by other storage methods approved by the Engineer that prevent damage to plants from exposure to drying winds, sun, heat, low humidity, or freezing. After being dug and until planted, the roots of

all plants shall be kept covered with a suitable moisture-holding material such as straw, saw dust, moss, or soil, and this material shall be kept continuously moist except during freezing weather. Prior to planting, plants shall be stored out of the direct sunlight and with adequate ventilation. Plants shall be protected from drying winds and freezing until planted.

Those plants that cannot be planted on the day of delivery shall be temporarily stored by “heeling-in” or by placing them in a well ventilated, cool, moist storage place.

When heeling-in bare root plants, the roots shall be buried in moist soil in such a manner that the roots will be completely covered, leaving no air space. Heeled-in plants, whether bare root, balled and burlapped, or container grown, shall be properly cared for at all times and shall not remain so stored from one planting season to the next.

Roots of all plants must be protected from freezing at all times prior to planting. If roots become frozen, the plant will be rejected.

3.11 HARDINESS

All plant materials shall be sufficiently hardy to survive winters in plant hardiness Zone 4 and shall have been propagated from seed or rootstock originating in plant hardiness Zone 3 or 4 as depicted on the Plant Hardiness Zone Map of the U.S. Department of Agriculture.

All stock shall have been grown under climatic conditions approximating those in Zone 4 for a minimum of two years. The name of the supplier or wholesale nursery supplying the plant materials to the contractor shall be submitted to the City prior to delivery of all nursery stock. The City reserves the right to reject any plant material not considered to be sufficiently hardy.

3.12 PRUNING - TOP GROWTH AND ROOTS

Immediately before planting, the contract shall prune, as necessary, the roots of all bare root plants and the top growth of all deciduous plants to the satisfaction of the Engineer. Broken or badly bruised roots and dry root tips shall be cut back to sound, healthy tissue. Pruning on bare root (BR) plants and balled and burlapped (B & B) plants shall be limited to the removal of dead, damaged, or diseased branches and unwanted suckers.

Pruning cuts on all trees shall leave a branch collar (Shigo method) but in no case shall a stub remain. Pruning shall produce a clean cut in live wood without bruising or tearing the bark. Where branches are cut back, the cut shall be made at a point beyond the lateral shoot or bud a distance not less than one-half of the diameter of the supporting branch. All cuts shall be made on an angle sloping in the direction of the lateral shoot and in no case shall stubs be left.

In the case of trees with multiple stem leaders rather than a dominant central leader, the leader that will best promote the symmetry of the tree shall be preserved and the remainder shall be removed or cut back so they will not compete with the selected leader. Surrounding

top branches shall be cut back in conformance with the leader trimming to suppress competition with the selected leader. Deciduous shrubs shall be pruned to form a loose outline conforming to normal shape, with entire canes being removed where they are too thick.

All pruning of the plants shall be done at the project site prior to planting. The use of hedge shears, pole shears, or anvil action pruners for pruning plants will not be permitted. Pruning saws or bypass scissors type pruners shall be used for all pruning.

Between April 15 and July 1, all cut surfaces on oak, elm, crabapple, and hawthorn trees shall be immediately treated with latex paint to minimize the potential for entry of insect and disease organisms. It is recommended that pruning for these species be done outside of the aforementioned time period.

Evergreen trees and shrubs shall be pruned only to the extent of removing damaged growth or a competing leader, except where clipping of hedges is required.

3.13 INSTALLATION OF PLANTS

A. General

The Contractor:

1. Shall dig planting holes to the configuration and minimum dimensions shown in the plan.
2. Shall obtain the Engineer's approval of the planting holes before plants are installed.
3. Shall provide adequate drainage where planting holes and beds are dug in heavy clay or impervious soils and a percolation rate of at least .5" per hour is not observed after partially filling presaturated test holes with water.
4. May:
 - a) Raise the level of the planting area,
 - b) Install a granular filter arrangement,
 - c) Install a tile drainage system, or
 - d) Construct a combination of these features as shown on the plan and approved by the Engineer.

