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# 2022

## **CITY OF HERMANTOWN STANDARD SPECIFICATIONS FOR CONSTRUCTION**

**Public Works Department  
Hermantown, MN  
April 19, 2022**

## CITY APPROVAL



4/19/22

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APPROVED

CITY ENGINEER

DATE



4/19/22

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APPROVED

PUBLIC WORKS DIRECTOR

DATE

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**City of Hermantown, Minnesota**

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## **CITY OF HERMANTOWN GENERAL REQUIREMENTS**

### **S-1 MATERIALS AND WORK TO BE FURNISHED BY THE PUBLIC WORKS DEPARTMENT**

The Public Works Department will furnish the following materials and work on this project at no cost to the Contractor. Contractor is to excavate and backfill in order to allow the Department to perform said work.

- A. Shut down water mains and services as necessary to allow contractor to furnish and install water connections.
- B. Sample and test for bacteria for new public water mains. In the case of a failed bacteria test, the City reserves the right to charge the Contractor for retests and water loss.

### **S-2 USE OF WATER FROM CITY HYDRANTS**

All water taken from City hydrants, except for that water related to water main construction shall be metered and a charge will be made for the amount used. The Contractor must make arrangements with the Public Works Department at (218) 729-3640 to get the necessary permit, valve and meter, prior to using the hydrant for drawing water.

### **S-3 GOVERNING SPECIFICATIONS**

- A. The 2020 Edition of the Minnesota Department of Transportation 'Standard Specifications for Construction' shall govern.
- B. Latest version of Minnesota MUTCD, including the latest version of the Temporary Traffic Control Zone Layouts field manual.

### **S-4 RESPONSIBLE CONTRACTOR**

The Department cannot award a construction contract in excess of \$50,000 unless the Bidder is a "responsible contractor" as defined in Minnesota Statutes §16C.285, subdivision 3. A Bidder submitting a Proposal for this Project must verify that it meets the minimum criteria specified in that statute by submitting the "Responsible Contractor Verification and Certification of Compliance" form. A company owner or officer must sign the "Responsible Contractor Verification and Certification of Compliance" form under oath verifying compliance with each of the minimum criteria.

THE COMPLETED FORMS MUST BE SUBMITTED WITH THE BID PROPOSAL.

A bidder must obtain a verification from each subcontractor it will have a direct contractual relationship with. At the Department's request, a bidder must submit signed subcontractor verifications. A contractor or subcontractor must obtain an annual verification from each motor carrier it has a direct contractual relationship with. A motor carrier must give immediate written notice if it no longer meets the minimum responsible contractor criteria. The requirement for subcontractor verifications does not apply to:

- Design professionals licensed under Minnesota Statutes §326.06; and A business or person that supplies materials, equipment, or supplies to a subcontractor on the Project, including performing delivering and unloading services in connection with the supply of materials, equipment, and supplies. But, a business or person must submit a verification if it delivers mineral aggregate such as sand, gravel, or stone

that will be incorporated into the Work by depositing the material substantially in place, directly or through spreaders, from the transporting vehicle.

A bidder or subcontractor who does not meet the minimum criteria specified in the statute, or who fails to verify compliance with the criteria, is not a "responsible contractor" and is ineligible to be awarded the Contract for this Project or to work on this Project. Submitting a false verification makes the bidder or subcontractor ineligible to be awarded a construction contract for this Project. Additionally, submitting a false statement may lead to contract termination. If only one bidder submits a bid, the Department may, but is not required to, award a contract even if that bidder does not meet the minimum criteria.

### **1302 AWARD OF CONTRACT**

The provisions of MN/DOT 1302 are changed to read as follows:

The award of Contract, if to be awarded, will be made by City Council Resolution after the opening of proposals to the lowest responsible bidder who complies with all prescribed requirements. The successful bidder will be notified by a "Letter of Intent", mailed to the address shown on his/her proposal, that his/her bid has been accepted subject to execution and approval of the Contract as required by law.

The Letter of Intent will identify the date on which the City Council is expected to approve the Resolution awarding the Contract. Included with the Letter of Intent will be:

- A. Three (3) copies of the pending Contract covering the Project.
- B. A copy of the City of Hermantown Performance Bond form.
- C. A copy of the City of Hermantown Payment Bond form.
- D. Notice of whether an annual Certificate of Insurance is on file or whether Proof of Insurance is needed.

As a condition precedent to approval of a Contract, a corporation to whom a Contract is awarded shall furnish proof that it has met all legal requirements for transacting business in the State of Minnesota.

As a condition precedent to approval of a Contract, a sworn statement shall be filed with the City stating that the persons, firm, association, or corporation to whom the Contract is awarded has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the Contract. This sworn statement shall be in the form of an affidavit executed by, or on behalf of, the successful bidder and sworn to by him before a person who is authorized by the laws of this State to administer oaths. The forms for this affidavit will be furnished to the successful bidder and they shall be properly executed and returned within the period prescribed.

**1305 REQUIREMENT OF CONTRACT BOND**

The provisions of MN/DOT 1305 are changed to read as follows:

At the time of the execution of the Contract, the successful bidder shall furnish "Performance Bond" and a "Payment Bond" on City of Hermantown forms. Both bonds shall be in amounts equal to the full amount of the contract price.

**1306 EXECUTION AND APPROVAL OF CONTRACT**

The provisions of MN/DOT 1306 are changed to read as follows:

The three (3) copies of the Contract shall be signed by the successful bidder and returned, together with the Performance Bond and the Payment Bond, non-collusion affidavit, EEO affidavit, and Proof of Insurance, within ten (10) calendar days after the date the "Letter of Intent" has been mailed advising the bidder that his/her bid has been accepted subject to execution and approval of the Contract as required by law.

Notice of approval or disapproval of the Contract and Bonds will be given to the successful bidder by means of a "Notice to Proceed" letter after award by City Council Resolution.

Contract Time shall start ten (10) calendar days after the date of award by City Council resolution or on the date specified in the Special Provision modifying 1806, whichever is later. Failure of the bidder to properly execute and return all pertinent items within the prescribed period shall not change the start of Contract Time.

If return of the executed forms within the specified time is impossible due to the absence of one or more of the required signers, an extension of time may be granted by the City, provided that satisfactory evidence is furnished that the forms will be executed.

All members of a partnership, and the President or Vice President and the Secretary or Treasurer of each corporation shall sign the Contract and Bonds. In the case of joint ventures, signature requirements shall apply to each firm represented.

**1502 PLANS AND WORKING DRAWINGS**

MN/DOT 1502 is supplemented with following:

The contractor shall submit shop drawings for products supplied on the project. 'Shop drawings' shall include any product literature that identifies the materials, performance, manufacturer, type, size, and model number of products to be supplied. The list of required shop drawings will be reviewed and confirmed at the pre-construction meeting. The Contractor shall review all shop drawings for compliance with the contract documents. The Contractor shall "mark-up" shop drawings with pertinent notations to clarify the work furnished and identify any deviations. The Contractor shall include a signed certification that indicates the shop drawings are "reviewed" and all deviations shall have the reviewers "initials and date" and City standard noted on the page. The Contractor shall submit the shop drawings to the Engineer with sufficient time (not less than 14 days) to allow review and comment of the submittal.

The Engineer will review the shop drawings for compliance with the contract documents and current City standards. The Engineer will respond with comments (within 14 days of receipt of submittal) to the Contractor that the items submitted are either “reviewed” or “resubmit”. The Engineer may consider work unacceptable and no payment will be made, if the shop drawing review is not completed for products incorporated into the work.

In addition, the Engineer will submit “reviewed” shop drawings for **all HDPE water main and fittings** to the City Engineer for review. The Engineer and Contractor will schedule a time to meet on the construction site with the City Engineer to inspect the materials furnished prior to use in the work. No HDPE water main work will be considered acceptable and no payment will be made without the completed shop drawing review and inspection of the City Engineer.

#### **1507 UTILITY PROPERTY AND SERVICE**

Construction operations in the proximity of utility properties shall be performed in accordance with the provisions of MN/DOT 1507, except as modified below:

- A. Bidders are advised that the following utility companies have existing facilities in the construction area that may be affected by the work under this Contract.

##### **WATER and SANITARY SEWER**

City of Hermantown  
Paul Senst  
49171 Lightning Drive  
Hermantown, MN 55811  
psenst@hermantownmn.com  
(218) 729-3640

##### **GAS**

Minnesota Energy Resources  
Levi Langseth  
Levi.langseth@minnesotaenergyresources.com  
(651) 322-8964

##### **POWER**

Minnesota Power  
Aaron Nelson  
30 West Superior Street  
Duluth, MN 55802  
anelson@mnpower.com  
(218) 340-2872

##### **TELEPHONE**

CenturyLink  
Michael Coughlin  
322 West 1<sup>st</sup> Street  
Duluth, MN 55802  
michael.coughlin@centurylink.com  
(218) 723-4210 (Manager)

##### **CABLE TELEVISION**

Mediacom  
Scott Sandquist  
106 Chestnut Street  
Virginia, MN 55792  
ssandquist@mediacomcc.com  
(218) 741-7592

Consolidated Communications  
Jeff Bright  
4960 Miller Trunk Hwy, Ste 500  
Hermantown, MN 55811  
jbright@enventis.com  
(218) 740-6146



- B. The City's Contractor shall coordinate their work and cooperate with the foregoing utility owners and their forces in a manner consistent with the provisions of MN/DOT 1507 and the applicable provisions of MN/DOT 1505.
- C. The Contractor shall perform work in a manner that all existing utility valves, manholes, pull boxes, controls, access vaults, pedestals, and poles are accessible to the utility operator. Materials or equipment will not be allowed to be stored over, or impede access to, the facility.

**1508 CONSTRUCTION STAKES, LINES AND GRADES**

The provisions of MN/DOT 1508 are supplemented to include the following:

The primary line and grade for utility installation will be established by the Engineer. For trench installation, line and grade stakes will be set parallel to the proposed pipeline at an appropriate offset as will best serve the Contractor's operations wherever practical. For tunnel or directional drilling installation, line and grade stakes will be set directly above the proposed pipeline setting. Grade and stakes will be set at appropriate intervals along the pipeline and at appurtenances and service lines.

For sanitary or storm sewer installation, the Contractor shall use a "laser beam" instrument to maintain line and grade.

The Contractor shall arrange his operations as will avoid necessary interference with the establishment of the primary line and grade stakes and shall render whatever assistance may be required by the Engineer in accomplishing the staking. The Contractor shall be responsible for preservation of the primary stakes and shall bear the full cost of any re-staking necessitated by his negligence. The Contractor shall be solely responsible for the correct transfer of the primary line and grade to all working points and for construction of the work to the prescribed lines and grades as established by the Engineer.

**1706 EMPLOYEE HEALTH AND WELFARE**

The provisions of MN/DOT 1706 are supplemented to include the following:

The Contractor shall not use any motor vehicle equipment on this Project having an obstructed view to the rear unless:

- A. The vehicle has a reverse signal alarm which is audible above the surrounding noise level; or
- B. The vehicle is backed up only when an observer signals that it is safe to do so.
- C. The first incident of non-compliance observed on the project site shall subject the Contractor to a \$50.00 penalty for failure to comply with these backup requirements. The second incident of non-compliance observed on the Project shall subject the Contractor to a \$500.00 penalty for failure to comply with these backup requirements. Subsequent to the second incident, each additional incident of non-compliance observed on the Project shall subject the Contractor to a \$1000.00 penalty for failure to comply with these backup requirements.

- D. None of the penalty (penalties) listed above shall be considered by the Contractor as allowance of non-compliance incidents of these backup requirements on this Project. The Contractor is advised that at any time the Contractor is not in compliance, the Engineer may take additional remedial measures which may include, but not be limited to, contacting the Contractor's insurance company and/or MN/OSHA.

## 1717 STORMWATER MANAGEMENT AND EROSION CONTROL

The provisions of MN/DOT 1717 are supplemented and/or modified with the following:

Pollution of natural resources of air, land and water by operations under this Contract shall be prevented, controlled, and abated in accordance with the rules, regulations, and standards adopted and established by the Minnesota Pollution Control Agency (M.P.C.A.), and in accordance with the provisions of MN/DOT 1717, these Special Provisions, and the following:

1. By signing the NPDES Declaration and completing the electronic online NPDES CSW permit, the Contractor is a co-permittee with the Department to ensure compliance with the terms and conditions of the Construction General Storm Water Permit (MN R100001) and is responsible for those portions of the permit where the operator is referenced. This Permit establishes conditions for discharging storm water to waters of the State from construction activities that disturb 1 acre [0.4 hectares] or more of total land area.

A copy of the permit is available at:

<https://www.pca.state.mn.us/sites/default/files/wq-strm2-80a.pdf>

or by calling 651-296-3890.

- (A) Unless otherwise noted in the project special provisions, the **Contractor shall apply and pay for the NPDES Permit** on this Project. Payment for the application shall be incidental to the Contract. The Department will provide the Contractor with the information needed for Sections 1 thru 3 and 5 thru 14 of the application form, as part of the Contract document package. The Contractor shall complete the application process, and post the Permit and MPCA's letter of coverage onsite. A copy of the MPCA confirmation and a signed Permit Declaration form must be returned to the Engineer.

**OR**

- (B) If the Department has obtained the NPDES General Construction Stormwater Permit as Owner and Contractor on this project prior to Bidding, the Department will provide the Contractor with a copy of the original completed application, the Notice of Termination/Permit Modification Form with the Existing Permit Identification, Option 2, Current Owners Authorization Signature, and Current Contractor Authorization signature completed, as part of the Contract document package. The Contractor shall complete New Contractors Authorized signature section, send the form to the MPCA and post the transfer document, the Permit

and MPCA's letter of coverage onsite. A copy of the signed permit Transfer form and a signed Permit Declaration form must be returned to the Engineer.

**No work which disturbs soil and/or work in waters of the state will be allowed on this Project until the NPDES Permit is in effect and the Department has received the required documentation.**

2. The Contractor shall be solely responsible for complying with the requirements listed in Part II.B and Part IV of the General Permit.

The Contractor shall be responsible for providing all inspections, documentation, record keeping, maintenance, remedial actions, and repairs required by the permit. All inspections, maintenance, and records required in the General Permit Paragraphs IV.E, shall be the sole responsibility of the Contractor. The word "Permittee" in these referenced paragraphs shall mean "Contractor". Standard forms for logging all required inspection and maintenance activities shall be used by the Contractor. All inspection and maintenance forms used on this Project shall be turned over to the Engineer every two weeks for retention in accordance with the permit.

The Contractor shall have all logs, documentation, inspection reports on site for the Engineer's review and shall post the permit and MPCA's letter of coverage on site. The Contractor shall immediately rectify any shortcomings noted by the Engineer. All meetings with the MPCA or any local authority shall be attended by both the Engineer and the Contractor or their representatives. No work required by said entities, and for which the Contractor would request additional compensation from Department, shall be started without approval from the Engineer. No work required by said entities and for which the changes will impact the design or requirements of the Contract documents or impact traffic shall be started without approval from the Engineer.

The Contractor shall immediately notify the Engineer of any site visits by Local Permitting Authorities performed in accordance with Part V.H.

3. Emergency Best Management Practices must be enacted to help minimize turbidity of surface waters and relieve runoff from extreme weather events. It is required to notify the MPCA Regional Contact Person within 2 days of an uncontrolled storm water release. The names and phone numbers of the MPCA Regional Contract personnel can be found at: <http://www.pca.state.mn.us/water/stormwater/stormwater-c.html>.

The Contractor is reminded that during emergency situations involving uncontrolled storm water releases that the State Duty Officer must be contacted immediately at 1-800-422-0798 or 1-651-649-5451.

4. The Contractor shall review and abide by the instructions contained in the permit package. The Contractor shall hold Department harmless for any fines or sanctions caused by the Contractor's actions or inactions regarding compliance with the permit or erosion control provisions of the Contract Documents.

5. The Contractor is advised that Section 1 of the NPDES application form makes reference to a Storm Water Pollution Prevention Plan (SWPPP). This Projects' SWPPP is addressed throughout MN/DOT's Standard Specifications for Construction, as well as this Project's Plan and these Special Provisions. The following table identifies NPDES permit requirements and cross-references where this Contract addresses each requirement.

6. In accordance with section IV.C.6 of the NPDES permit, the Contractor shall use street sweeping to remove sediment on streets resulting from vehicle tracking or haul vehicle spillage. Equipment shall be pick-up type sweeper having adequate water and spray dust controls to meet all air quality regulations and avoid creating a nuisance to adjacent properties. All street sweeping required under this Contract shall be performed as incidental work.

7. In addition to the requirements of the project SWPPP incorporated into the Contract documents, the Contractor shall incorporate the MPCA guidance and recommendations into their site management activities. Refer to the MPCA's web site:

<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html>

<b>NPDES Permit Requirements</b>	<b>Cross-Reference within this Contract</b>
Obtain NPDES Permit; Permit Compliance; Submit Notice of Termination	MN/DOT 1701, 1702; and 1717 Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Certified Personnel in Erosion / Sediment Control Site Management Develop a Chain of Command	MN/DOT 1506, 1717, and 2573; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Project / Weekly Schedule (for Erosion / Sediment Control) Completing Inspection / Maintenance Log / Records	MN/DOT 1717 and 2573; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit); and
Project Specific Construction Staging	The Plans; MN/DOT 1717; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit); and 1806 (Determination and Extension of Contract Time)
Temporary Erosion / Sediment Control	The Plans; MN/DOT 2573, 2574 and 2575
Maintenance of Devices / Sediment removal Removal or Tracked Sediment Removal of Devices	The Plans; MN/DOT 1717 and 2573; Special Provisions: 1514 (Maintenance During Construction), and 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Dewatering	MN/DOT 2105.3C and 2451.3C; May also require DNR Permit
Temporary work not shown in the Plans Grading areas (unfinished acres exposed to erosion)	MN/DOT 1717, 2573, and 2575; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)
Permanent Erosion / Sediment Control and Turf Establishment	The Plans; MN/DOT 1717, 2573, 2574, and 2575; Special Provisions: 1717 (National Pollutant Discharge Elimination System (NPDES) Permit)

## **1717 EROSION AND SEDIMENT CONTROL PERMIT FOR MS4 COMPLIANCE**

The provisions of MN/DOT 1717 are supplemented with the following:

For projects with a land disturbance greater than 500 square feet, the pollution of natural resources of air, land and water by operations under this Contract shall be prevented, controlled, and abated in accordance with the rules, regulations, and standards adopted by the City of Hermantown ordinances and in compliance with the Minnesota Pollution Control Agency (M.P.C.A.) Municipal Separate Storm Sewer System (MS4) general permit MNR040000, these Special Provisions, and the following:

1. The Contractor shall obtain an Erosion and Sediment Control Permit (ESCP) for ALL projects with a land disturbance area **greater than 500 square feet and less than 1.0 acre**.
2. The Contractor shall obtain **BOTH** the Erosion and Sediment Control Permit (ESCP), and the MPCA/NPDES Permit (described above) for ALL projects with a land

disturbance area **greater than or equal to 1.0 acre.**

3. The Erosion and Sediment Control Permit application form can be picked up at City Hall, or downloaded from the City's web site under the Applications & Forms:

<http://www.hermantownmn.com/>

4. For City public improvement projects, the City's project manager will coordinate the internal application review and processing of the ESCP application.

5. In accordance with goals of the City MS4 program, the Contractor shall use street sweeping to remove sediment on streets resulting from vehicle tracking or haul vehicle spillage. Equipment shall be pick-up type sweeper having adequate water and spray dust controls to meet all air quality regulations and avoid creating a nuisance to adjacent properties. All street sweeping required under this Contract shall be performed as incidental work.