Plants shall be installed plumb and shall be so set that, after installation and backfill consolidation, the beginning taper of the root flare of bare root or container grown plants will be at or above the approximate level of the finished soil elevation. Due to landscape industry practices, the beginning taper of the root flare of balled and burlapped plants may be found below the soil grade but in no case will balled and burlapped plants be accepted if more than 4 inches of soil is found above the root taper in the ball. All excess soil above the root flare must be removed so that the root flare is visible after planting. Care shall be taken to ensure that roots are not damaged while placing and compacting the backfill.

The backfilling operations shall be accomplished in more than one stage in accordance with the plan. Sufficient planting soil shall be placed prior to the initial watering in order to cover the root system completely and provide firm support for the plant in the hole. The remaining backfill shall be placed within 5 days after the initial watering following water permeation and soil treatment.

The Contractor shall complete one individual test planting for each root category or method of planting of evergreen tree, evergreen shrub, deciduous tree, deciduous shrub, seedling, vine and perennial, as it applies, to obtain approval by the Engineer that the Contractor's methods are sufficient to perform the work as specified with initial watering, guying, painting, protective devices, and mulching. No other planting will be allowed until the test planting approval is provided by the Engineer.

B. Balled and Burlapped Stock

Balled and burlapped plants may be installed without removing the burlap covering or wire baskets entirely. Before completing the backfilling of planting holes, the top loops of wire baskets shall be removed and the burlap shall be loosened at the top and pulled back to expose the entire top third of the ball. All twine and rope material shall be removed from the ball and the planting site. If directed by the Engineer, biodegradable twine may be left on B & B plants for stem/root ball support until the end of the contract. Prior to final acceptance all twine, that has not decomposed, must be cut and removed from plant stems to prevent girdling injury. Treated burlap will be allowed on the root balls but vertical slits must be cut through the burlap at the time of installation. The vertical slits shall be at 4" intervals around the circumference of the root ball and from the top downward in a manner that does not damage the root system.

C. Container Stock

Plants supplied in containers shall be installed immediately upon being removed from the containers. Removal of plants from containers shall be in a manner that will not disturb the root system or the soil in which they were planted. Under no conditions shall the plant be removed from the container by pulling on the main stem or plant growth. The outside of the root ball shall be scored or pruned in order to redirect circling roots.

D. Bare Root Stock

Before installing bare root trees and shrubs, planting soil shall be placed and compacted to a depth of approximately 6" in the bottom of the plant hole. The plants shall be installed with the roots evenly distributed and spread in their natural position, with the growing medium being carefully placed and compacted around the roots.

E. Machine Transplant Stock

The Contractor shall transplant trees as designated in the contract by hydraulic spade-type mechanized digging equipment.

The Contractor shall not transplant trees until the Department of Agriculture has inspected and found the trees to be free from plant pests.

The Contractor is responsible for all appropriate permits and certifications required for plants moved off of the Owner's Right of Way.

The Contractor does not need to provide replacement trees when transplanted trees are furnished by the Owner and die or are defective. However, the Contractor shall remove the dead or defective tree at no expense to the Owner and as directed by the Engineer.

The Contractor shall:

- a) Apply water to thoroughly hydrate the tree and hold the root package together during digging operations and transport.
- b) Cover the spade portion of the digger with a tight hood to prevent soil sifting from the root ball.
- c) Cover trees with a tarp when trees are transported during the growing rather than dormant season if the transport distance exceeds 5 miles.
- d) Ensure that soil in the ball does not sift out of the digger while in transit.
- e) Support the tree in a manner that will prevent shifting and damaging of the root ball.
- f) Fill holes created by the removal of trees from public property within 24 hours. Fill holes so that after settling, the fill will be the same as the surrounding ground surface.
- g) Reset trees that are not plumb with a spade of the same size or larger. Pull away mulch from the tree so that the spades will slip into the original cut. Plumbing trees by tightening guy wires will not be permitted.

- h) Trees shall be moved and planted within 24 hours of harvesting and shall remain in spade until planted.
- i) Remove double leaders and broken, dead, diseased, or crossed branches. Immediately treat cut surfaces on oak species with a suitable tree wound dressing.
- j) Protect all plants from injury during digging, lifting, storing, transportation, delivery, transplanting, and planting.
- k) No plant shall be so bound with rope or wire at any time to damage the bark, break branches, or destroy its natural shape.

F. Seedling Stock

The Contractor shall only plant evergreen and deciduous seedlings during the optimum spring planting dates for evergreens as shown in the plan. The Contractor shall not plant seedlings in water filled depressions.

The Contractor shall not damage the fine root hairs on seedlings during storage, handling, or planting. The Contractor shall not prune roots of seedlings unless approved by the Engineer.

The Contractor shall:

- a) Place seedlings in the ground so that the seedling assumes a position within 20 degrees of vertical.
- b) Prevent tangled or turned up root ends (J-root).
- c) Set the root collar of each seedling within .5” of the elevation of the finished soil surface.
- d) Plant and tamp the ground, around seedling roots, firmly without excessive compaction. Air pockets or voids around the roots will not be permitted. The Engineer will determine acceptable planting by a tug test and by inspecting for air pockets and excessive compaction in the root zone. The tug test is satisfied if gentle pulling of the seedling at its base does not pull the roots out of the ground or loosen the soil in the root area.
- e) Protect deciduous seedlings with seedling tree shelters according to the plan, when so designated in the contract.

3.14 FOLLOWING PLANT INSTALLATION

A. Watering and Backfill

Within 2 hours after being installed, each plant shall be watered to thoroughly saturate the backfill soil and provide for settlement and filling of voids in the backfill. Consecutive watering and addition of planting soil may be necessary for thorough backfilling and saturation of the soil.

Within five days after installation, the Contractor shall add sufficient planting soil around each plant to bring the soil to the specified level shown in the plan. Plants shall be thoroughly watered unless soil moisture is at optimum or excessive levels. Plants that are improperly positioned with respect to depth and plumbness shall be reset or replaced as necessary. Reset and replaced plants shall be watered within 2 hours to thoroughly saturate the backfill soil.

The Contractor shall have available on the project, at all time, sufficient watering equipment and forces to carry out a complete watering of all plants once each week, if necessary, from April 1 until ground freeze, or as otherwise directed by the Engineer, until the initial plant installation operations have been accepted. Watering intervals shall be varied in consideration of prevailing soil moisture and weather conditions.

B. Mulch Placement

Planting bed soil shall be fine-graded and leveled with hand tools prior to placing mulch to avoid impeding or puddling surface drainage and to prevent mulch depth irregularities. Mulch material shall be placed within 48 hours after the second watering, unless further delay is authorized by the Engineer in cases where soil moisture is excessive and additional time is required to allow excess soil moisture to evaporate. Mulch placement is shown in the plan.

3.15 PROTECTION OF PLANTS

The Contractor shall take precautionary and protective measures to ensure healthy growth and survival of all plants.

A. Guying and Staking

The Contractor shall:

- a) Guy and stake trees in accordance with the details shown in the plan (Standard Detail Plate Nos. 5310 and 5312).
- b) Guy and stake trees only when necessary to maintain the plant in a plumb condition where excess soil moisture, steep slopes, high wind, or vandalism is a problem. When the estimated quantity of staking and guying is not shown as incidental work in the plan, staking and guying approved by the Engineer, as necessary to maintain trees in a plumb condition, will be paid for as Extra Work.

- c) Remove the staking and guying after 1 year of plant establishment or as soon as is practicable during the plant establishment period.

B. Rodent Protection

The Contractor shall place rodent protection around all deciduous and pine trees in accordance with the details in the plan unless specified otherwise.