6. In addition to the requirements of the project SWPPP incorporated into the ESCP, the Contractor shall incorporate the MPCA guidance and recommendations into their site management activities. Refer to the MPCA's web site:

<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html>

#### **1804 PROSECUTION OF WORK (SPECIAL PROJECT ADA REQUIREMENTS)**

The provisions of MN/DOT 1804 are supplemented and/or modified with the following:

##### **1. SPECIAL PROJECT ADA REQUIREMENTS**

All pedestrian facilities and shared use paths on this Project must be constructed according to Public Rights-of-Way Accessibility Guidelines (PROWAG) which can be found at: <http://www.dot.state.mn.us/ada/pdf/PROWAG.pdf>

The appropriate pedestrian ramp details for each quadrant are included in the Plan. The Engineer may provide additional details to those provided in the Plan that meet the PROWAG guidelines as the need arises and field conditions dictate.

(A) The Contractor must designate a responsible person competent in all aspects PROWAG to assess proposed sidewalk layouts at each site before work begins. Any time work the Contractor is performing concerns pedestrian facilities, the Contractor's responsible person shall be on site.

- (B) Pedestrian facilities must be constructed to meet the following criteria:
- (1) Pedestrian Access Routes (PAR) must be constructed to meet the following:
    - Minimum 4 feet width.
    - A maximum cross slope of 2.0%.
    - Vertical discontinuities must be less than 0.25 inches.
    - Must provide positive drainage without allowing any ponding and maintain existing drainage flow patterns unless indicated otherwise in the Plan.
    - All grade breaks shall be constructed perpendicular to the path of travel.
  - (2) Landings are part of the PAR and must be constructed to meet the following:
    - 4 feet by 4 feet minimum width.
    - Maximum slope of 2.0% in all directions.
    - Required at all locations where the PAR changes directions or inverse grades.
    - Must be connected to the PAR.
  - (3) Ramps are part of the PAR and must be constructed to meet either of the following criteria:
    - Longitudinal slopes less than 5% in the direction of travel requires no landing at the top of the ramp (unless the PAR changes direction).
    - Longitudinal slopes between 5 - 8.3% in the direction of travel require a landing at the top of the ramp.
  - (4) If the Contractor constructs any pedestrian or shared-use trail facilities that are not per Plan, do not meet the above requirements, or do not follow the agreed upon resolution, the Contractor will be responsible for correcting the deficient facilities with no compensation paid for the corrective work. To ensure that the pedestrian facilities are constructed in compliance with PROWAG, the Contractor shall follow the following three steps:
  - (5) The Contractor shall use the appropriate ramp details in the Plan and identify the removal limits for the sidewalk and curb and gutter. If Contractor determines the removal limits are not adequate to meet PROWAG, the Contractor shall stop work immediately and consult the Engineer to determine the best solution. Once the Engineer and the Contractor reach agreement on how to proceed, the Contractor may finish the removals.
  - (6) Prior to pouring each curb and gutter segment, the Contractor must verify the zero-height curb and curb transitions will be located as shown in the

Plans and will provide an adequate detectable edge as shown on MN/DOT Standard Plan Sheet No. 5-297.250 (sheet 4 of 5). The Contractor shall also verify the proposed curb flow lines will provide positive drainage as well as maintain existing drainage patterns including existing gutter inflows/outflows. The curb and gutter shall be constructed as detailed in the Plan with a defined flow line and no vertical discontinuities. The Contractor shall consult with the Engineer to determine a resolution if any of these conditions cannot be met. Once the Engineer and the Contractor reach agreement on how to proceed, the Contractor may proceed with pouring the curb and gutter.

- (7) After the curb has been correctly poured, the Contractor has set the sidewalk forms, and prior to placing the concrete curb ramps/sidewalks, the Contractor shall verify the requirements in Section B will be achieved.

In addition, the longitudinal slopes shown in the Construction Plans and the Standard Plans shall be utilized unless these conditions cannot be met. The starting point for setting the forms on the controlling ramp leg should be the following:

Steep (S) = 7%  
Flat (F) = 4%  
Landing = 1.5%  
Sidewalk Cross Slope = 1.5%  
Fan ramp = 5%

If any of these requirements cannot be met the Contractor shall meet with the Engineer to determine the best solution. Once the Engineer and the Contractor reach agreement on how to proceed, the Contractor may proceed with the curb ramp/sidewalk pour.

Landings – An initial landing is the first required landing of a pedestrian ramp. All initial landings required at the top of a ramped sloped surface (>2% longitudinal slope), shall be formed and placed separately in an independent concrete pour. This does not include initial landings placed at roadway grade such as depressed corners, parallel ramps, or rural flat landings. Secondary landings consist of all landings beyond the initial landing. These secondary landings do not require a separate landing pour. All landings adjacent to push buttons shall be formed and placed separately in an independent concrete pour, regardless of ramp type.

Wet casting or drill and grouting of dowel bars will be required in accordance with the details shown in Standard Plan 5-297.250 Sheet 5 of 5. These bars may be either smooth or deformed and shall be installed with 2-inch minimum concrete cover. When not accounted for in the Plan, payment for these bars will be made under Item 2301.602 (Drill & Grout Reinforcement Bar (Epoxy Coated)) by the Each at the Predetermined Price of \$10.00 per bar furnished and installed. All necessary subgrade preparation and aggregate base placement for the entire ramp construction limit shall be done before the initial landing is constructed at each location.



(C) It shall be the responsibility of the Contractor, or Contractor's Surveyor if applicable, to layout all proposed work at each intersection in accordance with the Plan and requirements listed in this Special Provision. The Contractor may confer with the Engineer for guidance in laying out the proposed work, but it will be the Contractor's responsibility to ensure the proposed work meets all the requirements of this Special Provision. This layout includes, but is not limited to placement of grade breaks, curb transitions, gutter flow lines, truncated dome placement, crosswalk marking placement, flares, landing limits, and ramp limits. It is important that the Contractor layout this work properly to achieve the construction of a compliant pedestrian facility. The owner's surveyor will only stake points and elevations provided in the Plan. For custom designs, other than specific dimensions provided in the Plan, the Contractor shall be expected to scale dimensions from the Plan as needed to construct the facility. If scaled dimensions do not allow for a facility to be constructed to meet the requirements of this Special Provision, the Contractor shall follow the process listed in Section B. This layout work shall be incidental.

(D) The Contractor shall utilize measures and methods when working near existing buildings that will avoid damaging the building's face or structure. The contractor will be responsible for any damage to the building's face or structure, both below and above ground. Any damage resulting from Contractor operations will be repaired at the Contractor's expense to the satisfaction of the Engineer.

(E) This section applies when no sidewalk joint information is provided in the Plan. The Contractor will round all sidewalk joints with a ¼ inch radius edging tool, contraction joints shall extend to at least 30 percent of walk thickness and shall be ¼ inch maximum width. The Contractor shall have the option of providing saw cuts to construct all sidewalk joints and the gutter joints within the PAR. When greater than 50 feet of continuous sidewalk runs are constructed, the Contractor shall saw cut all joints. The top grade break of walkable flares need a visual joint to indicate a change in grade. This visual joint shall have ¼ inch radius, ¼ inch maximum width, and ¼ inch depth. All saw cut work associated with PAR construction shall be incidental.

(F) In areas where the sidewalk is to be constructed around fixed structures and the grade has been changed, the sidewalk shall be finished around these structures to the satisfaction of the Engineer at no additional cost.

(G) All pedestrian signal systems should be installed as shown in the Plan and must be constructed to meet the following criteria. The Contractor shall verify that the proposed push button locations will meet all of the following criteria before proceeding with the installation of the pedestrian push button system:

- Pedestrian push buttons shall be oriented with the button facing towards the intersection and the button face placed parallel to the outside edge of the crosswalk.
- Pedestrian push buttons shall be a minimum of 4 feet and a maximum of 10 feet from the back of curb/edge of roadway, but may be placed 1.5 feet to

4 feet from the back of curb/edge of roadway if mounted on a signal pole as indicated in the Plan or as approved by the Engineer.

- Pedestrian push buttons shall be located at the outside crosswalk edge and shall be no more than 5 feet offset from the projected outside edge of the crosswalk/outside edge of detectable warnings.
- Pedestrian push buttons shall be a minimum of 10 feet apart, except in islands and medians where only a 6' clear distance must be maintained
- Each pedestrian push button shall have a landing immediately adjacent to the push button face with minimum dimensions of 4 feet by 4 feet and a maximum slope of 2.0% in all directions. Center the push button on the landing if possible to do so without violating any of the requirements listed in this Special Provision. The landing must be connected to the Pedestrian Access Route.
- A 6-foot wide clear distance between obstructions in the same path as the PAR shall be maintained wherever it is possible to do so for snow removal purposes. This 6-foot obstruction free area is called a (MAR) Maintenance Access Route
- All new hand holes shall be placed outside of the PAR, inclusive of ramps and landings.
- The push buttons shall be mounted at a height of 42 inches as indicated in the Plan.
- Crosswalks shall be striped in a straight alignment between the outside edges of the detectable warnings with no kinks unless the crosswalks are shown as kinked in the Plan.
- The Contractor shall maintain all working points marked by the surveyor and use the working points to layout push button locations in accordance with the Plans and Special Provisions.

If any of these conditions cannot be met, the Contractor shall consult with the Engineer to determine a resolution. Once the Engineer and the Contractor reach an agreement on how to proceed, the Contractor may proceed. If the Contractor constructs any pedestrian push button systems or pedestrian facilities which do not meet the criteria or the agreed upon resolution, the Contractor will be responsible for correcting the deficiencies with no compensation paid for the corrective work.

To help ensure signal systems are properly constructed the Contractor must adhere to the following practices:

- All push button station bases shall be installed using a breakaway pedestal base, see Typical APS Pedestrian Push Button Location and MN/DOT approved /qualified products list. The pedestal base shall be fastened to the station foundation using 4 5/8-inch (UNC) x 7 ½ inch' stainless steel anchor rods. The push button station foundation shall be constructed as part of the sidewalk by increasing the sidewalk dimension to a 12-inch minimum thickness and an 18 inch minimum diameter to top of sidewalk surface. The

push button station foundation shall be placed as part of the landing. All construction joints/grade breaks shall be located outside of foundation area and designated landing area.

- When not accounted for in the Plan, and determined necessary by the Engineer payment to furnish and install additional APS pedestrian push button station will be \$ 1,000.00 each and will be made under Item 2565.602 (Pedestrian Push Button Station). Payment shall include all components necessary to furnish and install APS push button station, including additional conduit, wiring, APS push button base installation, and shaft with reflective tape and cap.
- Signal pole foundations which are being constructed in or adjacent to sidewalk shall be constructed in accordance with the applicable MN/DOT Standard Plate 8120 or 8126. If a push button is proposed to be mounted on a signal pole, the APS push button shall meet the vertical, horizontal, and crosswalk skew requirements. If these specifications cannot be met a MN/DOT approved extension bracket must be used.

#### **1906 PARTIAL PAYMENTS**

Partial Payments shall be made in accordance with the provisions of MN/DOT 1906 and the following:

- A. The first sentence of Paragraph Three shall be amended to read as follows: "From the total of the amounts ascertained as payable, five percent (5%) will be deducted and retained by the City for the protection of its interests as hereinafter provided. The balance, less all previous payments, will be certified for payment."
- B. All provisions for partial payments shall apply to domestic materials only. No payments shall be made to the Contractor for materials manufactured outside of the United States until such materials have been delivered to the job site.

#### **1908 FINAL ESTIMATE AND PAYMENT – CONDITIONS AND PROCESS**

Final Payment shall be made in accordance with the provisions of MN/DOT 1908 and the following:

- 1) The final estimate will show the balance due the Contractor after making all legal and specified forfeitures and deductions. This balance will then be paid by the City to the Contractor within thirty (30) days after such estimate is presented to and accepted by the Contractor or within forty-five (45) days after such estimate is presented to and not acted upon by the Contractor, less five percent (5%) of the total value of work on the final estimate. At such time, the paid final estimate shall be considered valid with no further compensation due the Contractor.

2) Condition for Release of Five Percent (5%) of Retainage:

The Contractor and all of its subcontractors shall comply with Minnesota Statutes, Section 290.92. Pursuant to Minnesota Statutes, Section 270C.66, the City will not release the five percent (5%) retainage or any portion thereof to the Contractor prior to receipt of an "Affidavit For Obtaining Final Settlement of Contractor With the State of Minnesota and Any of its Political or Governmental Subdivisions" (Form IC-134) from the Contractor and from each of the Contractor's subcontractors (if any). The Contractor and subcontractors shall submit to the City original copies of Form IC-134 already fully executed by the Commissioner of Revenue of the State of Minnesota. It shall be the responsibility of the Contractor to ensure that all of the Affidavits herein required are submitted to the City.

**2051 HAUL ROAD MAINTENANCE AND RESTORATION**

The provisions of MN/DOT 2051 hereby deleted and replaced with the following:

A. General

The Contractor shall take reasonable care to protect and maintain ALL haul routes.

B. Designated Haul Road

1. In coordination with any traffic restrictions detailed in the Plans, the Contractor shall designate Haul Routes for approval by the Engineer. The Contractor shall present Haul Route Application to the engineer and public works director at the Preconstruction Conference.
2. The Engineer will review the haul route application and approve either the proposed hauls routes or acceptable alternative haul routes. The intent of the Engineer's review is to keep the construction traffic on those streets that have adequate capacity to support the construction traffic, minimize traffic congestion, and minimize deterioration. The Engineer anticipates that the Haul Route(s) will be approved prior to the preconstruction conference.
3. Once the approved haul route has been established, the Contractor will be required to perform all hauling of equipment and supplies on those approved haul routes ONLY. The Contractor will not be allowed to haul on other streets without written approval of the Engineer to revise the haul route application. These haul route restrictions shall apply to all subcontractors and suppliers as well, for which the prime contractor shall be responsible to coordinate.

C. Restoration of Haul Roads

1. If, in the opinion of the Engineer, roadway deterioration occurs as a result of the construction traffic and repairs are needed on the streets **designated as "approved" haul routes**, the Engineer will direct the Contractor to make repairs. Repair work on the approved haul routes will be considered Extra Work and the Contractor will be compensated in accordance with the provisions of MN/DOT 1904.

2. If, in the opinion of the Engineer, roadway deterioration occurs as a result of the construction traffic and repairs are needed on City streets **not permitted or not designated as the approved haul routes**, it shall be a rebuttable presumption that said damage was caused by the Contractor impermissibly using such streets or roadways. The Engineer will direct the Contractor to make repairs to restore the road to a condition that is as good as, or better than, the road conditions existing prior to construction. Repair work on the non-approved routes will be considered incidental and no compensation will be made to the contractor. If the repairs are not made by the Contractor within 30 days, the Engineer may order the work done by others and deduct the cost from monies due the Contractor.

#### **2104 REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES**

Abandoned structures and other obstructions shall be removed from the Right-of-Way and disposed of in accordance with the provisions of MN/DOT 2104, except as modified below:

- A. Measurement and payment for the removal and disposal of materials will be made only for those items of removal work specifically included for payment as such in the Proposal and as listed in the Contract Drawings. The removal of any unforeseen obstruction requiring, in the opinion of the Engineer, equipment or handling substantially different from that employed in excavation operations, will be paid for as Extra Work as provided in MN/DOT 1402.5.
- B. The Contractor shall maintain in place all existing "Stop" and "Yield" signs until the street is closed to traffic with barricades and "Road Closed" signs. The Contractor may remove and store, if necessary, "Stop" and "Yield" signs only when the street is closed to traffic. Before the street is re-opened to any traffic, the Contractor shall properly re-install the "Stop" and "Yield" signs.
- C. All materials removed during one working day that are scheduled for disposal shall be disposed of during the same working day. Job site stockpiling of removal items will not be permitted.
- D. Both the upgrade and downgrade ends of all drainage or sewer pipes leading from abandoned basements, manholes, or similar structures shall be plugged with concrete or masonry.
- E. Crushing or processing of pavement materials or rock on the project site shall not be permitted except as stated in the Special Provisions.
- F. Sawing of sidewalks needed for removal shall be incidental.

## **2106/2451 ROCK BLASTING AND VIBRATION CONTROL**

The provisions for rock blasting, as covered herein, are applicable to all uses of explosive materials in the fragmentation of rock for the purpose of excavation of rock materials. These provisions cover the usage of explosives, project documentation, safety, public relations and vibration controls, required for the types of rock excavation listed below. Construction details for these items are found elsewhere in these specifications.

### **A. Definitions**

1. Blast Monitor/Survey are incidental to 2106.507 Excavation – Rock and 2451.507 Structure Excavation, Class R and refers to preparatory work and operations for rock removal, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site, blasting plan submittal, maintaining appropriate records, safety, public relations, vibration control and monitoring, and insurance.
2. (2106.507) Excavation - Rock refers to the main fragmentation blasting resulting from appropriately spaced production holes drilled throughout the rock excavation area. This includes rock excavated outside the normal roadway grading section as defined under Rock Channel Excavation.
3. (2451.507) Structure Excavation, Class R refers to removal of rock materials (bedrock, boulders, detached rock) where the excavation will be used for the placement of bridges, retaining walls, water main, culverts, pipe sewers, drainage structures, subsurface drains, etc.

### **B. General Requirements**

#### **1. Use of Explosives**

The regulatory requirements of OSHA Safety and Health Standards 29 CFR, Part 1926, Subpart U, “Blasting and Use of Explosives” shall apply. All blasting operations, including the storage and handling of explosives and blasting agents, shall be performed in accordance with the applicable provisions of the Standard Specifications and all other pertinent federal, state, and local regulations. Whenever explosives are used, they shall be of such character and in such amount as is permitted by state and local laws and ordinances and all respective agencies having jurisdiction over them. The person(s) responsible for the use of explosive materials shall be knowledgeable and experienced in their use and handling. Blasting will be limited to a period between 8:00 a.m. and 5:00 p.m. or as otherwise approved by the Engineer.

#### **2. Blasting Plan Submittal**

Not less than three weeks prior to commencing drilling and blasting operations or at any time the Contractor proposes to change the drilling and blasting methods, the Contractor shall submit a “Blasting Plan” to the Engineer for review. The blasting plan shall describe in full details, the drilling and blasting patterns the Contractor proposes to use for the types of blasting required by the Contract. The blasting plan shall include (at a minimum):

- a. Name and experience of Blaster(s).
- b. Type of explosives, primers and initiators including manufacturer's data sheets for all explosive products.
- c. General blasting configurations including hole size, spacing, loading pattern, detonation procedure, anticipated maximum pounds of explosive per delay, powder factor, number of lifts, and limits of blasting.
- d. Procedures to inform and protect the public and adjacent property (e.g., signs, horns, letters, personal visits, etc.).
- e. Flyrock control plan.
- f. Proposed "Shot Log" for individual blasts.

The blasting plan submittal is for quality control and record keeping purposes. Review of the blast plan by the Engineer shall not relieve the Contractor of his responsibility for the accuracy and adequacy of the plan when implemented in the field. When the contract requires the Contractor to retain a blasting consultant to assist with the blast design, all blasting plan submittals must be approved by the blasting consultant.

3. Shot Log

The Contractor is required to submit records (shot logs) for each individual shot on forms approved by the Engineer. The shot log shall be maintained by the Contractor and submitted to the Engineer at the end of each day. No blasting will be allowed until the shot log from the preceding day has been submitted to the Engineer. The shot log shall include the following information (at a minimum);

- a. Location of the shot by station and offset.
- b. Plan view of the drill pattern including free face, burden, hole spacing, diameters and angles.
- c. Section view showing type and amount of explosives, primers, initiators, location and depth of stemming, lift height, and subdrill depth.
- d. Initiation sequence of holes including cumulative delay times and delay system.
- e. Maximum peak particle velocity measured at the closest (or most critical receptor), location of monitoring station, and scaled distance.