C. Tree Painting

The Contractor shall paint trees in accordance with the species, notes, and details shown in the Plan. The Engineer may require additional applications when paint is applied to wet bark or under other adverse conditions.

3.16 DISPOSAL OF EXCAVATED MATERIALS

Excess and unwanted excavated materials shall be removed from the planting areas and disposed of to the Engineer's satisfaction within 3 days after the excavation.

3.17 CLEANUP AND RESTORATION WORK

Cleanup and restoration work shall be accomplished as the final step of the initial planting operations and throughout the plant establishment period, to the satisfaction of the Engineer.

3.18 PLANT ESTABLISHMENT PERIOD

A. Establishment Period

The Contractor shall maintain the work and care for the installed plants from completion of the initial planting operations until final acceptance at the end of the Plant Establishment Period.

B. Establishment Work

The Contractor shall keep all plants in a healthy growing condition, using good horticultural practices performed on a day by day basis during the growing season and as necessary during the remainder of the year, with necessary replacements being made as required.

If, at any time, inspection shows that the care and replacement operations have been inadequate, untimely, or unsatisfactory, the Engineer will notify the contractor in writing of such default and the Contractor shall promptly comply with the instructions. The Contractor shall replace plant stock as required in the contract but only within the optimum planting dates specified, extended, or shown in the plan or as required by the Engineer. If the Contractor does not proceed satisfactorily within 3 working days after receiving the written notice from the Engineer, a daily charge of \$200 will be assessed against the Contractor until compliance with the notice is noted by the Engineer.

1. All Plants Except Seedlings

In plant establishment work except for seedlings, the Contractor shall:

- a) Maintain adequate (but not excessive) soil moisture in conformance with Section 3.00H (2571.3H) and watering guidelines provided in the plan. The Contractor shall use the soil moisture meter and provide soil moisture readings when requested by the Engineer.
- b) Repair, adjust, or replace, as necessary, the staking and guying, mulch material, planting soil, rodent protection, seedling tree shelters, tree painting, and other incidental items.
- c) Apply insecticides, fungicides, and other cultural procedures, as necessary, to maintain healthy, vigorous plants free from harmful insects, fungus and disease.
- d) Furnish and install replacement plants and remove dead plants, as needed, with new mulch, planting soil, and other incidental items.
- e) Maintain the plants in a plumb condition at the appropriate planting depth.
- f) Maintain all planting areas in a weed-free condition by continuously removing all weed growth in the mulched planting areas as necessary.
 1. Remove all weed growth in the mulched areas.
 2. Spray application of chemicals for weed control in the mulched planting areas will not be permitted during the plant establishment period unless the Engineer authorizes otherwise. A non-selective, non-residual post emergence herbicide containing 41% glyphosate as the active ingredient may be applied, with a surfactant, on a spot treatment basis only, with a brush or wick applicator, if authorized by the Engineer. A broad-spectrum dichlobenil based granular herbicide may be applied in conformance with product labeling and manufacturer's recommendations for residual weed control, if authorized by the Engineer.
 3. Dispose of weeds in accordance with Section 3.09.
- g) Perform other plant establishment operations consistent with proper care of the plants.

2. Seedlings

In plant establishment work for seedlings, the Contractor shall:

- a) Repair, adjust, or replace seedling tree shelters as necessary.
- b) Furnish and install replacement seedlings (one time only after 1 year as necessary with one initial watering).
- c) Maintain all mulched planting areas in a weed-free condition until final acceptance at the end of the plant establishment period.

3. Supplemental Watering

The Contractor is not required to provide supplemental watering of seedlings during the plant establishment period.

C. Replacement Requirements

The Contractor shall:

1. Replace all dead, defective, or missing plants and incidental materials as required in the contract or when ordered by the Engineer and within 2 weeks of notification by the Engineer, unless a longer period of time is acceptable to the Engineer.
2. Replace all installed plants that are lost due to accidents, vandalism, theft, rodent damage, and other causes.
3. Repair or replace all damage caused by the Contractor's operations.