4. Scaling and Stabilization

All rock on the excavated face that is loose, hanging, or which creates a potentially dangerous situation shall be removed or stabilized to the Engineer's satisfaction during or upon completion of the excavation in each lift. Drilling of the next lift will not be allowed until this work has been completed.

Exposed rock slopes shall be scaled throughout the span on the Contract and at such frequency as required to remove all hazardous loose rock or overhangs. The slopes shall be hand scaled using a suitable standard steel mine scaling rod. Subject to the Engineer's approval, other methods such as machine scaling, hydraulic splitters, or light blasting may be used in lieu of or to supplement hand scaling. Payment for scaling and removal of scaled rock from outside the excavation limits shall be incidental to the Contract unit price for rock excavation.

If in-place stabilization of back slope rock is required due to defects inherent in the bedrock structure or weathering, as determined by the Engineer, rock bolting or other Engineer-approved stabilization techniques will be used and paid for as extra work. Stabilization necessitated, in the opinion of the Engineer, by the Contractor's blasting or excavation operations shall be performed at the Contractor's expense.

5. Safety

The Contractor shall observe the entire blast area for a minimum of five minutes following a blast to guard against rock fall before commencing work in the cut. The Contractor is responsible for the safety of workers and the public in general.

The Engineer shall, at all times, have the authority to prohibit or halt the Contractor's blasting operations if it is apparent that, through the methods being employed, the required slopes are not being obtained in a stable condition or the safety, convenience, or property of the public is being jeopardized.

The Contractor is advised that structures may be located close to the proposed work and that noise and vibration producing activities shall be conducted so as to preclude damage to these structures and undue annoyance to their occupants. The Contractor shall be responsible for all damage caused by his activities.

6. Public Relations

The Contractor is required to have both letter and personal contact with residents or owners of buildings that are adjacent to the construction area or near enough to it for ground vibrations from construction operations (including blasting) to affect the structure, personal property, or water wells. This contact will be made prior to the beginning of any blasting or other vibration producing activity. The Contractor will furnish a list of those contacted to the Engineer, as part of the blasting plan.

The Contractor will identify a contact person for complaints from the public and will maintain a log of such complaints and any action taken by the Contractor. This log shall be available to the Engineer at his request. The Contractor shall make an initial reply to complaints within 24 hours.



C. Flyrock Control

Before the firing of any blast in areas where flying rock may result in personal injury or damage to property or the work, the rock to be blasted shall be covered with approved blasting mats, soil, or other equally serviceable material to prevent flyrock. Flyrock control procedures shall be approved by the Engineer.

D. Fresh Concrete Vibration Controls

During the course of the work, the Contractor may desire to conduct vibration producing activities (such as blasting, vibratory compaction, pavement breaking or operation of heavy construction equipment) in the vicinity of freshly poured concrete. The following maximum\* vibration levels for fresh concrete shall apply:

Concrete Age (hours)	Maximum Peak Particle Velocity [inches per second (mm/sec)]
0-3	No Limit
3-12	1.00 (25)
12-24	1.50 (40)
24-48	2.50 (65)
48 or greater	4.00 (100)

(\*The term maximum as used herein refers to the maximum of three mutually perpendicular transducer components.)

The Contractor shall provide the necessary monitoring equipment (typically a vibration seismograph) to assure that these limits are not exceeded. Any monitoring equipment supplied shall be capable of measuring a peak particle velocity of at least 4.0 inches per second [100 mm per second]. Vibrations shall be measured at a point directly between the concrete structure and the closest point of the vibration producing operation. The actual measuring point will be determined by the Engineer, and the geophone will typically be buried in the soil adjacent to the structure or placed on the structure. When located on the structure, the geophone must be grouted or mechanically fastened (bolted) to the structure.

If the Contractor desires to utilize higher vibration limits than those permitted above, he must submit a recommendation prepared by a recognized Consultant with expertise in this field. The Consultant report must be specific to this Project and shall include (at a minimum): 1) the proposed vibration limits, 2) basis for these limits, 3) specific equipment that will be employed to monitor the vibrations, and 4) potential impact of the proposed vibration levels on other structures or buildings on or off the Right of Way. The Engineer will review the submittal and respond within two weeks. If the use of higher vibration levels is approved and subsequent damage occurs, such as cracking of the concrete or deterioration of support rock below the structure, lower vibration

levels will be established. Any damage caused by the higher limits shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the State.

The above vibration limits, or any new limits established for the protection of fresh concrete on this Project, do not relieve the Contractor from complying with any other vibration limits that may be in force on the Project, nor do they relieve the Contractor from responsibility for damage to any existing structures (on or off the Right of Way) that may be affected by vibrations at lower levels than are allowed herein for the protection of the concrete.

The Engineer, at his discretion (or in consultation with the Geology Unit, Office of Construction Materials and Engineering), may waive the requirement for vibration monitoring if the vibration producing operation is conducted at such a distance that ground vibrations cannot be readily felt by a person standing adjacent to the location where the concrete will be poured.

**E. Vibration Control and Monitoring**

Whenever vibration damage to adjacent structures is possible, the Contractor shall monitor each blast with an approved seismograph located, as approved, between the blast area and the closest (or most critical) structure subject to blast damage. The seismograph shall be capable of recording peak particle velocity for three mutually perpendicular components of vibration in the range generally found in construction blasting.

The peak particle velocity of each component shall not be allowed to exceed the safe limits, as established below, for all adjacent structures subject to vibration damage.

**1. Ground Vibration Control Limit**

Measurements for this limit will be made at external ground locations adjacent to affected buildings or structures. This vibration criteria will be measured in peak particle velocity. No controls have been established for in place utilities and the Contractor shall conduct operations to prevent damage to same.

The maximum single component peak particle velocity resulting from construction activity shall not exceed the values given in the table below:

<b>Frequency of the Peak Particle Velocity (Hz)</b>	<b>Allowable Peak Particle Velocity [inches per second (mm/sec)]</b>
1 or less	0.20 (5)
4	0.75 (19)
11	0.75 (19)
30 or greater	2.00 (51)

The frequency and peak particle velocity shall be analyzed for each of the three components and the velocity limit shall apply to each component. The frequency is defined as that associated with peak particle velocity pulse of the ground motion and is calculated as the inverse of twice the time interval between the two zero crossings of that pulse.

2. Air Blast Control Limit

The maximum air blast resulting from blasting shall not exceed the values given in the table below:

Frequency Range of Instrumentation	Maximum Air Blast (dB)	Maximum Air Blast [psi (kPa)]
0.1-200 Hz, flat response	134	0.015 (0.103)
2.0-200 Hz, flat response	133	0.013 (0.090)
6.0-200 Hz, flat response	129	0.008 (0.055)

3. Vibration Monitors

The amplitude/frequency vibration monitor shall be an Instantel Blastmate DS677 or equivalent. This instrument shall be capable of measuring, recording, and producing a hard copy of the frequency and peak particle velocity in three mutually perpendicular axes ("vector sum" instrumentation is not allowed). The instrument shall be capable of measuring Linear Scale air blast pressure (other weighting systems, such as A- or C-scale are not allowed). The instrument must also be capable of plotting the measured vibration level against the OSM criteria or be capable of reporting the frequency and displacement of each vibration event.

When blasting near buildings, structures, or utilities which may be subject to damage from blast induced ground vibrations, the ground vibrations shall be controlled by the use of properly designed delay sequences and allowable charge weights per delay. Allowable charge weights per delay shall be based on vibration levels which will not cause damage. The allowable charge weights per delay shall be established by carrying out trial blasts and measuring vibration levels. The trial blasts shall be carried out in conformance with the blasting test sections described elsewhere in these provisions, modified as required to limit ground vibrations to a level which will not cause damage.

F. Measurement and Basis of Payment

Blast Monitor/Survey will be paid on a lump sum basis. On the first partial estimate that shows 10 percent or more of the original Contract amount of rock excavation has been earned, payment will be made under Item 2105.601 (Blast Monitor/Survey) for

50 percent of the amount bid. When the rock removal items are completed, the remaining 50 percent of the amount bid for Blast Monitor/Survey will be paid.

Measurement for Rock Excavation and/or Rock Channel Excavation will be made by the number of cubic yards of in-place rock removed. Payment will be made under Item 2105.503 (Rock Excavation) or Item 2105.513 (Rock Channel Excavation) at the Contract bid price per cubic yard, which shall be payment in full for all costs incidental thereto.

Payment for all work specified for monitoring vibrations in the vicinity of fresh concrete as described above, including but not limited to, furnishing monitoring equipment and maintaining appropriate records, shall be considered incidental.

## **2106 EXCAVATION AND EMBANKMENT – COMPACTED VOLUME METHOD**

Roadway excavation and embankment construction shall be performed in accordance with the provisions of MN/DOT 2106, except as modified below:

### **A General**

Unless otherwise directed in the Plans or project Special Provisions, compaction of all embankments, including culvert backfills, shall be obtained by the “Specified Density Method” described in MN/DOT 2106.3.G.1. The minimum sampling and testing for compaction shall be in accordance with Appendix B Schedule of Materials Testing – City of Hermantown Street and Utility Projects included in these specifications. Additional testing may be performed as determined by the Engineer.

### **B Materials**

Select Granular Borrow (MN/DOT 3149.2.B) shall be modified so that of the portion passing a 1-inch sieve, not more than 7 percent by weight will pass a No. 200 sieve.

## **2108 GEOSYNTHETIC CONSTRUCTION MATERIALS**

This work shall consist of placing geotextile below the fill material (may be underwater) at the location(s) shown in the Plan, or as directed by the Engineer. The work shall be accomplished according to MN/DOT 2108, these Special Provisions, or as directed by the Engineer. The purpose of the geotextile layer is to provide separation between the fill and underlying softer soils, to prevent mixing, to provide stability during compaction, to provide some reinforcement and to minimize differential movement. The Contractor’s proposed construction sequence for geotextile and fill placement shall be submitted to the Engineer for review at least 21 days prior to beginning of this element of construction.

### **A. Material Requirements**

Geotextile shall conform to the requirements of MN/DOT 3733, Type V, and be non-woven.

B. Construction Requirements

The prepared surface shall be relatively smooth and free of stones, sticks, or other debris or irregularities that would tend to puncture or tear the geotextile. Unless otherwise directed or approved by the Engineer, the geotextile shall be placed with the highest strength direction (usually the “machine” or roll direction) oriented in the direction of the greatest expected field stress. (This will usually be at right angles to the centerline of the construction.)

If multiple pieces of geotextile are required, adjacent strips shall be field or factory sewn with the seams to have strength as specified in MN/DOT 3733.2.B. All **seams shall be sewn using a “double spool” machine** capable of sewing a Federal Type 401 locking stitch. Seam Type “J,” thread strength (25-lbs minimum), number of rows of stitching (1 or 2), and stitches per inch (typically, 5 to 7) shall be consistent with achieving the required seam strength and as recommended by the geotextile manufacturer. The Contractor may use **spray adhesive seams** as an alternative to sewn seams under the following conditions: 1) adhesive product shall be a MN/DOT Approved/Qualified Product; 2) adhesive spray shall be installed in accordance manufacturer’s recommendations; 3) installer shall spray both sides of geotextile fabric; and 4) 12-inch minimum overlap is required.

The geotextile shall be adequately secured so that it is not displaced during subsequent construction. No traffic or construction equipment will be permitted to operate directly on the geotextile. Any damaged geotextile shall be repaired to the satisfaction of the Engineer by patching and sewing or, when appropriate, a 36-inch overlap on all sides without sewing.

Fill shall be placed onto the fabric in uniform lifts as required by the applicable specification and approved by the Engineer, but in no case, shall lifts in excess of 12-18 inches be used, unless required to bring the fill above water level or provide stability. Fill material shall be as shown in the Plan or as directed by the Engineer. For placement underwater and for two (2) feet above water level, granular materials shall be used unless otherwise provided in the Contract Drawings or approved by the Engineer.

C. Measurement and Payment

Measurement will be made of the number of square yards of satisfactorily installed geotextile approved by the Engineer. No allowance will be made for seams. Payment will be made under Item 2108.504 Geotextile Fabric Type V at the Contract bid price per square yard, and shall include but not be limited to, geotextile, seaming, placement, anchoring, and any needed repairs.

## **2211 AGGREGATE BASE**

Aggregate base courses shall be constructed in accordance with the provisions of MN/DOT 2211 except as modified below:

Aggregate for base construction shall conform to the requirements of MN/DOT 3138 and may be sampled, tested, and inspected by the City at any time prior to being incorporated permanently in the work.

The City will measure compaction of aggregate base by the "Specified Density Method" described in MN/DOT 2211.3.D.2.

Materials sampling and testing will be in accordance with Appendix B Schedule for Materials Testing – City of Hermantown Street and Utility Projects included in these specifications. Additional testing may be performed as determined by the Engineer.

## **2357 BITUMINOUS TACK COAT**

Bituminous tack coat work shall be provided in accordance with MN/DOT 2357 except as modified as follows:

- A. MN/DOT 2360.3.B.3 Tack Coat is supplemented with the following:

The Contractor shall coat the vertical surfaces of ALL edges abutting the asphalt pavement. When placing tack coat, the Contractor shall overspray (not more than 2 inches) the longitudinal joint of the adjacent road surface to seal the joint.

- B. Section MN/DOT 2360.4 Method of Measurement and section MN/DOT 2360.5 Basis of Payment are deleted.

No measurement will be made of bituminous material for tack coat and no direct compensation will be made. All costs for providing bituminous materials for tack coat will be incidental.

## **2360 PLANT MIXED ASPHALT PAVEMENT**

MN/DOT 2360 specification is hereby modified with the following:

- A. The provisions of MN/DOT 2360.2.E.5.a(1) Aggregate are modified with the following: Scrap shingles, as an asphalt binder source, shall not be included in any wear or non-wear layer.
- B. The provisions of MN/DOT 2360.2.G.4.b Sampling and Testing are modified with the following:
1. The Contractor will take the first QC sample from the second, third or fourth truck on the construction job. Thereafter, the Contractor shall ensure that all QC samples are taken at random locations.

- C. The provisions of MN/DOT 2360.2.G.8 Documentation are hereby modified with the following:

Delete “District Materials Laboratory” and replace with “City of Hermantown’s Project Engineer”.

- D. The provisions of MN/DOT 2360.3.D Compaction are hereby modified with the following:

- (1) The first paragraph of MN/DOT 2360.3.D.1 is hereby deleted and replaced with the following:

**D.1 Maximum Density**

Compact the pavement to at least the minimum required maximum density values in accordance with Table 2360-19, “Required Minimum Lot Density (Mat)”.

- (2) MN/DOT Table 2360.3-2 Longitudinal Joint Density Requirement is hereby deleted.

- (3) MN/DOT 2360.3.D.1.i Mat Density Cores is hereby deleted and replaced with the following:

**D.1.h Mat Density Cores**

Obtain four cores in each lot. Take two cores from random locations as directed by the Engineer. Take the third and fourth cores, the companion cores, within 1 foot [0.3 m] longitudinally from the first two cores. Submit the companion cores to the Engineer immediately after coring and sawing. If the random core location falls on an unsupported joint, at the time of compaction, (the edge of the mat being placed does not butt up against another mat, pavement surface, etc.) cut the core with the outer edge of the core barrel 1 foot [0.3 meters] away (laterally) from the edge of the top of the mat (joint). If the random core location falls on a confined joint (edge of the mat being placed butts up against another mat, pavement surface, curb and gutter, or fixed face), cut with the outer edge of the core barrel 6 inches  $\pm$  0.5 inch [150 mm  $\pm$  12.5 mm] from the edge of the top of the mat (ex. center of 4 inch [100 mm] core barrel 8  $\pm$  0.5 inches [200 mm  $\pm$  12.5 mm] from the edge of the top of the mat). Cores will not be taken within 1 foot [300 mm] of any unsupported edge. The Contractor is responsible for maintaining traffic, coring, patching the core holes, and sawing the cores to the paved lift thickness before density testing.

The Engineer may require additional density lots to isolate areas affected by equipment malfunction, heavy rain, or other factors affecting normal compaction operations.

- (4) MN/DOT 2360.3.D.1.j Companion Core Testing is hereby deleted and replaced with the following:

The Department will select at least one of the two companion cores per lot to test for verification.

(5) MN/DOT 2360.3.D.1.n Longitudinal Joint Density is hereby deleted.

(6) MN/DOT 2360.3.D.1.p Shoulders is hereby deleted.

(7) MN/DOT Table 2360.5-6 Payment Schedule for Longitudinal Joint Density (SP Non-Wear and SP Shoulders, 4% Void) is hereby deleted.

(8) MN/DOT Table 2360.5-7 Payment Schedule for Longitudinal Joint Density (SP Non-wear and SP Shoulders, 3% Void) is hereby deleted.

(9) MN/DOT 2360.5.B.13.b Pay Factor Determination is hereby deleted.

E. The provisions of MN/DOT 2360.4 Method of Measurement are hereby modified:

The following sentences are added: Asphalt mixtures paid by the square yard per inch will be for areas where it is impractical for a paving machine to pave driveways and other areas not on the mainline. If areas behind the curb and gutter can be paved with a paving machine, then that quantity will be paid for under the unit price per ton of asphalt placed.

F. The provisions of MN/DOT 2360.5 Basis of Payment are hereby modified as follows:

Payment for the accepted quantities of asphalt mixture used in each course at the Contract prices per unit of material shall be compensation in full for all costs of constructing the asphalt surfacing and providing or incorporating asphalt binder, tack coat, mineral filler, hydrated lime, and anti-stripping additives that may be permitted or required.

## **2360 PLANT MIXED ASPHALT PAVEMENT – STREET RESTORATION PATCHING**

The provisions of MN/DOT 2360 are supplemented with the following:

### **A. Description**

This work shall consist of providing plant mixed asphalt pavement to restore patches of the existing street pavement that are removed or damaged as a result of miscellaneous construction activities that do not include full-lane plant mixed asphalt pavement paving work as part of the project.

A street restoration patch will be defined generally as a small or minor area within an existing asphalt street pavement where the size or shape of the patch area preclude the use of standard asphalt street paving equipment.



Asphalt pavement street restoration patch thickness shall match the existing asphalt pavement section or unless otherwise provided in the Plan Details.

Unless otherwise indicated in the Plans or special provisions, asphalt mixture for street restoration patch shall be: SP 12.5 Wearing Course Mixture (3,B) (SPWEB340B)

**B. Materials**

- 1) MN/DOT 2360.2 Materials is supplemented with the following: The Contractor shall submit Mixture Design to the Engineer at least 14 days prior to the asphalt paving work.
- 2) MN/DOT 2360.2.G Mixture Quality Management is supplemented with the following: The Contractor shall provide copies of testing results to the Engineer upon request.

**C. Construction Requirements**

- 1) MN/DOT 2360.3.B.2.e Rollers is supplemented with the following: The use of mechanical tampers or skid plate compactors will only be considered acceptable with the written authorization of the Engineer prior to the work.
- 2) MN/DOT 2360.3.B.3 Tack Coat is supplemented with the following: The Contractor shall coat the vertical surfaces of all edges abutting the asphalt pavement street restoration patch.
- 3) MN/DOT 2360.3.D Compaction is supplemented with the following: Unless otherwise noted, the density of asphalt pavement for street restoration patch will be evaluated by "Ordinary Compaction" method.
- 4) MN/DOT 2360.3.E Surface Requirements apply to the work of asphalt pavement for street restoration patch.
- 5) MN/DOT 2360.3.E.1 Lift Thickness is supplemented with the following: Unless otherwise noted in the Plan details, the work shall be constructed with a maximum lift thickness of 3 inches.

**D. Method of Measurement**

MN/DOT 2360.4 Method of Measurement is supplemented as follows: Where the actual total thickness of asphalt pavement for street restoration patch varies from the Contract bid items, the Engineer will prorate the quantities measured based on an adjustment factor determined by the ratio of actual thickness to bid item thickness.

**E. Basis of Payment**

MN/DOT 2360.5 Basis of Payment is supplemented as follows: The accepted quantities of asphalt pavement mixture for street restoration patch used in each course at the Contract

prices per unit of material shall be compensation in full for all costs of constructing the asphalt surfacing and providing or incorporating asphalt binder, tack coat, mineral filler, hydrated lime, and anti-stripping additives that may be permitted or required.

Payment will be made for asphalt pavement for street restoration patch under Item 2360.604 Type SP 12.5 Wearing Course Mixture (3,B) Street Restoration Patch (x)" Thick at the contract unit price per square yard.

*Note:*

*(x) Total Thickness of asphalt pavement for street restoration patch. Thicknesses greater than 3 inches WILL require more than one lift of pavement.*

## **2451 EXCAVATION, BACKFILL AND COMPACTION FOR UTILITIES**

This work shall consist of furnishing all materials, labor, equipment, and other services as are necessary for preparing the site for work, the excavating, preparing the trench for the utility pipeline to be altered or installed, the backfilling and compaction. The excavation and backfill aspects of the work required for sewer and water utilities shall meet MN/DOT 2451 except as modified in the following:

### **A. Description**

MN/DOT 2451.1 Description is supplemented with the following:

The City of Hermantown considers sanitary, storm, and water utility pipe, manholes, catch basins, hydrants, and valves to be 'prefabricated'.

### **B. Use of on-site Materials**

Where acceptable (suitable) select grading material **is available** within the project site, the select grading materials shall be utilized for backfilling pipe trench from the top of pipe encasement zone up to the subgrade (bottom of road section or bottom of topsoil) at the direction of the Engineer.

### **C. Materials**

MN/DOT 2451.2 Materials is supplemented with the following:

#### **1. Suitable On-Site Backfill Material**

Suitable materials shall be defined as a mineral soil reasonably free of foreign materials (rubbish, debris, etc.), frozen clumps, aggregate larger than 3 inches, rock, concrete or bituminous chunks, and other unsuitable materials, that may damage the pipe installation, prevent thorough compaction, or increase the risks of after settlement unnecessarily. Suitable backfill shall meet the provisions of MN/DOT 2106.2.B.3 Select Grading Material. The Engineer shall determine if any material is suitable.

2. Imported Granular Materials for Pipe Bedding and Encasement

Granular materials furnished for foundation, bedding, pipe encasement, or other purposes as may be specified shall consist of any natural mineral aggregate such as sand, gravel, crushed rock, crushed stone, that shall meet the gradation requirements specified on the Standard Details, the Contract Drawings and the Special Provisions.

3. Imported Granular Materials for Manholes and Catch Basins

Granular materials furnished for foundation and bedding shall consist of granular materials as specified on the Standard Details, the Contract Drawings and the Special Provisions. Structure backfill for manholes and catch basins shall meet MN/DOT 3149.2.D.1 Granular Backfill.

4. Imported Materials for Backfill

Where acceptable select grading material **is not available** within the project site, the Contractor shall furnish granular backfill meeting MN/DOT 3149.2.D.1 Granular Backfill or common backfill meeting MN/DOT 2106.2.B Common Borrow which shall be utilized for backfilling from the top of pipe encasement zone up to the subgrade (bottom of road section or bottom of topsoil) at the direction of the Engineer.

Where the backfill materials are not specified in the Plans or Special Provisions, it shall be Granular Backfill meeting MN/DOT 3149.2.D.1. (<20% passing No.200 sieve/1in).

D. Construction

1. General Provisions

a) Protection of Surface Structures.

All surface structures and features located outside the permissible excavation limits for underground installations, together with those within the construction areas which are indicated in the Contract Drawings as being saved, shall be properly protected against damage and shall not be disturbed or removed without approval of the Engineer. Within the construction limits, as required, the removal of improvements such as paving, curbing, walks, turf, etc., shall be subject to acceptable replacement of underground work, with the expense of removal and replacement being borne by the Contractor to the extent that separate compensation is not specifically provided for in the Contract.

Obstruction such as street signs, traffic control signs, guard posts, small culverts, and other items of prefabricated construction may be temporarily removed during construction provided that essential service is maintained in a relocated setting as approved by the Engineer and that nonessential items are properly stored for the duration of construction. Upon completion of the underground work, all such items shall be replaced in their proper setting at the sole expense of the Contractor.

b) Interference of Underground Structures.

When any underground structure interferes with the planned placement of the pipeline or appurtenances to such an extent that alterations in the work are necessary to eliminate the conflict or avoid endangering effects on either the existing or proposed facilities, the Contractor shall immediately notify the Engineer and the Owner of the affected structure. When any existing facilities are endangered by the Contractor's operations, he shall cease his operations at the site and take such precautions as may be necessary to protect the in-place structures until a decision is made as to how the conflict will be resolved.

Without specific authorization from the Engineer, no essential utility service shall be disrupted, nor shall any change be made in either the existing structures or the planned installations to overcome the interference. Alterations in existing facilities will be allowed only to the extent that service will not be curtailed unavoidably and then only when the encroachment or relocation will satisfy all applicable regulations and conditions.

Whenever alterations are required as a result of unforeseen underground interferences not due to any fault or negligence of the Contractor, the Engineer will issue a written order covering any additional or extra work involved and specifying the revised basis of payment, if any. Any alterations made strictly for the convenience of the Contractor shall be subject to prior approval. If an alteration diminishes the Contractor's responsibilities under the Contract in providing services or materials, a deduction will be made from the Contractor's final payment by a change order. No extra compensation will be allowed for delays caused by the interference of underground structures.

c) Temporary Surface Measures.

While any open excavations are maintained, the Contractor shall have available a supply of steel plates suitable for temporary bridging of open trench sections where either vehicular or pedestrian traffic must be maintained. Use of the plates shall be as directed or approved by the Engineer and where installed they shall be secured against possible displacement and be replaced with the permanent structure as soon as possible.

2. Excavation and Repair of Trench

a) Operational Limitations and Requirements.

Excavating operations shall proceed only so far in advance of pipe installation as will satisfy the need for coordination of work and permit advance verification of unobstructed line and grade as planned. At no time shall over 400 lineal feet of excavated trench be open at one time. Where interference with existing structures is possible or in any way indicated, and where necessary to establish elevation or direction for connection to in-place structures, the excavating shall be done at those locations in advance of the main operation so actual conditions will be exposed in sufficient time to make adjustments without resorting to extra work or unnecessary delay.

All installations shall be accomplished by open trench construction except for short tunnel sections approved by the Engineer and with the exception that boring, directional drilling, jacking, insertion in existing pipe or tunnel construction methods shall be employed where so specifically required by the Contract Drawings or Special Provisions. Installation of pipe through tunnel excavations will be allowed only where the surface structure can be properly supported and the backfill restored to the satisfaction of the Engineer.

The excavating operations shall be conducted so as to carefully expose all in-place underground structures without damage. Wherever the excavation extends under or approaches so close to an existing structure as to endanger it in any way, precautions and protective measures shall be taken as necessary to preserve the structure and provide temporary support. Hand, vacuum, or other non-evasive methods of excavating shall be utilized to probe for and expose such critical or hazardous installations as gas pipe and power or telephone cables.

The Engineer shall be notified of any need for blasting to remove materials which cannot be broken up mechanically, and there shall be no blasting operations conducted until the Engineer's approval has been secured. All blasting shall be performed in accordance with 2106/2451 ROCK BLASTING AND VIBRATION CONTROL specifications.

b) Classification and Disposition of Materials.

Rock will be paid for separately from other unclassified materials, either as a separate Contract Item or as an Extra Work Item when no bid price is applicable. All other materials encountered in the excavations, with the exception of items classified for payment as structure removals, will be considered as Unclassified Excavation. Unclassified materials shall include muck, rubble, wood debris, and boulder stone, masonry, or concrete fragments less than one quarter cubic yard in volume, together with other miscellaneous matter that can be removed effectively with power operated excavators without resorting to drilling and blasting.

For water, sanitary sewer and storm sewer.

Rock Excavation shall be defined to include all hard, solid rock in ledge formation, bedded deposits and un-stratified masses; all-natural conglomerate deposits so firmly cemented as to present all the characteristics of solid rock; and any boulder, stone, masonry or concrete fragments exceeding **one cubic yard in volume**. Materials such as shale, hard pan, soft or disintegrated rock which can be dislodged with a hand pick or removed with a power operated excavator will not be classified as Rock Excavation.

Excavated materials will be classified for reuse as being either suitable or unsuitable for other specified use as determined by the Engineer. All suitable

materials shall be reserved for backfill where allowed and to the extent needed as called for on the Contract Drawings or in the Special Provisions, and any surplus remaining shall be utilized for other construction on the project as may be specified or ordered by the Engineer. To the extent practicable, granular materials and topsoil shall be segregated from other materials during the excavating and stockpiling operations so as to permit best use of the available materials at the time of backfilling.

All excavated materials reserved for backfill or other use on the project shall be stored at locations approved by the Engineer that will cause a minimum of inconvenience to public travel, adjacent properties, and other special interests. The material shall not be deposited so close to the edges of the excavations as would create hazardous conditions, nor shall any material be placed so as to block the access to emergency services. All materials considered unsuitable by the Engineer, for any use on the project, shall be immediately removed from the project and disposed of as arranged for by the Contractor.

c) Excavation Limitations and Requirements—Open Trench.

Trench excavating shall be to a depth that will permit preparation of the trench bottom as shown on the Contract Drawings and installation of the pipeline and appurtenances at the prescribed line and grade, except where alterations are specifically authorized. Trench widths shall be as shown on the Standard Details and Contract Drawings and shall be sufficient to permit the pipe to be laid and joined properly and the backfill to be placed and compacted as specified. Extra width shall be provided as necessary to permit convenient placement of sheathing and shoring, to accommodate placement of appurtenances, or to make connections. No payment will be made for extra width required for the contractors shoring. The contractor shall notify the engineer prior to excavating any additional material outside the standard trench width.

Excavations shall be extended below the bottom of structure grade only if necessary to accommodate any required bedding material. When rock or unstable foundation materials are encountered at the established grade, additional materials shall be removed as specified or ordered by the Engineer to produce an acceptable foundation. Unless otherwise indicated or directed, rock shall be removed to an elevation at least six inches below the bottom surface of the pipe barrel.

Minimum and maximum width of utility trenches shall be as shown on the Standard Details or Contract Drawings.

Maximum allowable trench width for combined utilities shall be the maximum required separation between pipelines plus the outside diameters of each pipe plus 24 inches.

The maximum allowable trench widths shown on the Standard Details or Contract Drawings shall be used to establish maximum payment volume for granular backfill and rock excavation. Where the trench width was exceeded due to conditions which the Contractor could have controlled using reasonable methods to secure a trench, no additional payments for granular backfill will be made.

When no other grade controls are indicated or established for the pipeline, the excavation and foundation preparations shall be such as to provide a minimum cover over the top of the pipe as specified. Trench widths shall allow for at least six inches of clearance on each side of the joint hubs. The width of the trench at the ground surface shall be held to a minimum to prevent unnecessary destruction of the surface structures.

d) Sheathing and Braced Excavations.

All excavations shall be sheathed, shored and braced as will meet all requirements of OSHA; shall comply with any specific requirements of the Contract; and prevent disturbance or settlement of adjacent surfaces, foundations, structures, utilities, and other properties. Any damages to the work under contract or to adjacent structures or property caused by settlement, water or earth pressures, slides, cave-ins, or other causes due to failure or lack of sheathing, shoring or bracing or through negligence or fault of the Contractor in any manner shall be repaired by the Contractor at his expense and without delay.

Where conditions warrant extreme care, the Contract may require special precautions to protect life or property, or the Engineer may order the installation of sheet piling of the interlocking type or direct that other safety measures be taken as he deems necessary. Failure of the Engineer to order correction of improper or inadequate sheathing, shoring, or bracing shall not relieve the Contractor of his responsibilities for protection of life, property, and the work. The contractor shall assume full responsibility for proper and adequate placement of sheathing, shoring, and bracing, wherever and to such depths that soil stability may dictate the need for support to prevent displacement. Bracing shall be so arranged as to provide ample working space and so as not to place stress or strain on the in-place structures to any extent that may cause damage.

Sheathing, shoring and bracing materials shall be removed only when and in such a manner as will assure adequate protection of the in-place structures and prevent displacement of supported grounds. Sheathing and bracing shall be left in place only as required by the Contract or ordered by the Engineer. Otherwise, sheathing and bracing may be removed as the backfilling reaches the level of respective support. Wherever sheathing and bracing is left in place, the upper portions shall be cut and removed to an elevation of three feet or more below the established surface grade as the Engineer may direct.

All costs of furnishing, placing and removing sheathing, shoring and bracing materials, including the value of materials left in place as required by the Contract, shall be included in the prices bid for pipe installation and will not be compensated for separately. When any sheathing, shoring or bracing materials are left in place by written order of the Engineer, in the absence of specific requirements of the Contract to do so, payment will be made for these materials as an Extra Work Item, including waste material resulting from upper cut-off requirements.

e) Preparation and Maintenance of Foundations and Bedding.

Foundation preparations shall be conducted as necessary to produce a stable foundation and provide continuous and uniform pipe bearing between bell holes. Over excavation shall be performed as necessary to allow installation of bedding where called for on the Standard Details, Contract Drawings or Special Provisions. The initial excavation or bedding operations shall produce a subgrade level slightly above finished grade as will permit hand shaping to finished grade by trimming of high spots and without the need for filling of low spots to grade. Bell hole excavations shall be made at each joint as will permit proper joining of pipe and fittings.

Where the foundation soil is found to consist of materials that the Engineer considers to be so unstable as to preclude removal and replacement to a reasonable depth to achieve solid support, a suitable foundation shall be constructed as the Engineer directs in the absence of special requirements therefore in the Contract. The Contractor may be required to furnish and drive piling and construct concrete or timber bearing supports or other work as may be provided for in an Extra Work order.

Care shall be taken during the final subgrade shaping to prevent any over-excavation. Should any low spots develop, they shall only be filled with approved material, which shall have optimum moisture content and be compacted thoroughly. The finished subgrade shall be maintained free of water and shall not be disturbed once established. Where pipe lowering operations are to occur, excavation may be required as necessary to remove pipe slings.

All costs of excavating below grade and placing foundation or bedding materials as required shall be included in the unit price bid for the related utility. Any excavation below grade and any foundation or bedding aggregates required by order of the Engineer in the absence of Contract requirements therefore will be compensated for separately as Extra Work items.

f) Dewatering

All excavation for utility pipe or structures shall be dry and free from water as necessary to provide a stable foundation. The Contractor shall provide all



necessary dewatering equipment and all necessary equipment or materials for water quality treatment when necessary. Discharge from dewatering operations shall meet all federal, state and city standards prior to entering any water course or storm sewer.

MN/DOT 2451.3.D Backfilling Excavations is supplemented with the following:

3. Backfilling Operations

a) General Requirements.

Sequence of operations necessary prior to commencing final backfilling may be governed by the Standard Details, Contract Drawings, Special Provision, or the Specifications. Backfilling prior to completing other requirements will, at the option of the Engineer, result in removal of backfill as necessary at no extra cost to the City. Elevations and measurements of existing or new exposed utilities are of primary importance prior to backfilling.

All pipeline excavations shall be backfilled as will restore pre-existing conditions as the minimum requirement, and fulfill all supplementary requirements indicated in the Standard Details, Contract Drawings and Specifications. The backfilling operations shall be started as soon as conditions will permit on each section of pipeline, so as to provide continuity in subsequent operations and restore normal public service as soon as practicable on a section-by-section basis.

b) Temporary Aggregate Base Surface.

Trench surfaces which are to be restored with concrete or bituminous pavements constructed by others shall have the top 18 inches backfilled to match the elevation of the existing surface with MN/DOT 3138 Class 5 aggregates. The temporary surface shall be opened to traffic where necessary and maintained by the Contractor until immediately prior to paving. At such time, the surface shall be excavated to provide for the depth of the permanent pavement.

c) Placement Procedure and Compaction.

Initial backfill and pipe encasement materials shall be installed immediately following pipe installation. The pipe encasement area shall include all backfill up to 12 inches above the top of pipe for water and sewer. The pipe shall be secured in place with backfill materials to the mid-point prior to covering the pipe or compacting. Utility trench compaction will be measured by MN/DOT 2106.3.G.1 Specified Density method as follows:

- Compaction of materials placed within the pipe bedding and encasement zones shall be accomplished with portable or hand equipment methods, so as to achieve thorough consolidation under and around the pipe and avoid damage to the pipe. The materials at this level shall be thoroughly compacted with a mechanical compactor to meet 95% of maximum

standard proctor density.

- Above the pipe encasement zone (and below subgrade), backfill materials shall be carefully placed in relatively uniform depth layers spread over the full width and length of the trench section and as will provide simultaneous support on both sides of the excavation. Compaction of backfill for utility pipe trench shall be meet 100% of maximum standard proctor density for the upper 3 feet below subgrade; and 95% of maximum standard proctor density below the upper 3 feet.
- Compaction of backfill for manholes and catch basin structures shall meet 100% of maximum standard proctor density for full depth from bedding up to subgrade.

These compaction requirements apply to both mainline and service pipes with no differentiation made for pipe or structures located “outside” the roadway.

The minimum sampling and testing for compaction shall be in accordance with Appendix B Schedule of Materials Testing – City of Hermantown Street and Utility Projects included in these specifications. Additional testing may be performed as determined by the Engineer.

Compaction of the in-place layer shall be acceptably completed before placing material for a succeeding layer thereon. The manner of placement, layer thickness, compaction equipment, and procedure effectiveness shall be subject to approval of the Engineer. The use of heavy roller type compaction equipment shall be limited to safe pipe loading.

The maximum loose thickness of each backfill layer shall be 8 inches, except that 12 inches will be permitted for Granular Materials placed above an elevation one foot above the top of pipe, and with the provision that, by authority of the Engineer in consideration of the demonstrated capability of special type vibratory compactors, these maximums may be increased at his discretion.

Until final acceptance of the project, the Contractor shall assume full responsibility and expense for all backfill settlement and shall refill and restore the work as directed to maintain an acceptable surface condition. All additional materials required shall be furnished without additional cost to the City.

d) Surplus and Waste Material.

All surplus or waste materials remaining after completion of the backfilling operations shall be disposed of in an acceptable manner within 24 hours after completing the backfill work on each particular pipeline section. Disposal at any location within the project limits shall be as specified, or as approved by the Engineer; otherwise, disposal shall be accomplished outside the project

limits at the Contractor's discretion. The backfilling and surplus or waste disposal operations shall be a part of the work required under the pipeline installation items, not as work that may be delayed until final cleanup. No additional payments will be made for disposal of surplus or waste material.

E. Measurement

MN/DOT 2451.4.A.2 Prefabricated Structures is hereby deleted and replaced with the following:

A.2 Excavation for Prefabricated Structures

No measurement will be made for excavation of prefabricated structures (utility pipes and structures), except where rock excavation is required. The Engineer will measure rock excavation for prefabricated structures by volume in accordance with the limits shown in the City of Hermantown Standard Details for Construction.

MN/DOT 2451.4.B Granular Materials is hereby deleted and replaced with the following:

B.1 Granular Materials for Bedding and Encasement

No measurement will be made for granular materials utilized to construct foundation bedding and backfill within the pipe encasement zone.

B.2 Granular Materials for Manholes and Catch Basins

No measurement will be made for granular materials utilized to construct foundation bedding and structure backfill of manholes and catch basins.

MN/DOT 2451.4 Method of Measurement is supplemented with the following:

C.1 On-Site Materials for Backfill

No measurement will be made for select grading materials utilized for backfill of prefabricated structures.