The requirements for replacement plantings shall be the same as for initial planting.

Within the 2-year plant establishment period, the Contractor is also responsible for determining which plants need to be replaced based upon the Contractor's assessment of their condition and present or probable compliance with the project requirements.

For plant replacement when less than a full year remains in the original plant establishment period, the Contractor will be required to provide a 1-year plant establishment period for the replaced plant.

After the first replacement, except in the case of seedlings, the Engineer will decide if the plant will be replaced again at the Contractor's expense, or deleted from the plan.

3.19 ACCEPTANCE OF WORK

For acceptance at full payment, plants shall meet all requirements including the criteria listed in the current edition of "Inspection and Contract Administration Guidelines for MnDOT

Landscape Projects,” published by the MnDOT Landscape Unit. The plants shall be healthy, vigorous, and structurally sound.

A. Acceptance of Preparatory Work

The Engineer will accept the preparatory work after the Contractor has satisfactorily moved equipment and supplies to the project site, provided for protection of existing plants, and obtained the Engineer’s approval of the progress schedule.

B. Acceptance of Preparation of Planting Holes and Beds

The Engineer will accept the preparation of planting holes and beds after the Contractor has satisfactorily completed staking, initial weed control, soil cultivation with incorporation of amendments, and temporary erosion prevention measures.

C. Acceptance of Initial Planting Operation

Initial acceptance will be made upon satisfactory completion of the initial planting operation for the individual plant.

1. Preliminary Inspection

One year into the plant establishment period, the Engineer will make an inspection of the project and notify the Contractor of any dead, defective, or missing plants and work that must be performed to comply with specifications. Dead or defective plants shall be removed and replaced where so ordered.

D. Final Acceptance

Final acceptance will be made after final inspection of the completed project at the end of the plant establishment period.

1. Final Inspection

On or about the date on which the plant establishment period expires, the Engineer will make an inspection of the project and notify the Contractor of any dead, defective, or missing plants and work that must be performed prior to acceptance. Dead or defective plants shall be removed where so ordered.

As a condition for acceptance of the work, plant maintenance operations shall not be past due at the time of the final inspection. Every plant shall have received a thorough watering within the preceding 10 days before inspection unless soil moisture is at sufficient levels. The mulched planting areas shall be weed free. All work shall be in good order as would reflect recent care and require no further attention until the next growing season.

The Engineer will make a determination as to which plants will be accepted for payment at the contract unit prices, at a reduced payment, or at no payment. The Engineer may consider as unacceptable the machine transplanted trees that are mechanically damaged and trees with vigor and growth reduction from improper transplanting operations. The Engineer may accept these trees at a reduced payment or at no payment.

Upon final acceptance, the Contractor will not be required to provide any further care for the plantings. However, final acceptance of the work will not be made until cleanup and restoration work are completed to the Engineer's satisfaction.

E. Uninspected, Non-conforming, and Unauthorized Work

Acceptance of uninspected, non-conforming, or unauthorized work will be made to the extent the Engineer determines the work to be acceptable.

SECTION 4.00 - METHOD OF MEASUREMENT (2571.4)

4.01 PLANTS FURNISHED AND PLANTED

Trees, shrubs, vines and perennials of each species, variety, size, or age, and root category furnished, planted, and maintained by the Contractor will be measured separately by the number of acceptable plants.

4.02 PLANTS PLANTED

Trees, shrubs, vines and perennials of each species, variety, size, or age, and root category furnished by the Owner and planted and maintained by the Contractor will be measured separately by the number of acceptable plants.

4.03 PLANTS TRANSPLANTED

Trees, shrubs, vines, and perennials of each size and type furnished by the Owner and transplanted will be measured separately by the number of plants moved and maintained in an acceptable manner.

SECTION 5.00 - BASIS OF PAYMENT

Payment for plant installation at a percentage of the contract price per unit of measure will be compensation in full for all costs relating to furnishing, installing, and maintaining, or installing and maintaining, the required plants and materials specified.

If the Engineer requires additional materials and work beyond that specified or shown in the contract, the Contractor will receive compensation for the additional materials and work as Extra Work.

5.01 INITIAL PAYMENT

Initial payment of up to but not exceeding 80% of the contract unit price will be paid in partial payment amounts for satisfactory completion of the following work:

A. Preparatory Work

Up to but not exceeding 10% of the contract amount for the plants to be planted.

B. Preparation of Planting Holes and Beds

Up to but not exceeding 20% of the contract amount for the plants to be planted in each project area.

C. Initial Planting Operation

Up to but not exceeding 50% of the contract amount for the plants planted.

5.02 MAXIMUM PAYMENT

The Engineer may authorize an interim partial payment of up to but not exceeding 80% of the contract amount for the plants planted, at the end of the first calendar year of the plant establishment period when required plant establishment operations on the entire project have been acceptable generally and continuously throughout this period as determined by the initial acceptance and the preliminary inspection. The Engineer will not authorize this payment if these conditions are not met.

5.03 FINAL PAYMENT

Final payment will be made upon final acceptance of the completed project at the end of the plant establishment period. Final payment may involve full payment, reduced payment, or no payment for the individual plants.

Payment will be made for only one plant at one location, not for each initial and each replacement plant.

When an initial payment is made for an individual plant and the final payment is at full, reduced, or no payment, the amount of the initial payment will be deducted from the final payment to the Contractor. Payment to the Owner shall be required when the remaining balance of payments is insufficient to compensate for unacceptable work.

A. Full Payment

Full payment at 100% of the contract unit price will be made for the individual plant that is acceptable at the final inspection if the Contractor has met the following requirements:

1. Acceptance of the preparatory work.
2. Acceptance of the preparation of the planting hole or bed.
3. Acceptance of the initial planting operations.
4. Compliance with all plant establishment work requirements at the time of inspection and the plant has had the minimum two growing seasons or, in the case of a replacement plant, the plant has had a minimum of one growing season.

Replacement plants that have received 1 full year of plant establishment care, within the plant establishment period or an extended plant establishment period, and that are otherwise acceptable, will receive full payment.

B. Reduced Payment and No Payment

1. Reduced Payment - Owner Option

The Contractor may not elect to receive reduced payment in lieu of performing the work in conformance with the contract documents. At the Owner’s option, reduced payment at a percentage of the contract unit price for the individual plant not in full compliance with specifications at final inspection may be made in accordance with the following schedule:

REDUCED PAYMENT SCHEDULE	
Condition of Acceptance	Total Payment Percentage
The plant is acceptable at final inspection but existing vegetation was not protected.	Payment to the extent the Engineer determines acceptable to compensate for damages.
The plant is acceptable at final inspection but the preparation of the planting hole or bed or the initial planting operation was unacceptable.	50%

The plant is acceptable at final inspection but the Contractor is not currently in compliance with all plant establishment work requirements or the plant has not received the minimum of 1 year for replacements only	50%
The Owner-furnished plant or machine transplant is not acceptable at final inspection but the protection of existing vegetation, the preparation of the planting hole or bed, the initial planting operation and the continuous plant establishment operations have all been acceptable.	50%
The plant is not acceptable at final inspection but the protection of existing vegetation, the preparation of the planting hole or bed, and the initial planting operation were acceptable and the Contractor has been in general compliance continuously with the plant establishment requirements for the minimum 2 years required for the initial plant or the minimum 1 year required for the replacement plant.	35%
The plant is not acceptable at final inspection and the Contractor has not been in general compliance continuously with the plant establishment requirements.	0%

2. No Payment

No payment will be made for an unacceptable plant with unacceptable establishment care or for a plant when payment is made for the replacement plant.