C. 2 Imported Materials for Backfill

The Engineer will measure imported materials for backfill above the encasement zone and below subgrade by volume in accordance with the limits shown in the City of Hermantown Standard Details, when required in the Plans, or at the direction of the Engineer.

D Imported Materials for Foundation Stabilization

Where additional foundation material is required by the engineer, it will be measured by weight or volume within the limits defined by the Engineer. Unless otherwise specified, volume will be determined by vehicular measure (loose volume) at the point of delivery. Load ticket must be given to inspector upon delivery which indicates either volume (loose) or weight.

F. Basis of Payment

All costs of excavating to foundation grade, dewatering, preparing the foundation, furnishing and installing bedding and encasement materials, placing and compacting backfill materials, and other work necessary for prosecution and completion of the work as specified, shall be included for payment as part of the specified utility and utility appurtenance Contract bid items without any direct compensation being made therefore.

MN/DOT 2451.5 Basis of Payment is hereby supplemented with the following:

No payment will be made for structure excavation or trench excavation of prefabricated structures. All costs for excavation, foundation preparation, dewatering, and separating unacceptable materials shall be considered incidental to relevant Contract bid items.

No payment will be made for granular bedding and pipe encasement materials. All costs for furnishing, placing, and compaction of bedding and encasement zone backfill materials within the pipe encasement zone shall be considered incidental to relevant Contract bid items.

No payment will be made for granular bedding and structure backfill materials for manholes or catch basins. All costs for furnishing, placing, and compaction of bedding and structure backfill materials shall be considered incidental to relevant Contract bid items.

No payment will be made for backfill with suitable on-site select grading materials; all costs for handling, placing, compaction, and disposal of unacceptable materials shall be considered incidental to relevant Contract bid items.

Payment for furnishing backfill for prefabricated structures (excluding manholes and catch basins) will be made under bid Item 2451.507 (Furnish Granular Backfill (CV)) or 2451.507 (Furnish Common Backfill (CV)) at the Contract unit price per cubic yard, which shall be compensation in full for all labor, equipment, and materials necessary to furnish backfill materials to the site and disposal of waste excavation.

**All costs for placing and compacting backfill (regardless of type: select grading material, common or granular) shall be considered incidental to relevant Contract bid items.**

## **2502 SUBSURFACE DRAINS**

Subsurface drain construction shall be performed in accordance with the provisions of MN/DOT 2502, the detailed drawing in the Contract Drawings, and the following:

4-inch or 6-inch perforated Poly-Vinyl Chloride (PVC) Sewer Pipe, SDR 35, ASTM D 3034 shall be used. Type I geotextile conforming to MN/DOT 3733 shall be used.

Payment for drain pipe will be made under the bid items listed in MN/DOT 2502 at the Contract unit price per foot, which shall be compensation in full for all costs of furnishing and installing the pipe complete in place as specified including excavation, bedding, granular backfill, geotextile, fittings, adapters, connection to existing pipe, and connection to storm structures.

## **2503 CONNECT TO EXISTING SEWERS**

MN/DOT 2503 is supplemented with the following:

This work consists of constructing connections into existing sanitary sewer and storm sewer in accordance with the applicable MN/DOT Standard Specifications.

Measurement will be made by the number of connections constructed as specified.

Payment will be under Item 2503.502 Connect to Existing [Sanitary or Storm] Sewer at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto, including but not limited to, all materials and labor necessary to connect the proposed drainage structure to the existing sewer pipe. Any damage caused to the existing sewer pipe shall be repaired at no expense to the Department and to the satisfaction of the Engineer.

## **2503 PIPE SEWERS - GRAVITY**

Gravity sanitary sewer and storm sewer construction and reconstruction shall be performed in accordance with the provisions of MN/DOT 2503, except as modified below:

This work shall consist of the construction of gravity sanitary and storm sewer main and building services utilizing plant fabricated pipe and other appurtenant materials, installed for conveyance of wastewater and storm water. The work includes the relocation or adjustment of existing facilities as may be specified in the Contract.

All references to Specifications of MN/DOT, AASHTO, ASTM, ANSI, AWWA, etc. shall mean the latest published edition or supplement available on the date of advertisement for bids.

### **A. Materials**

#### **1. General Requirements**

All materials required for this work shall be new material conforming to requirements of the referenced specifications for the class, kind, type, size, grade and other details indicated in the Contract. Unless otherwise indicated, all required material shall be furnished by the Contractor. If any options are provided for, as to

type, grade or design of the material, the choice shall be limited as may be stipulated in the Contract Drawings or Specifications.

All manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Contract Drawings. Otherwise, the City may require advance approval of material suppliers, product design, or other unspecified details as it deems desirable for maintaining adopted standards.

2. Reinforced Concrete Pipe and Fittings

Reinforced concrete pipe, fittings, and specials shall conform to the requirements of MN/DOT 3236 and Standard Plate 3000 for the type, size and strength class specified. Rubber O-ring gasket joints conforming to Standard Plate 3006 shall be used.

3. Poly-Vinyl Chloride Pipe and Fittings

Smooth-walled poly-vinyl chloride pipe and fittings shall conform to the requirements of ASTM D-3034 for the size, standard dimension ratio (SDR), and strength requirements indicated on the Contract Drawings, Specifications, and Special Provisions. Unless otherwise specified, all pipe and fittings shall be SDR 35 and connections shall be push-on with elastomeric gasketed joints which are bonded to the inner wall of the gasket recess of the bell socket. Schedule 40 pipe with glued joints shall not be used.

4. Corrugated Polyethylene Pipe

This work shall consist of furnishing and installing dual-wall corrugated polyethylene pipe and fittings in accordance with the Contract Drawings, MN/DOT 2503, AASHTO M294, Design Section 18 of the AASHTO Standard Specifications for Highway Bridges and the following:

Corrugated polyethylene pipe and fittings shall be manufactured from high density polyethylene (HDPE) virgin compounds. Clean reworked HDPE materials from the manufacturer's own production may be used by the manufacturer of HDPE pipe, provided that the pipe and fittings produced meet all requirements of these Special Provisions and in AASHTO M294 and Design Section 18 of the AASHTO Standard Specifications for Highway Bridges. The polyethylene compounds shall conform to the requirements of ASTM D 3350 Cell Class 335420C. Pipe shall be new or stored for a period of time that does not exceed the manufacturer's recommended maximum period of exposure, regardless of the method of storage.

Pipe couplings shall meet the watertight performance requirements of ASTM 2306. Watertight couplings must be capable of meeting a 10 psi laboratory test per ASTM 3212 and utilize a bell and spigot design with a gasket meeting the requirements of ASTM F 477.

Wall thickness shall be the thickness of the inner liner measured between corrugation valleys of the outer rib wall. The wall thickness shall equal or exceed the minimum wall thickness values in Table 1.

The pipe stiffness shall be determined in accordance with AASHTO M294 at 5 percent deflection. The average pipe stiffness shall equal or exceed the minimum pipe stiffness value for each size of pipe listed in Table 1.

<b>TABLE 1 DUAL WALL CORRUGATED POLYETHYLENE PIPE NOMINAL DIAMETER (IN.)</b>						
<b>Properties</b>	<b>12</b>	<b>15</b>	<b>18</b>	<b>24</b>	<b>30</b>	<b>36</b>
Min. I.D. (in.)	11.8	14.8	17.7	23.6	29.5	35.5
Max. O.D. (in.)	14.7	18.0	21.5	28.7	36.4	42.5
Min. Wall Area (in. <sup>2</sup> /ft.)	1.50	1.91	2.34	3.14	3.92	4.50
Min. C (in.)	0.35	0.45	0.50	0.65	0.75	0.90
Min. I (in. <sup>4</sup> /in.)	.024	.053	.062	.116	.163	.222
Min. Pipe Stiffness (psi)	46	42	40	34	28	22
Min. Wall Thickness (in.)	.035	.035	.050	.050	.080	.100

5. Connections to Polyethylene Storm Sewer Pipe

Private sump pump discharge connections to HDPE storm pipe must have soil tight connections and meet manufacturer's recommendations for Tee connections. Inserta Tee, ADS UNI-T Tapping Tee, and other proprietary connections may be used with the project engineer's prior approval.

6. Flexible Couplings

Flexible couplings and adapters shall be made from elastomeric polyvinyl chloride. Couplings shall be resistant to chemicals, ultraviolet rays, fungus growth, normal sewer gases and unaffected by soil conditions. Couplings shall be water tight. Couplings shall be attached to pipe utilizing stainless steel bands.

B. Construction Requirements

1. General Provisions

Requirements for excavation, preparing trench, backfilling and restoration are contained in 2451 EXCAVATION, BACKFILL, AND COMPACTION FOR UTILITIES of these specifications and State of Minnesota Department of Transportation "Standard Specifications for Construction", and shall govern the execution of work where the specifications therein are not in conflict with more specific requirements contained in this section, the Contract Drawings or the Special Provisions.

**2. Handling and Inspection**

Proper and adequate 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. Unloading, distribution and storage of pipe and appurtenant materials on the job site shall be as approved by the Engineer. All materials shall be handled carefully, as to prevent damage and avoid jolting contact, dropping, or dumping.

Before being lowered into laying position, the Contractor shall make a thorough visual inspection of each pipe section and appurtenant units to detect damage or unsound conditions that may need corrective action or be cause for rejection. Inspection procedure shall be as approved by the Engineer, with special methods being required as he deems necessary to investigate suspected defects more definitely. The Contractor shall inform the Engineer of any defects discovered and the Engineer will prescribe the required corrective actions or order rejection.

Immediately before placement, the joint surfaces of each pipe section and fitting shall be inspected for the presence of foreign matter, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair as needed.

Store pipe on level surface. Pipe may be placed in pyramidal stacks provided the number of courses recommended by manufacturer is followed and pipe is chocked on each side to prevent roll out of the layers.

Do not dump pipe from conveyance. Unload pipe with ropes and skids or with mobile unloading equipment. Use wide slings for hoisting large pipe with boom trucks, cranes or lifts. Reinforced web slings are acceptable; chains, wire ropes or fiber ropes are not acceptable slings. Use of hooks for unloading is also unacceptable.

**3. Pipe Laying Operations**

Trench excavation and bedding preparations shall proceed ahead of pipe placement as will permit proper laying and joining of the units at the prescribed line and grade.

The bedding shall provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connections, but they shall be no larger than would be adequate. Unless otherwise permitted by the Engineer, bell and spigot pipe shall be laid with the bell ends facing upgrade and the laying shall start at the downgrade end and proceed upgrade.

As each length of pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. All pipe and fitting joints shall fit tightly and be fully closed. The pipe shall be secured in place with backfill material to mid-point of pipe, and backfilled to 1 foot over the



top of the pipe as specified in 2451 EXCAVATION, BACKFILL, AND COMPACTION FOR UTILITIES and as shown on the standard details and the contract drawings.

4. Pipes to be Cleaned

The interior of all pipes shall be carefully freed from all dirt, stones, sand silt, mud, concrete and superfluous material of every description as the work progresses. If, in the opinion of the Engineer, the pipe contains an excess of material, the pipe shall be cleaned by the Contractor at no additional expense to the Owner.

5. Locating Wire

Locating wire shall be installed in accordance with 2503/2504 LOCATING WIRE FOR WATER AND SEWER of these specifications and the Standard Details and the Special Provisions.

6. Inside Drops

Where a sanitary sewer main line connects to a manhole more than 2 feet above the invert of the outgoing sewer, the connection shall be made by means of an Inside Drop Connection installed per the Standard Details. Outside drops shall not be used except where approved by the City Engineer.

7. PVC Sewer Service Pipe

Sewer service connections shall be installed as provided for in the contract and as may be directed by the Engineer. The sewer service connections and pipelines shall be installed in conformance with all applicable requirements of the main sewer installation. The Engineer, with the assistance of the Contractor, shall keep accurate records of all service installations as to the type, location, and elevation at the point of connection (wye), property line and termination, etc. The service installation shall not be backfilled until all required information has been obtained and recorded. Unless otherwise specified, service pipe shall be installed at right angles to the main sewer and at a straight line and grade to the property line. The standard and minimum grade shall be a uniform rise of 1 inch in 4 feet (2%) for sanitary service lines. Pipe bends shall be provided as necessary to bring the service lines to the proper location and grade. Pipe bends shall not exceed 22-½ degrees without approval of the Engineer.

All wyes, tees or the end of lateral service lines shall be closed with a stopper until all testing has been completed. Plugs/caps shall be tested against with the maximum air pressure to be used in testing.

All sanitary sewer service pipes must be insulated if the depth of cover is 6'-0" or less.

PVC sewer service pipe for existing private building services shall match the size of the existing sewer service, typically 6". In no case shall the sewer pipe reduce in size between the building and the sewer main. Four-inch service pipe may be used in new developments with new sewer main and new sewer services for residential homes. All service pipe installation shall meet the requirement of the State of Minnesota Plumbing Code.

8. Continuous Sewer Service

The Contractor shall provide adequate equipment and facilities to provide bypass pumping for all elements of work requiring interruption to flow in the sanitary sewer. Provide backup or standby capabilities satisfactory to the City. The Contractor shall be responsible for damages to private or public property due to sewer backup while controlling sewage flow.

Under no circumstances will bypassing of untreated wastewater to any storm drainage facility or surface water course be allowed.

All costs for flow control, temporary pumping, etc., shall be inclusive to the unit price bid for sanitary sewer.

9. Dewatering of Trench

Dewatering of the trench shall be considered incidental work for which no separate payment will be authorized.

10. Flexible Couplings

Flexible couplings and adapters shall be used to connect new pipe to existing PVC or clay pipes.

11. Bulkheads

All pipe and fitting ends left open for future connection shall be bulk-headed with prefabricated caps of the same material as the pipe material. They shall be installed with watertight seals as required for the pipeline joints. Plugs/caps shall be tested against with the maximum air pressure to be used in testing.

12. Infiltration

The infiltration shall not exceed 50 gallons per inch diameter of pipe per mile per day.

13. Television Inspection

After the sewer is completed, the City may inspect all or any portion of the sewer with closed-circuit television. The Contractor shall be responsible for leaving the sewer in a clean condition for televising.

14. Air Test

All sanitary sewer lines, including service connections, shall be 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 by 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. 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 27.58 kPa (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 re-tightened, 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 24.82 to 20.68 kPa (3.6 to 3.0 psi) in less time than one-half minute per one inch in diameter of the pipe tested.

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.

**15. Deflection Testing**

Deflection testing shall be performed by the Contractor using a nine point mandrel approved by the Engineer. The ball or mandrel shall have a minimum diameter equal to 95% of the actual inside diameter of the pipe.

Mandrel testing shall be done no less than thirty (30) days after installation or upon completion of construction of the roadway to the finished subgrade, whichever occurs first. The mandrel must be pulled through the pipe by non-mechanical means. Pipe through which the mandrel does not pass will be considered unacceptable. New pipe or deformed pipe which is not damaged shall be re-laid. The re-laid pipe shall be retested for deflection after no less than five (5) calendar days.

<b>Sanitary Sewer Pipe and Mandrel Diameter</b>		
Pipe Diameter, Nominal (inches)	Pipe Diameter, Actual, SDR 35 (inches)	Mandrel Diameter (inches)
4	3.895	3.60
6	5.742	5.45
8	7.665	7.28
10	9.563	9.08
12	11.361	10.79
15	13.898	13.20
18	16.976	16.13
21	20.004	19.00
24	22.48	21.36
27	25.327	24.06
30	29.132	27.68
36	34.869	33.13

16. Electrical Continuity Test

The Contractor shall perform a continuity test on all tracer wire after installation of pipe. If the test shows no continuity, the Contractor shall find and repair the broken tracer wire. Pipe that fails to meet continuity requirements above will be considered unacceptable and no payment will be made.

C. Basis of Measurement and Payment

1. All payment for Pipe Sewers- Gravity and related items within this section shall include all incidental work specified under 2451 EXCAVATION, BACKFILL AND COMPACTION FOR UTILITIES including backfill with suitable onsite materials where specified.

2. Sanitary Sewer or Storm Sewer

Measurement for Pipe Sewers – Gravity shall be per lineal foot of the specified diameter and material installed. Payment shall be made for Pipe Sewers – Gravity at the Contract unit bid price for the specified diameter and material installed. Payment for pipe sewer-gravity shall include, in addition to the Basis of Payment in 2503.5, excavation, bedding, encasement materials to 1 foot over the pipe, adapters and construction joints, placing and compacting backfill above encasement zone, all cleaning and testing, and other work necessary to complete the work..

3. PVC Wye

Measurement will be made by the number of each size PVC wye furnished and installed as specified.

Payment for wyes of each size will be made under item 2503.602 ((size main)" X (service size)" PVC Wye) at the Contract price per each, which shall be compensation in full for all costs of furnishing and installing the wye complete in place as specified.

4. Connect Sewer Service

This work shall consist of furnishing and installing a connection to a Pipe Sewer complete in place including all fitting, elbows, adapters, etc. from the center line of the pipe sewer to 4 feet beyond the main in accordance with the applicable provisions of MN/DOT 2503.

Measurement will be made by the number of each sanitary or storm sewer service connections furnished and installed as specified.

Payment for each connection will be made under Item 2503.602 (Connect Sewer Service), at the Contract price per each, which shall be compensation in full for all costs of furnishing and installing the connection complete in place as specified.

5. PVC Sewer Service Pipe

This work shall consist of furnishing and installing PVC Sewer Pipe (SDR 35) complete in place including fittings, adapters, and construction joints from 4 feet beyond the wall of the pipe sewer to a termination point or connection to an existing service as the Inspector designates in accordance with the applicable provisions of MN/DOT 2503.

Measurement will be made by length along the line of the sewer service pipe to the nearest 0.5 feet. Payment for sewer service pipe will be made under Item 2503.503, ((size)"PVC Sewer Service Pipe), at the Contract price per foot, which shall be compensation in full for all costs of furnishing and installing the sewer service pipe complete in place as specified including, but not limited to, excavation, bedding, encasement materials, placing and compacting backfill and other work necessary to complete the work.

6. Construct Inside Drop

This work shall consist of furnishing and installing an Inside Drop Connection in accordance with the Standard Details, Contract Drawings and Special Provisions. Inside Drop Connections will be measured separately by the number of complete units installed, in addition to measured Contract pay items under MN/DOT 2503 and 2506. Payment for inside drop connections will be made under Item 2503.602 (Construct Inside Drop) at the Contract bid price per each, which shall be compensation in full for all costs of furnishing and installing the inside drop connection complete in place as specified.

**2503 PIPE SEWERS - PRESSURE**

Pressure sanitary sewer and forcemain construction and reconstruction shall be performed in accordance with the provisions of MN/DOT 2503 except as modified below: This work shall consist of the construction or reconstruction of pressure sanitary sewer and forcemain and building service pipelines utilizing plant fabricated pipe and other appurtenant materials, installed for conveyance of wastewater. The work includes the relocation or adjustment of existing facilities as may be specified in the Contract.

All references to Specifications of AASHTO, ASTM, ANSI, AWWA, etc. shall mean the latest published edition or supplement available on the date of advertisement for bids.

A. Materials

1. General Requirements

All materials required for this work shall be new material conforming to requirements of the referenced specifications for the class, kind, type, size, grade and other details indicated in the Contract. Unless otherwise indicated, all required material shall be furnished by the Contractor. If any options are provided for, as to type, grade or design of the material, the choice shall be limited as may be stipulated in the Contract Drawings or Specifications.

All manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Contract Drawings. Otherwise, the Department may require advance approval of material suppliers, product design,

or other unspecified details as it deems desirable for maintaining adopted standards.

**2. Ductile Iron Pipe**

Ductile Iron Pipe shall conform to the latest requirements of ANSI/AWWA C151/A-21.51. In addition, the pipe shall comply with the following supplementary provisions:

- a. All pipe shall be furnished with cement mortar lining meeting the latest requirements of ANSI/AWWA C104/A-21.4-08 for standard thickness lining. All interior surfaces of the pipe shall have an asphaltic coating at least one mil thick.
- b. The exterior of the pipe shall have an asphaltic coating at least one mill thick unless specified otherwise in the Special Provisions.
- c. When specified in the Special Provisions, the exterior of the pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m<sup>2</sup> of pipe surface area. A finishing layer asphaltic topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils. The coating system shall conform in every respect to ISO 8179-1 "Ductile iron pipes – External zinc based coating – Part 1: Metallic zinc with finishing layer. Second edition 2004-06-01.
- d. All pipe shall be furnished with push-on type joints conforming to ANSI/AWWA C111/A-21.11 unless specified otherwise in the Special Provisions or shown on the contract drawing.
- e. When specified in the Special Provisions or shown on the Contract Drawings, joints shall be boltless, flexible, push-on restrained joint such as Flex-Ring by AMERICAN, or TR Flex by US PIPE. Field adaptable restrained joints may be provided through the use of Field Flex-Ring restraints by AMERICAN.
- f. Where shown on the Contract Drawings, flange joints shall be provided. Flanges shall be standard AWWA C115/A21.15lb threaded on flanges for 250 psi operating pressure. Bolt on flanges such as Uni-flange or Mega-flange may not be substituted for flanged pipe.
- g. All pipe shall be furnished in 18 or 20-foot nominal lengths.
- h. Minimum ANSI thickness class furnished shall be Class 52 for all pipe through 16" pipe. For pipes larger than 16" the appropriate class shall be called out in the Special Provisions. Above grade flanged pipe shall be class 53.
- i. Pipe shall be provided with provisions to maintain electrical continuity for thawing and locating purposes.
- j. A Certificate of Compliance shall be furnished stating that the materials furnished have been tested and are in compliance with the requirements of this Specification.

**3. Ductile Iron Fittings**

Fittings shall conform to the latest requirements of ANSI/AWWA C110/A-21.10-08 (Gray Iron and Ductile Iron Fittings), or ANSI/AWWA C153/A-21.53 (Ductile Iron Compact Fittings), all with ductile iron glands and cement lining.

- a. Buried fittings shall be mechanical joint with rubber gaskets.
  - b. Exposed fittings shall be flanged conforming to ANSI B16.1, Class 125 and have full face gaskets.
  - c. Exposed fittings shall be shop primed for painting.
  - d. Fittings shall be provided with provisions to maintain electrical continuity.
  - e. Fittings shall be manufactured in North America or preapproved by the City City Engineer.
  - f. Mechanical joint bolts shall be as specified elsewhere in this section
  - g. When specified in the Special Provisions or shown on the Contract Drawings, buried fittings shall be boltless, flexible, push-on restrained joint fittings such as Flex-Ring by AMERICAN, or TR Flex by US PIPE. Field adaptable restrained joints may be provided through the use of Field Flex-Ring restraints by AMERICAN.
4. HDPE Pipe and Fittings
- a. HDPE pressure sewer and forcemain pipe 4 inches and greater shall be polyethylene pipe conforming to ASTM D3035 and AWWA C906-15, Polyethylene (PE) Pressure Pipe and Fittings, 4" through 63", for Water Distribution. Pipe furnished shall be marked with a continuous green stripe. Pipe and fittings shall be PE4710, HDPE Pressure Class 200, SDR 11, and have outside diameters similar to ANSI A-21.51 ductile iron pipe. Joints and fittings shall be butt heat fusion type, ASTM F2620. Ends shall be plain for butt fusion joining as specified in the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe.
  - b. Pressure sewer pipe less than 4-inch shall be polyethylene pipe conforming to the requirements of ASTM D2239 or D3035 and shall have a minimum working pressure of 200 psi at 73 deg. F., DR11. Joints and fittings shall be butt heat fusion type, ASTM F2620.
  - c. All fittings for 4 inch through 12 inch pipe, must be molded if a molded fitting is available including all 45 degree elbows, 90 degree elbows and tees. If a molded fitting is not manufactured, then a fabricated fitting may be used. All 8 x 6 reducers shall be molded or machined. Other size reducers may be fabricated. All fabricated fittings shall be rated for a minimum operating pressure of 200 psi. All fabricated fittings shall be made from a minimum thickness material of SDR 9. Fabricated 90-degree elbows shall have a minimum of 4 sections. Fabricated 45-degree elbows shall be 2 sections. Fabricated fittings shall be manufactured by Plasson USA or George Fischer Central Plastics. All other brands of fabricated fittings shall be submitted to the City City Engineer for pre-approval a minimum of 2 weeks prior to any bids. The City reserves the right to reject a fabricated fitting based solely upon an on-site inspection due to poor workmanship or questionable pressure rating.
  - d. All fittings for 3 inch and smaller pipe shall be molded. All fittings shall be rated for 200 psi.
  - e. Couplings used for pressure sewer force main and services (4 inches and larger) shall be electrofusion type. Couplings used for services (3 inches and smaller) shall be electrofusion or socket fused type.

- f. Pipe shall be new or stored for a period of time that does not exceed the manufacturer's recommended maximum period of exposure, regardless of the method of storage.
- g. The DR number and pressure rating specified above shall be considered a minimum. Provide stronger class pipe if required by loads imposed by directional drilling pulling operation or pipe bursting.
- h. Shop drawings for HDPE pipe must specify minimum allowable pipe deflection radius.
- i. Reference Standards - American Society for Testing and Materials (ASTM)
  - ASTM D638 – Tensile Method for Tensile Properties of Plastics
  - ASTM D790 – Test Materials for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
  - ASTM D3035 – Polyethylene (PE) Plastic Pipe (DR-PE) Based on Controlled Outside Diameter
  - ASTM D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene Plastic Pipe and Tubing
  - ASTM D3350 – Polyethylene Plastic Pipe and Fittings Material
  - ASTM F714 – Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
  - ASTM F2206 – Fabricated Fittings of Butt-Fused Polyethylene Plastic Pipe, Fittings, Sheet Stock, Plate Stock or Block Stock.
  - ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

5. Stainless Steel Pipe

Stainless steel pipe materials shall meet the requirements of ASTM A53 schedule 40 with threaded joints meeting the requirements of ASTM A865. All couplings and fittings shall be the same material as the host pipe.

**All steel shall be made in North America.** The Contractor shall provide certification of steel origin to Engineer prior to installation.

6. HDPE Transition Couplings and Adapters

- a. The HDPE by MJ Adapters shall be manufactured by Central Plastics Company or equal. The adapter shall comply with AWWA C906 and be manufactured for use on pipe conforming to ASTM D2513, D3035 and F-714. The adapter shall be molded from a PPI and NSF listed pre-blended virgin resin in accordance with the material specifications listed in ASTM D3350 with a cell classification of 445574C and be compatible for heat fusion with any pipe manufactured from a like or similar resin. Adapters shall be tested according to ASTM D1599 and ASTM D1598. HDPE Adapters shall be sized for use with ductile iron pipe size HDPE pipe. Adapters shall provide joint restraint. Adapters shall be used for all transitions from HDPE to valves or ductile iron pipe.
- b. The HDPE to cast iron or ductile iron transition couplings shall be furnished and installed from new HDPE pipe to existing pipe. The transition couplings shall be Smith Blair model 441 or equal. HDPE pipe stiffeners shall also be provided and



- installed to prevent compression of the HDPE pipe. Pipe stiffeners shall be Smith Blair or equal. Stiffeners shall be designed to prevent over insertion.
- c. Transition couplings 2-inch and smaller shall consist of HDPE by threaded stainless steel connections. The coupling shall include a stainless-steel transition compression ring with O-ring seal. Adapters shall have a pressure rating equal to that of the mating pipe. HDPE shall be plain end for butt fusing. Coupling shall be manufactured by Central Plastics, Inc. or equal.
  - d. All bolts to be used on adapters and couplings shall be supplied with 6-ounce zinc anode caps conforming to ASTM B-418.

7. Transition Couplings

Cast transition couplings for 4 inch through 12 inch shall be furnished with ductile iron sleeves, ductile iron followers and 316 stainless steel bolts. Gaskets shall be natural or synthetic vulcanized rubber recommended for water system use. The finish shall be fusion bonded epoxy meeting ASTM C213. Couplings shall have a size range to connect cast iron to cast iron or cast to ductile iron, or ductile iron to ductile iron as necessary for the application.

Estimated pipe outside diameters are shown in the table below. Latter dimension is maximum for pit cast end requirement. Contractor shall verify all pipe dimensions prior to ordering couplings. All couplings shall be rated for 250 psi minimum.

4"	4.80" to 5.10"
6"	6.90" to 7.20"
8"	9.05" to 9.45"
10"	11.10" to 11.50"
12"	13.20" to 13.50"

Couplings shall be Smith Blair 441, JCM 210, Ford FC1, Krauz Hymax, Romac Macro HP, or approved equal.

8. Gate Valves

Gate valves shall be manufactured and furnished in accordance with an approved pattern and shall conform to the requirements of AWWA C509 or C515 for resilient seated gate valves, and all gate valves must meet such supplementary requirements as may be stipulated in the Contract Drawings or Special Provisions and the provisions hereof.

Unless otherwise specified, the valves furnished shall comply with the following supplementary requirements:

- a. All gate valves shall have a working pressure rating of 350 psi.
- b. Gate valves shall be solid disc with resilient seating.
- c. The wedge shall be ductile iron and fully encapsulated with EPDM rubber.

- d. Valves shall have a two inch square operating nut opening counter-clockwise.
- e. All valves shall be of the non-rising stem type.
- f. All valves shall be furnished with O-Ring stem seals. The O-Rings above the thrust collar shall be fully replaceable with the valve "open" and under full pressure.
- g. The exterior of the valve shall be supplied with a fusion baked epoxy coating.
- h. All buried gate valves shall be furnished with extension stems which extend to within one foot of the finished grade elevation. The extension stem shall have a 2-inch operating nut and be mechanically connected to the valve operator.
- i. All valves within structures or vaults shall have extension stems that extend to within 6 inches of the top of slab or other designated elevations shown on the drawings. Stem guides shall be provided for all valves within wet wells, vaults or other inaccessible locations.
- j. Gate valves shall be manufactured by American Flow Control, Clow, Waterous, Mueller, AVK, or equal. All "or equal" valves shall be preapproved by the City Engineer prior to bidding. All valves shall be made in North America. Shop drawings for gate valves shall include a statement attesting to their country of origin.
- k. Gate valve box adapters shall be ¼ inch steel adapter and ¾ inch neoprene gasket. The steel adapter shall be coated with bitumastic coal tar epoxy. Adapters shall be manufactured by Adaptor, Inc.
- l. Buried valves shall have mechanical joint ends or fusible HDPE stubs of the same pipe diameter and SDR as the main. MJ joints shall be complete with gasket, gland, and bolts.
- m. Exposed valves shall have flanged ends conforming to ANSI B16.1, Class 125 with full face gaskets.
- n. Bolts or valve flange shall be provided with means for preventing the bolt from slipping in the slotted holes.
- o. All exposed bolts on the valve, including stuff box and bonnet bolts shall be 316 stainless steel.
- p. Bolts for flanged valves exposed to wastewater shall be 316 stainless steel.
- q. Mechanical joint bolts shall be as specified in the Water Main section (2504).
- r. 6-ounce zinc anode caps conforming to ASTM B-418 shall be installed on the bolts on all mechanical joint fittings.
- s. A 5-pound (minimum) magnesium anode shall be attached to MJ bolt for all valves as shown in the Standard Detail W-11.

9. Valve Boxes

Valve Boxes shall be 5 1/4" cast iron screw-type, consisting of the following parts:

Cover	Stay-put type, "SEWER" cast thereon, with solid edges (no grooves or flutes on edge)
Top Section	26" length
Extension Section	30" length
Bottom Section	30" length
Base	#6 Round Base

All parts must be interchangeable with Bingham and Taylor #4906 and Tyler #6860. Valve box assemblies shall be manufactured in Northern America or preapproved by the Engineer.

10. Check Valves

Check valves shall be provided with cast iron or ductile body with top opening for disc replacement without requiring valve body removal. Valve body shall provide a clear waterway in the fully opened position. Trip shall be grade A bronze. Valves shall be furnished with outside lever and weight to assist rapid closure. Disc shall be of cast or ductile iron construction, bronze-mounted. Valves shall be furnished with flanged ends conforming to ANSI B16.1, Class 125. Valves shall meet the general requirements of AWWA C508. Check valves shall be Clow, Henry Pratt or pre-approved equal

11. Ball Valves

Ball valves up to 2-inches shall be bronze or stainless steel one-piece body, chrome plated brass ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends. PVC ball valves are not acceptable.

12. Pressure Gauges

Pressure gauges shall be 2 ½ inch minimum diameter, silicone filled, stainless steel case and base, and spiral tube with a polycarbonated lens and ¼ NPT male center back connection. The gauge shall be rated for a maximum pressure of twice the rated pump capacity unless called for otherwise in the Special Provisions or on the Plans.

13. Pressure Sewer Services and Fittings

- Pressure sewer services shall conform to the same requirements for HDPE pipe and fittings.
- Tapping Tees with Electrofusion Saddle shall be manufactured by Central Plastics Company or equal and shall conform to the requirements for Water Pipe Materials and Fittings as specified.
- Curb Stop shall have threaded connections for use with HDPE adapters.
- Curb Boxes shall be magnetized locator wire boxes as specified elsewhere shall be adjustable up and down for a minimum of 7 feet of cover.

14. Wall Sleeves and Wall Pipes

Wall sleeves and wall pipes shall conform to the requirements of the process piping as indicated on the contract drawings and as specified as follows:

Cast Iron: ASTM A48, Class 30B

Ductile Iron: ASTM A536, Grade 60-40-18

Mechanical Joint: ANSI/AWWA C111/A21.11

Integral cast or welded intermediate wall collar

Wall pipes shall be used at all locations where pipes penetrate new cast in place concrete walls.

15. Modular Rubber Seals

Modular rubber wall seal shall be mechanical type, consisting of inter-locking synthetic rubber links. The elastomeric element shall be sized and selected per manufacturer's recommendation and have the following properties as designated: Standard service application (-40 degrees F to 250 degrees F) EPDM:

ASTM D2000 M3BA510.

Hydrocarbon service application (-40 degrees F to 210 degrees F) Nitrile:

ASTM D2000 M1BF510

High temperature or fire seal application (-67 degrees F to 400 degrees F)

Silicone: ASTM D2000 M1GE505

Assembly of synthetic rubber links connected with 316 stainless steel bolts. When the bolts are tightened, pressure plates shall compress the rubber links to fill the annular space between the pipe and the wall sleeve to form a watertight seal.

Modular rubber wall seals shall be used where pipes penetrate existing concrete walls or precast walls and as otherwise indicated on the contract drawings. Use of modular rubber seals in any other locations shall require written approval of the Engineer.

Modular rubber wall seal shall be Link-Seal, manufactured by Thunderline Corporation or equal.

16. Pipe Supports and Pipe Hangers

Pipe supports bearing on concrete surfaces shall consist of a base flange, support rod with threaded ends for height adjustment and a saddle type or stanchion type support. Provide floor-mounted type support stands where wall or ceiling mount are not feasible and maintenance access will not be interrupted.

Wall mounted support brackets shall be constructed of angle iron and include a u-bolt attachment, roller or pipe saddle above the bracket. Wall mounted pipe support brackets are permitted the pipe is within 2 feet of the wall.

Ceiling installed hangers and supports shall conform to the American Standard Code for Pressure Piping, ANSI B31.1.

All pipe supports installed in above ground building without the presence of wastewater shall be painted steel. All pipe supports installed below ground or in any room where exposed wastewater is present shall be 316 stainless steel.

**B. Construction Requirements**

**1. General Provisions**

Requirements for excavation, preparing trench, backfilling and restoration are contained in 2451 EXCAVATION, BACKFILL, AND COMPACTION FOR UTILITIES of these specifications and State of Minnesota Department of Transportation "Standard Specifications for Construction" current edition, and shall govern the execution of work where the specifications therein are not in conflict with more specific requirements contained in this section, the Standard Details, Contact Drawings, or the Special Provisions.

All horizontal directional drilling shall be performed in accordance with (2503/2504/2505) HORIZONTAL DIRECTIONAL DRILLING of these specifications.

**2. Handling and Inspection**

Proper and adequate 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. Unloading, distribution and storage of pipe and appurtenant materials on the job site shall be as approved by the Engineer. All materials shall be handled carefully, as will prevent damage to protective coatings, linings, and joint fittings; preclude contamination of interior areas; and avoid jolting contact, dropping, or dumping.

Before being lowered into laying position, the Contractor shall make a thorough visual inspection of each pipe section and appurtenant units to detect damage or unsound conditions that may need corrective action or be cause for rejection. Inspection procedure shall be as approved by the Engineer, with special methods being required as he deems necessary to investigate suspected defects more definitely. The Contractor shall inform the Engineer of any defects discovered and the Engineer will prescribe the required corrective actions or order rejection. Any pipe with scratches, cuts or scrapes deeper than 10% of the wall thickness shall be used unless the damaged section is cut out.

Immediately before placement, the joint surfaces of each pipe section and fitting shall be inspected for the presence of foreign matter, coating blisters, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair as needed.

Store pipe on level surface. Pipe may be placed in pyramidal stacks provided the number of courses recommended by manufacturer is followed and pipe is chocked on each side to prevent roll out of the layers. Cover pipe ends to prevent dirt, debris, wildlife and weather from entering. HDPE pipe stored for more than 3 weeks should be covered for protection from sunlight and weather.

Do not dump pipe from conveyance. Unload pipe 12 inch (300 mm) and smaller by hand with ropes and skids. Unload pipe larger than 12 inch (300 mm) or pipe bundles with mobile unloading equipment. Use wide slings for hoisting large pipe with boom trucks, cranes or lifts. Reinforced web slings are acceptable; chains, wire ropes or fiber ropes are not acceptable slings. Use of hooks for unloading is also unacceptable.

**3. Pipe Laying Operations**

Trench excavation and bedding preparations shall proceed ahead of pipe placement as will permit proper placement and joining of the pipe and fittings at the prescribed grade and alignment without unnecessary hindrance. Every reasonable precaution shall be taken to prevent foreign materials from entering the pipe and fittings while they are being placed in the line. The sewer materials shall be carefully lowered into laying position by the use of suitable restraining devices. Under no circumstances shall the pipe be dropped or dumped into the trench.

At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connection, but they shall be no larger than would be adequate. No pipe material shall be laid in water nor when the trench or bedding conditions are otherwise unsuitable or improper. Unless otherwise permitted by the Engineer, bell and spigot pipe shall be laid with the bell ends facing in the direction of laying.

When placement or handling precautions prove inadequate, in the Engineer's opinion, the Contractor shall provide and install suitable plugs or caps effectively closing the open ends of each pipe section before it is lowered into laying position, and they shall remain so covered until removal is necessary for connection of an adjoining unit.

As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material, which shall be thoroughly compacted around the pipe. The joint areas shall remain exposed and precautions shall be taken to prevent the soil from entering the joint space, until the joint seal is affected.

At all times when pipe laying is not in progress, including noon hour and overnight periods, all open ends of the pipe line shall be closed by watertight plugs or other means approved by the Engineer. If water is present in the trench, the seals shall remain in place until the trench is pumped completely dry.

**4. Aligning and Fitting of Pipe**

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe and so as to leave a smooth square-cut end. Cast iron or ductile iron pipe shall be cut with approved mechanical cutters. The electric-arc cutting method, using carbon or steel rod, will be approved for use on the larger size pipe where mechanical cutters are not available. Flame cutting will not be allowed under any conditions. All rough edges shall be removed from the cut ends of pipe and, where rubber gasket joints are used, the outer edge shall be rounded or beveled by grinding or filing to produce a smooth fit.

When necessary to deflect the pipe from a straight line either in the vertical or horizontal plane to avoid obstructions, or produce a long radius curve, the amount of deflection allowed at each joint shall not exceed the allowable limits established in the following tables:

<b>MAXIMUM PERMISSIBLE DEFLECTION IN LAYING PUSH-ON JOINT FOR DUCTILE IRON PIPE</b>					
<b>Pipe Size</b>	<b>Max. Angle</b>	<b>MAX OFFSET PER PIPE</b>		<b>Approx. Radius</b>	
		<b>18' length</b>	<b>20' length</b>	<b>18' length</b>	<b>20' length</b>
3" to 12"	5°	19"	21"	205'	230'
16" to 24"	3°	11"	12"	340'	380'
30" to 36"	2°	7.5"	8"	510'	570'

<b>MAXIMUM PERMISSIBLE DEFLECTION IN LAYING MECHANICAL JOINT FOR DUCTILE IRON PIPE</b>			
<b>Pipe Size</b>	<b>Max. Angle</b>	<b>MAX. OFFSET PER PIPE</b>	
		<b>18' length</b>	<b>20' length</b>
4"	8.3°	31"	35"
6"	7.1°	27"	30"
8" to 12"	5.3°	20"	22"
16"	3.5°	13"	15"
18" & 20"	3.0°	11"	12"
24" & 30"	2.3°	9"	10"
36"	2.0°	8"	9"

Connection and assembly of joints shall be accomplished during the setting, aligning and fitting operations, in accordance with the provisions of this specification to the extent that the jointing requirements will permit.

HDPE pipe may be deflected at a maximum radius of 25 times the nominal pipe OD. When a fitting or connection is present, the maximum radius shall be 100 times the nominal pipe OD.

**5. Blocking and Anchoring of Ductile Iron Pipe**

All plugs, caps, tees, bends and other thrust points shall be provided with reaction backing, or movement shall be prevented by attachment of suitable restraining devices, in accordance with the requirements listed below and the Standard Details.

- a. All horizontal bends, plugs, caps and branch tees shall be provided with concrete buttresses.
- b. For 16" and smaller diameter, precast concrete blocks may be used in lieu of cast in place concrete when used in conjunction with "Mega-lug" joint restraints. Precast blocks shall be stepped out as installed to provide similar surface area as the cast in place thrust blocks. Use of "Mega-lug" restraints only without blocking is only acceptable if adjacent pipe is restrained as described below.
- c. All vertical bends exceeding 11-1/4 degrees deflection shall be provided with concrete buttress blocking at the low points with metal tie rod or strapping restraints at the high points.
- d. Offset bends made with standard offset fittings need not be strapped or buttressed, unless installed in combination with another fitting.

All necessary fittings, bands, tie rods, nuts, and washers, and all labor and excavation required for installation of reaction restraints shall be furnished by the Contractor at his expense and without direct compensation.

Concrete blocking shall be at least 2 inches nominal thickness.

Concrete buttresses shall be poured against firm, undisturbed ground and shall be formed in such a way that the joints will be kept free of concrete and remain accessible for repairs. The concrete mix used in buttress construction shall meet the requirements for Type 3 Grade B of MN/DOT 2461. Buttress dimensions shall be as indicated on the Standard Detail Drawing.

All metal parts of tie rod or strap type restraints shall be galvanized.

"Megalug" joint restraints by Ebba Iron, Inc., or Uni-Flange Series 1400 "Block Buster" by Ford, may be substituted for rodding and blocking. Retainer (set screw type) glands may not be used in lieu of approved restraints or buttresses. "Megalug" and "Blockbuster" restraints may only be used on ductile iron pipe and shall not be used on any existing cast iron pipe.

When using "Megalug" type restraints in lieu of blocking, the pipe shall be restrained in each direction from the fitting a sufficient distance to prevent joint separation upstream or downstream. The minimum length of restrained pipe required shall be as shown on the contract drawings or as specified in Special Provisions. If no minimum length for restrained joints is specified, the Contractor shall submit the restrained joint calculations to the Engineer for review prior to construction or restrain a minimum of 42 feet in each direction.



6. Blocking of HDPE Pipe

All plugs, caps, tees, bends and other thrust points shall be provided with concrete blocking if there is an unstrained joint within 42 feet of the thrust point. Blocking is not required when all joints within 42 feet are restrained.

When required, concrete blocking shall be install per the Standard Details.

7. Locating Wire

Locating (tracer) wire shall be installed on all HDPE pressure sewers, force mains and services in accordance with section 2503/2504 LOCATING WIRE FOR WATER AND SEWER.

8. Electrical Continuity in Ductile Iron Pipe

Provisions shall be made to insure electrical continuity between all joints, fittings, and valves. Two serrated brass wedges shall be inserted for 3 inch to 12 inch push-on joints on ductile iron pipe or cable bond may be used. Four wedges per joint shall be used for larger pipe. Continuity for mechanical joints may be provided using copper clips inserted in the gasket by the manufacturer, armored tipped gaskets, copper strap, or cable bond. Megalug joint restraints shall not be used for electrical continuity.

9. Connection and Assembly of Joints

a. General

Where rubber gasketed joints are specified, care shall be taken during the laying and setting of piping materials to ensure that the units being joined have the same nominal dimension of the spigot outside diameter and the socket inside diameter. A special adaptor shall be provided to make the connection when variations in nominal dimension might cause unsatisfactory joint sealing.

Immediately before making the connection, the inside of the bell or socket and the outer surface of the spigot ends shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter. Insertion of spigot ends into the socket or bell ends shall be accomplished in a manner that will assure proper centering and insertion to full depth. The joint seal and securing requirements shall be as prescribed below for the applicable pipe and joint type.

b. Push-On Joints

The circular rubber gasket shall be flexed inward and inserted in the gasket recess of the ball socket. A thin film of approved gasket lubricant shall be applied to either the inside surface of the gasket or the outside surface of the spigot end, or to both. Care shall be taken while inserting the spigot end to prevent introduction of contaminants. The joint shall be completed by forcing the spigot end to the bottom of the socket by the use of suitable pry-bar or jack type equipment. Spigot ends which do not have depth marks shall be marked before assembly to insure full insertion. Field cut pipe shall be filed or ground at the spigot edge to resemble the manufacturer's fabricated detailing.

c. Mechanical Joints

The last eight inches of the outside spigot surface and the inside bell surface of each pipe and appurtenance joint shall be painted with a soap solution after being thoroughly cleaned. The gland shall then be slipped on the spigot end with the lip extension toward the socket or bell end. The rubber gasket shall be painted with soap solution and be placed on the spigot end with the thick edge toward the gland. An approved lubricant provided by the pipe manufacturer may be used in lieu of the soap solution.

After the spigot end is inserted into the socket to full depth and centered, the gasket shall be pressed into place evenly around the entire joint. After the gland is positioned behind the gasket, all bolts shall be installed and the nuts tightened alternately to the specified torque, such as to produce equal pressure on all parts of the gland.

Unless otherwise specified, the bolts shall be tightened by means of a suitable torque-limiting wrench to within a foot-pound range of: 45 to 60 for 5/8" bolts; 75 to 90 for 3/4" bolts; 100 to 120 for 1" bolts, and 120 to 150 for 1-1/4" bolts.

6-ounce zinc anode caps conforming to ASTM B-418 shall be installed on the bolts on all mechanical joint fittings.

d. Qualifications for Joining HDPE Sewer Pipe

Before being permitted to make joints on the HDPE water main pipe, all joiners shall be qualified and successfully complete a qualification test as required in accordance with Qualifications for Joining PE Pipe, of the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe.

e. Fusion Joining of HDPE Sewer Pipe

All HDPE water main pipe and fittings shall be joined by butt fusion or electrofusion procedures as specified in the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe. Water branch or tap service pipe of any diameter shall be joined by butt fusion.

Unless otherwise directed by the pipe manufacturer's recommendations, the heating tool surface temperature must be minimum 400°F to 450°F maximum.

10. Pipe Support Spacing

Contractor shall provide pipe supports as necessary to adequately support exposed piping. At a minimum, one support shall be provided for every 4 feet of PVC pipe installed or one for every 10 feet of steel or ductile pipe installed, at each direction change and at each valve.

**11. Pressure Gauge Installation**

Pressure gauges shall be installed on each City-owned pump discharge within the valve vault or as shown on the Contract Drawings. Provide an isolation ball valve at each installation to allow for gauge removal.

**12. Pressure Sewer Service Installation**

Pressure sewer service facilities consisting of 1 ¼ service lines, complete with all required appurtenances, shall be installed as required by the Contract, in accordance with all pertinent requirements for main line installations together with the provisions hereof.

It shall be the responsibility of the Contractor to keep work exposed so the Engineer may obtain an accurate record of the location, depth and size of each service connection and other pertinent data such as the location of curb stops and pipe endings.

Pressure sewer service lines shall normally be installed by trenching or directional drilling and be subject to the same requirements as prescribed for the main pipeline installation, except for those which may not be pertinent or applicable. Where water service lines are installed alongside of pressure sewer services, installation shall be such as to maintain the minimum specified clearances between pipelines and provide proper and adequate bearing for all pipes and appurtenances.

Unless otherwise specified, installation of pressure sewer service lines shall be such as to provide for not less than seven feet of cover over the top of the pipe and for not less than 18 inches of clearance between pipelines. Also, at least three inches of clearance shall be maintained in crossing over or under other structures except that 12-inches shall be maintained when crossing water mains. Where the service pipe may be exposed to freezing due to insufficient cover or exposure from other underground structures, the pipe shall be insulated as directed by the Engineer.

HDPE pressure sewer service piping shall be installed in one piece without intermediate butt fusion or electrofusion joint couplings between the tapping tee with electrofusion saddle at the pressure sewer and the curb stop. Transition couplings shall be used to connect to the curb stop.

Connection of HDPE pressure sewer service lines to the pressure sewer shall be made with an approved tapping tee with electrofusion saddle on HDPE mains.

Unless otherwise indicated, service lines shall be installed on a straight line at right angles to the pressure sewer or property lines as directed by the Engineer. Service lines shall extend for such distance beyond the curb stop as may be specified in the Contract. In the absence of specific requirements, the service line shall be terminated at the curb stop, where it shall be connected to an existing line or, in the case of undeveloped property, capped or plugged, as approved by the Engineer.

The service pipe and curb stop coupling depth shall be such as to maintain not less than the specified minimum cover and provide for a standard service box installation where practicable. Curb stop shall be set on a concrete block. The service box shall be threaded over the curb stop coupling. Service boxes shall be installed plumb and be braced effectively to remain vertical during and after completion of backfilling. The service boxes shall be brought to existing surface grade when the final grade has not been established. When the final grade has been established, the Contractor shall extend the service box to finished grade.

**13. Furnish and Install Gate Valve and Box**

This work shall consist of furnishing and installing a gate valve and valve box in accordance with the applicable MN/DOT Standard Specifications, the current Standard Practices and Specifications of the City of Hermantown as detailed in the Plan, and the following: Prior to installation, the valve shall be cleaned of all foreign matter. A 5-pound (minimum) magnesium anode shall be attached to MJ bolt for all valves as shown in the standard details. 6-ounce zinc anode caps conforming to ASTM B-418 shall be installed on the bolts on all mechanical joint fittings.

**14. Testing Pressure Sewer and Forcemain and Service**

Pressure sewer and forcemains shall be subjected to the pressure and leakage tests prescribed herein and in conformance with the pipe manufacturer's recommendations. The Contractor shall furnish the pump, pipe connections, gauges, and measuring equipment, and shall perform the testing under the direct observation of the Engineer.

The Contractor may test each valved section, larger sections, or the entire pressure sewer or forcemain so long as the elevation differential between the highest and lowest point does not exceed 110 feet.

All air must be expelled from the pipe. A hydrostatic pressure of not less than 150 pounds per square inch, measured at the lowest point of elevation, shall be applied by means of a pump connected to the pipe in a satisfactory manner.

For ductile iron mains, pressure shall be maintained for a minimum duration of 2 hours. No drop-in pressure will be allowed for acceptance of the main. Any defective joints, pipe, fittings, or valves revealed during the testing, or before final acceptance of the work, shall be satisfactorily corrected and the test shall be repeated until the specified requirement has been met.

For flanged pipe, no visible leakage shall be allowed during the test.

For HDPE mains, fill the main slowly ensuring fill rate does not exceed capacity of air release devices. Once air has been expelled from the system, gradually raise the pressure to 160 psi. Add makeup water as necessary to maintain this pressure as necessary for 4 hours. After 4-hour period, reduce main pressure to the 150-

psi test pressure and monitor for 1 hour. Do not increase pressure or add make-up water during this one-hour period. The test is passed and considered acceptable if the main pressure does not drop more than 5% (7.5 psi) during the 1-hour period. The connection of pressure sewer services to HDPE pressure sewers with an electrofusion corp saddle and corporation stop or a tapping tee with electrofusion saddle shall be soap tested and tested with air and accepted if it maintains 100 psig for 5 minutes. Accepted electrofusion corp saddle or tapping tee with electrofusion saddle can then be tapped to the main and the tap or punch tee cap reinstalled. Pressure sewer pipes shall be pressure tested either jointly or separately from pressure sewer main testing. Test pressure shall be 150 psi.

**15. Electrical Continuity Test**

For ductile iron pipe systems, the Contractor shall perform a continuity test between hydrants or any accessible point of the backfilled system. If the test shows no continuity, the Contractor shall find and repair the broken circuit. Megalug joint restraints shall not be used for electrical continuity.

For HDPE pipe systems, the Contractor shall perform a continuity test on all tracer wire after installation of pipe. If the test shows no continuity, the Contractor shall find and repair the broken tracer wire.

Pipe that fails to meet continuity requirements above will be considered unacceptable and no payment will be made.

**C. Method of Measurement**

All items will be measured separately according to the Pay Item name and as detailed and defined in the Contract Drawings, Specifications, standard details or Special Provisions. Pipe will generally be designated by size (nominal diameter), strength class, kind or type, and laying conditions. Complete-in-Place items shall include all component parts thereof as described or required to complete the unit, but excluding any excesses covered by separate Pay Items.

**1. Pressure Sewer, Pressure Sewer Service or Forcemain**

Mainline pipe and service pipe of each kind and size will be measured separately per linear foot by the overall length along the axis of the pipeline, from beginning to end of each installation and without regard to intervening valves or specials. Terminal points of measure will be the spigot or cut end, base of hub or bell end, center of valves, intersecting centers of tee or wye branch service connections, and center of main to center of curb stop. Linear measurement of piping will include the running length of any special fitting (tees, wyes, bends, gates, etc.) installed within the line of measure between specified terminal points. No additional measurement will be made for extra pipe installed due to extra depth required for direction drilling applications.

**2. Valves**

Valves of each size and type will be measured separately per each as complete units, including the required valve box setting.

3. HDPE Tapping Tee with Electrofusion Saddle

HDPE tapping tee and electrofusion corp saddle of each size and type will be measured separately per each by the number of complete units installed.

4. HDPE Service Tees

This work shall consist of furnishing and installing service tees in the Pressure Sewer Pipe in accordance with the applicable provisions of MN/DOT 2503.

Measurement will be made by the number of each size tee furnished and installed as specified.

Payment for tee of each size will be made under item 2503.602 at the Contract price per each, which shall be compensation in full for all costs of furnishing and installing the tee complete in place as specified.

5. Tracer Boxes

Tracer Boxes of each type will be measured separately per each by the number of complete units installed.

6. Air Vents

Air vents of each type and size will be measured separately per each by the number of complete units installed, including the required manhole or valve box setting.

7. Access Structures

Access structures, such as Manholes and Vaults, will be measured for payment separately per each, except when included as a component part of an air vent. When applicable, measurement will be by the number of complete individual units installed of each type and design, including the required manhole or vault castings, and covers.

8. Pressure Sewer and Forcemain Fittings

All fittings for pressure sewer and forcemain installations shall be incidental to pipe installation and no measurement shall be made.

D. Basis of Payment

Payment for Pressure Sewer and Forcemain of each size and kind at the appropriate Contract prices per linear foot of installation shall be compensation in full for all costs of furnishing and installing the pipe complete in place as specified, including all costs of pipe installation as may not be specifically covered under other Contract Items. All costs of pipeline leakage testing, pipe jointing materials, dead facilities, blocking and anchorage materials, and other work necessary for installation of pipe as specified shall be included for payment as part of the pipe item, without any direct compensation being made thereafter.

Payment will be made under Item 2503.503 (size) DIP Forcemain at the contract bid price per linear foot which shall be compensation in full for all costs of furnishing and

installing ductile iron forcemain between the locations shown on the Contract Drawings, including all materials, labor, equipment, ductile iron forcemain pipe, appurtenances, zinc anode caps, excavation, bedding, encasement materials, placing and compacting backfill, testing, and incidentals.

Payment will be made under Item 2503.503 (size) HDPE Pressure Sewer or Forcemain SDR 11 at the contract bid price per linear foot which shall be compensation in full for all costs of furnishing and installing HDPE pressure sewer or force main between the locations shown on the Contract Drawings, including all materials, labor, equipment, HDPE pressure sewer or forcemain pipe and fittings, appurtenances, HDPE by MJ adapters, HDPE to cast iron transition couplings, zinc anode caps, locating wire, excavation, bedding, encasement materials, placing and compacting backfill, testing and incidentals. All costs of furnishing and installing electrofusion flex restraints on the HDPE pressure sewer or forcemain shall be considered incidental to the main. No payment shall be made for pipe with a tracer wire that has not passed the continuity test.

Payment will be made under Item 2503.503 (size) HDPE SDR 11 Pressure Sewer Service Pipe at the Contract bid price per foot, which shall be compensation in full for all labor and equipment necessary to complete the work as described herein including excavation, bedding, encasement materials, placing and compacting backfill, and tracer wire for HDPE pressure sewer service pipe. No payment shall be made for pipe with a tracer wire that has not passed the continuity test.

Payment will be made under Item 2503.502 (size) Tapping Tee with Electrofusion Saddle at the Contract bid price per each, which shall be compensation in full for all material, labor and equipment necessary to complete the work as described herein including tapping the pressure sewer, furnishing and installing the connection fitting on the main and butt fusing the HDPE pressure sewer service pipe to the tapping tee with electrofusion saddle.

Payment will be made under Item 2503.502 (size) Pressure Sewer Curb Stop and Box at the Contract bid price per each, which shall be compensation in full for all materials, labor and equipment necessary to install the curb box and furnish and install the curb stop and any transition fittings necessary to connect new HDPE pressure sewer service pipe to the curb stop.

Payment will be made under Item 2503.502 (size) Gate Valve and Box at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto to furnish and install the gate valve and valve box complete and in place, including but not limited to the gate valve and valve box, blocking, MJ to HDPE adapters, 5 lb. anode bag, zinc anode caps, and crushed stone. No additional payment will be made for valves installed where new mains are deeper than the minimum depth.

**2503/2504    LOCATING WIRE FOR WATER AND SEWER**

A.    Materials

1.    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.

2.    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 30 mil HDPE insulation thickness.

Trace wire – 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.

3.    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.

4.    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.

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). Access points shall be similar or equal to Cobra Hydrant Flange Package, two-terminal by Copperhead Industries.

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.

## **5. 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.

B. Installation

1. 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)

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.

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.

2. 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.

3. 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.

4. Storm Sewer System

This section shall apply to all plastic storm sewer systems.

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.

C. 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

D. Testing

All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the contractor, engineer and facility owner as applicable, prior to acceptance of ownership.

This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.

Continuity testing in lieu of actual line tracing shall not be accepted.

**2504 WATER MAIN AND SERVICE LINE INSTALLATION**

This work shall consist of the construction of water main and building service pipelines utilizing plant fabricated pipe and other appurtenant materials, installed for conveyance of potable water.

All references to Specifications of AASHTO, ASTM, ANSI, AWWA, etc. shall mean the latest published edition or supplement available on the date of advertisement for bids.

HDPE pipe and fittings shall be used for all new construction of public utilities. Ductile iron pipe and fittings shall only be used as approved by the city engineer and the public works director.

A. Materials

1. General Requirements

All materials required for this work shall be new material conforming to requirements of the referenced specifications for the class, kind, type, size, grade and other details indicated in the Contract. Unless otherwise indicated, all

required material shall be furnished by the Contractor. If any options are provided for, as to type, grade or design of the material, the choice shall be limited as may be stipulated in the Contract Drawings or Specifications.

All manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Contract Drawings. Otherwise, the City may require advance approval of material suppliers, product design, or other unspecified details as it deems desirable for maintaining adopted standards.

All pipe furnished for water main and service installations shall be of the type, kind, size and class indicated for each particular line segment as shown on the Contract Drawings and designated in the Contract Items. Wherever connection of dissimilar materials or designs is required, the method of joining and any special fittings employed shall be subject to approval of the Engineer.

**2. Ductile Iron Pipe**

Ductile Iron Pipe shall conform to the latest requirements of ANSI A-21.51 ANSI/AWWA C151/A-21.51. In addition, the pipe shall comply with the following supplementary provisions:

- a. All pipe shall be furnished with cement mortar lining meeting the latest requirements of ANSI A-21.4 ANSI/AWWA C104/A-21.4-08 for standard thickness lining. All interior surfaces of the pipe shall have an asphaltic coating at least one mil thick.
- b. The exterior of the pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m<sup>2</sup> of pipe surface area. A finishing layer asphaltic topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils. The coating system shall conform in every respect to ISO 8179-1 "Ductile iron pipes – External zinc based coating – Part 1: Metallic zinc with finishing layer. Second edition 2004-06-01.
- c. All pipe shall be furnished with push-on type joints conforming to ANSI/AWWA C111/A-21.11 unless specified otherwise in the Special Provisions or shown on the contract drawing.
- d. When specified in the Special Provisions or shown on the Contract Drawings, joints shall be boltless, flexible, push-on restrained joint such as Flex-Ring by AMERICAN, or TR Flex by US PIPE. Field adaptable restrained joints may be provided through the use of Field Flex-Ring restraints by AMERICAN.
- e. Where shown on the Contract Drawings, flange joints shall be provided. Flanges shall be standard AWWA C115/A21.15lb threaded on flanges for 250 psi operating pressure. Bolt on flanges such as Uni-flange or Mega-flange may not be substituted for flanged pipe.
- f. All pipe shall be furnished in 18 or 20-foot nominal lengths.
- g. Minimum ANSI thickness class furnished shall be Class 52 for all pipe through 16" pipe. For pipes larger than 16" the appropriate class shall be called out in the Special Provisions. Above grade flanged pipe shall be class 53.
- h. Pipe shall be provided with provisions to maintain electrical continuity for

thawing and locating purposes.

- i. A Certificate of Compliance shall be furnished stating that the materials furnished have been tested and are in compliance with the requirements of this Specification.

3. Ductile Iron Fittings

Fittings shall conform to the latest requirements of ANSI A-21.10 ANSI/AWWA C110/A-21.10-08 (Gray Iron and Ductile Iron Fittings), or ANSI/AWWA C153/A-21.53 (Ductile Iron Compact Fittings), all with ductile iron glands and cement lining.

- a. Buried fittings shall be mechanical joint with rubber gaskets.
- b. Exposed fittings shall be flanged conforming to ANSI B16.1, Class 125 and have full face gaskets.
- c. Exposed fittings shall be shop primed for painting.
- d. Fittings shall be provided with provisions to maintain electrical continuity.
- e. Fittings shall be manufactured in North America or preapproved by the City Engineer.
- f. Mechanical joint bolts shall be as specified elsewhere in this section
- g. When specified in the Special Provisions or shown on the Contract Drawings, buried fittings shall be boltless, flexible, push-on restrained joint fittings such as Flex-Ring by AMERICAN, or TR Flex by US PIPE. Field adaptable restrained joints may be provided through the use of Field Flex-Ring restraints by AMERICAN.

4. HDPE Pipe

HDPE pipe and fittings shall only be used as approved by the city engineer and the public works director.

- a. Water main and service pipe 4 inches and greater shall be polyethylene pipe conforming to ASTM 3035 and AWWA C906-15, Polyethylene (PE) Pressure Pipe and Fittings, 4" through 63", for Water Distribution. Pipe furnished shall be approved for potable water and marked to indicate so with a continuous blue stripe. Pipe shall be PE4710, HDPE Pressure Class 200, SDR 11, at 73 deg. F. and have outside diameters similar to ANSI A-21.51 ductile iron pipe. Joints shall be butt heat fusion type, ASTM F2620. Ends shall be plain for butt fusion joining as specified in the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe.
- b. Water main and service pipe less than 4-inch shall be polyethylene pipe conforming to the requirements of AWWA C901, current edition, "Polyethylene (PE) Pressure Pipe and Tubing, 1 In. (13 mm) Through 3 In. (76 mm), For Water Service" and ASTM D2239 or D3035. Pipe shall be PE4710,

DR 11, shall have a minimum working pressure of 200 psi at 73 deg. F. and have outside diameters similar to iron pipe size. Joints shall be butt heat fusion type, ASTM F2620. Joints may be socket fused type for service pipes 3 inches and smaller. Ends shall be plain for butt fusion joining as specified the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe.

- c. Pipe shall be new or stored for a period of time that does not exceed the manufacturer's recommended maximum period of exposure, regardless of the method of storage.
- d. The DR number and pressure rating specified above shall be considered a minimum. Provide stronger class pipe if required by loads imposed by directional drilling pulling operation or pipe bursting. Shop drawings for HDPE pipe must specify minimum allowable pipe deflection radius.
- e. Reference Standards - American Society for Testing and Materials  
(ASTM) ASTM D638 – Tensile Method for Tensile Properties of Plastics  
ASTM D790 – Test Materials for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials  
ASTM D3035 – Polyethylene (PE) Plastic Pipe (DR-PE) Based on Controlled Outside Diameter  
ASTM D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene Plastic Pipe and Tubing  
ASTM D3350 – Polyethylene Plastic Pipe and Fittings Material  
ASTM F714 – Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter  
ASTM F2206 – Fabricated Fittings of Butt-Fused Polyethylene Plastic Pipe, Fittings, Sheet Stock, Plate Stock or Block Stock.  
ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

5. HDPE Fittings

HDPE pipe and fittings shall only be used as approved by the city engineer and the public works director

- a. Water main and service fittings for pipe 4 inches and greater shall be polyethylene pipe conforming to ASTM 3035 and AWWA C906-15, Polyethylene (PE) Pressure Pipe and Fittings, 4" through 63", for Water Distribution. Fittings shall be PE4710, HDPE Pressure Class 200, SDR 11, at 73 deg. F. and have outside diameters similar to ANSI A-21.51 ductile iron pipe. Fittings shall be butt heat fusion type, ASTM F2620. Ends shall be plain for butt fusion joining as specified in the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe.

- b. Water main and service fittings for pipe less than 4-inch shall be polyethylene pipe conforming to the requirements of AWWA C901, current edition, "Polyethylene (PE) Pressure Pipe and Tubing, 1 In. (13 mm) Through 3 In. (76 mm), For Water Service" and ASTM D2239 or D3035. Fittings shall be PE4710, DR 11, shall have a minimum working pressure of 200 psi at 73 deg. F. and have outside diameters similar to iron pipe size. Fittings shall be butt heat fusion type, ASTM F2620. Ends shall be plain for butt fusion joining as specified the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe. All fittings shall be molded polyethylene fused-type suitable for use on iron pipe size (DIPS) HDPE pipe.
- c. All fittings for 4 inch through 12-inch pipe, must be molded if a molded fitting is available including all 45 degree elbows, 90 degree elbows and tees. If a molded fitting is not manufactured, then a fabricated fitting may be used. All 8 x 6 reducers shall be molded or machined. Other size reducers may be fabricated. All fabricated fittings shall be rated for a minimum operating pressure of 200 psi. All fabricated fittings shall be equivalent diameter ratio 11 full inside diameter (EDR-11, full ID). Fabricated 90 degree elbows shall have a minimum of 4 sections. Fabricated 45 degree elbows shall be 2 sections. Fabricated fittings shall be manufactured by Plasson USA, George Fischer Central Plastics or ISCO. All other brands of fabricated fittings shall be submitted to the City Engineer for pre-approval a minimum of 2 weeks prior to any bids. The City reserves the right to reject a fabricated fitting based solely upon an on-site inspection due to poor workmanship or questionable pressure rating.
- d. All fittings for 3 inch and smaller pipe shall be molded. All fittings shall be rated for 200 psi.
- e. Fittings shall be new or stored for a period of time that does not exceed the manufacturer's recommended maximum period of exposure, regardless of the method of storage.
- f. HDPE by MJ Adapters shall be manufactured by Central Plastics Company or equal. The adapter shall comply with AWWA C906 and be manufactured for use on pipe conforming to ASTM D2513, D3035 and F-714. The adapter shall be molded from a PPI and NSF listed pre-blended virgin resin in accordance with the material specifications listed in ASTM D3350 with a cell classification of 445574C and be compatible for heat fusion with any pipe manufactured from a like or similar resin. Adapters shall be tested according to ASTM D1599 and ASTM D1598. HDPE Adapters shall be sized for use with ductile iron pipe size HDPE pipe. Adapters shall be used for all transitions from HDPE to valves, hydrants or ductile iron pipe. All adapters used on pipe larger than 12-inch in diameter shall have a 316-stainless steel stiffener. MJ Adapters for use with butterfly valves shall be designed and shop fabricated not to interfere with valve operation so that the valve can be fully opened. Hand beveling or tapering of MJ adaptors in the field will not be allowed. Mechanical joint



bolts shall be as specified elsewhere in this section.

g. Reference Standards - American Society for Testing and Materials

(ASTM) ASTM D638 – Tensile Method for Tensile Properties of Plastics

ASTM D790 – Test Materials for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM D3035 – Polyethylene (PE) Plastic Pipe (DR-PE) Based on Controlled Outside Diameter

ASTM D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene Plastic Pipe and Tubing

ASTM D3350 – Polyethylene Plastic Pipe and Fittings Material

ASTM F714 – Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter

ASTM F2206 – Fabricated Fittings of Butt-Fused Polyethylene Plastic Pipe, Fittings, Sheet Stock, Plate Stock or Block Stock.

ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

6. HDPE Electrofusion Fittings

All electrofusion fittings shall be manufactured by Plasson USA, George Fischer Central Plastics Company or ISCO, and the following

- a. Electrofusion Transition Service Saddle with Threaded Brass Insert and Tapping Tees with Electrofusion Saddle shall conform to the requirements for HDPE Pipe and Fittings as specified. The electrofusion transition service saddles shall be suitable for the installation of corporation stops as specified.
- b. Couplings used for water mains and services (4 inches and larger) shall be electrofusion type. Couplings used for services (3 inches and smaller) shall be electrofusion or socket fused type.
- c. Electrofusion flex restraints, for use as an attachment component for use where in line concrete thrust restraint is called for on the plan, shall be suitable for the size of pipe intended.
- d. Any other brand of electrofusion fittings shall be submitted to the City Engineer for pre-approval a minimum of 2 weeks prior to any bids. Regardless of any pre-bid approvals or subsequent shop drawing approvals, the City reserves the right to reject any electrofusion fitting (including damages due to poor handling, storage, or workmanship) based solely upon appearance noted during an on-site inspection.

7. Transition Couplings

a. Cast Transition Couplings – 4” through 12”

Cast transition couplings shall be furnished with ductile iron sleeves, ductile iron followers and Cor-ten or similar low corrosion bolts 316 stainless steel

bolts. Gaskets shall be natural or synthetic vulcanized rubber recommended for water system use. The finish shall be fusion bonded epoxy meeting ASTM C213. Couplings shall have a size range to connect cast iron to cast iron or cast to ductile iron, or ductile iron to ductile iron as necessary for the application. Estimated pipe outside diameters are shown in the table below. Latter dimension is maximum for pit cast end requirement. Contractor shall verify all pipe dimensions prior to ordering couplings. All couplings shall be rated for 250 psi minimum.

4"	4.80" to 5.10"
6"	6.90" to 7.20"
8"	9.05" to 9.45"
10"	11.10" to 11.50"
12"	13.20" to 13.50"

Couplings shall be similar or equal to JCM 210, Ford FC1, Viking Johnson Style 110 Smith Blair 441, JCM 210, Ford FC1, Krausz Hymax, Romac Macro HP, or approved equal.

b. Cast Transition Couplings – 16"

Cast transition couplings (16" size) shall meet the above requirements. Estimated pipe diameters for transition are 17.40" cast or ductile iron pipe to 17.80" cast iron pipe. Contractor shall verify all pipe dimensions prior to ordering couplings. Minimum working pressure shall be 150 psi. Couplings shall be Smith Blair 441 or 433 or Ford FC1 Smith Blair 441 or Ford FC2 or approved equal.

c. Steel Transition Couplings

Steel transition couplings (18" CI through 48" CI) shall be rated for 150 PSI working pressure. Components shall consist of a steel sleeve and follower coated with 12 mils of 3M epoxy #206N. Bolts shall be 316 stainless steel. Gasket shall be Grade 30 rubber. The couplings shall be designed to connect ductile iron pipes to old cast iron pipes, sizes as follows:

Nominal Pipe Size	Ductile Iron O.D.	Cast Iron O.D. (Range)
18"	19.50" to	19.50" – 19.92"
20"	21.60" to	21.60" – 22.06"
24"	25.80" to	25.80" – 26.32"
36"	38.30" to	37.96" – 38.70"
42"	44.50" to	44.20" – 44.50"
48"	50.80" to	50.50" – 50.80"

More than one gasket shall be furnished if necessary to allow connection over the entire cast iron O.D. range. If the gaskets furnished are not interchangeable for all the connection pipe size, then each gasket must be

clearly labeled or its container labeled to indicate its applicable pipe O.D. range.

Couplings shall be JCM 203, Rockwell #413 or approved equal.

d. Transition Couplings for HDPE Main

The HDPE to cast iron or ductile iron transition couplings shall be furnished and installed from new HDPE pipe to existing pipe. The transition couplings shall be Smith Blair model 441 or equal. HDPE pipe stiffeners shall also be provided and installed to prevent compression of the HDPE pipe. Pipe stiffeners shall be Smith Blair or equal. Stiffeners shall be designed to prevent over insertion. This transition coupling shall only be used where approved by the Engineer.

Transition couplings 2-inch and smaller shall consist of HDPE by flared brass connections or threaded stainless steel connections. Stainless steel transitions shall include a compression ring with o-ring seal and shall be used with an adapter from threaded to flare. Adapters shall have a pressure rating equal to that of the mating pipe. HDPE shall be plain end for butt fusing. Coupling shall be manufactured by Poly-Cam, Central Plastics, Inc. or equal.

e. Restrained Couplings

Restrained couplings for use in joining like or unlike pipe materials shall be Romac Alpha Wide Range Restrained Joint couplings or Alphas XL or equal in sizes 4" through 12". All cast components (end rings, center ring, grippers and bolt guides) shall be ductile iron, meeting or exceeding the requirements of ASTM A536, grade 65-45-12. Grippers shall be machine sharpened and heat treated. Gaskets shall be nitrile butadiene rubber compounded for water and sewer service in accordance with ASTM D2000, NSF61 certified. Ramp runners shall be reinforced nylon. All bolts and nuts shall be 316 stainless steel with anti-galling protection. Center ring shall be fusion bonded epoxy in accordance with AWWA C213 and NSF 61 certified. Couplings shall be rated for a working pressure of 350 psi. Coupling shall be used where shown on the contract drawings for cast iron, ductile iron, or HDPE pipe.

8. Bell Joint Leak Clamps (3" through 36")

Clamps shall fit AWWA sand cast pipe classes A, B, C, and D and centrifugally cast pipe diameters. Bell and spigot rings shall be ductile iron, Cor-Ten or similar low corrosion type bolts (All bolts and nuts shall be 316 stainless steel with anti-galling protection.), with gaskets suitable for water service. Bell joint leak clamps shall not be installed on new mains.

9. Band Type Repair Clamps

Clamps shall be single band full circle type with a gridded, tapered, overlapping Buna-N Grade 60 gasket designed for repair of water mains. Clamp shall have a

stainless-steel band and bridge plate, ductile iron glands, and 316 stainless steel bolts spaced not more than 2.5 inches c-c. Provisions shall be provided for electrical continuity which will withstand a 10 minute-400-amp current (water filled pipe condition) with no harmful effects. This specification is for band clamps ranging in size from 2" through 16" and widths approximately 7-1/2" to 15". Clamp shall be Rockwell #225, #238, or approved equal Smith Blair 226-00090515, PowerSeal Model 3121 Range C or Ford F1-939-15. All other models must be approved prior to bidding by the City Engineer. Band Type Repair Clamps must fit the following O.D. range:

Pipe Size	Steel OD (In.)	Ductile or Cast Iron OD (In.)
2"	2.35 – 2.63	-
3"	3.36 – 3.60	3.73 – 4.00
4"	4.45 – 4.73	4.80 – 5.10
6"	6.56 – 6.96	6.90 – 7.20
8"	8.54 – 8.94	8.99 – 9.39
10"	10.64 – 11.04	11.10 – 11.40
12"	12.60 – 13.00	13.20 – 13.50
16"	-	17.13 – 17.90

10. Tapping Sleeves

a. Tapping Cast Iron, Ductile Iron or Steel Mains

(4" though 10" tap on 6" through 30" cast iron, ductile iron or steel mains) Sleeves shall conform to AWWA C223 and consist of two sections of heavy welded stainless steel (Type 316) which bolt together on a main pipe and seal against a full encirclement gasket. Flange shall be AWWA C207 Class D, ANSI 150 pound AWWA C228 Class SD, ANSI 175 pound (sizes up to 12") or ANSI 150 pound (sizes greater than 12") suitable for mating to a standard mechanical joint gate valve. Outlet body shall have a 3/4 inch NST test plug. Fitting shall be Type 316 stainless steel. Bolts and nuts shall be Type 316 stainless steel. Fitting shall be similar or equal to Rockwell 622 or Ford FTSC PowerSeal 3490MJ tapping sleeve or JCM 452 tapping sleeve and in the sizes and O.D. ranges specified.

b. Tapping HDPE Mains

Sleeves shall conform to AWWA C223 and consist of two sections of heavy welded stainless steel (Type 316) which bolt together on a main pipe and seal against a full encirclement gasket. Flange shall be AWWA C228 Class SD, ANSI 175 pound (sizes up to 12") or ANSI 150 pound (sizes greater than 12") suitable for mating to a standard mechanical joint gate valve. Outlet body shall have a 3/4 inch NST test plug. Fitting shall be 316 stainless steel. Bolts and nuts shall be Type 316 stainless steel. Fitting shall be similar or equal to JCM model 452 tapping sleeve (currently no other product is considered

equal for use with HPDE main pipe without field testing by City of Hermantown).

The size of the tap pipe shall be restricted to a maximum of two-thirds of the size of the HDPE main pipe, except that a 6" tap on 8" HDPE main will be acceptable.

Stainless steel tapping sleeves for HDPE pipe shall ONLY be used where approved by the City Engineer.

11. Fire Hydrants

Fire Hydrants shall be Waterous Pacer WB-67 conforming to the requirements of AWWA C502 and the following supplemental requirements:

- a. Main Valve Opening – 5 1/4 inches nominal diameter.
- b. Bury Depth – 7 ½ feet measured from the bottom of the branch pipe connection to the finished ground line at the hydrant.
- c. Upper Standpipe Length – 22 inches or 16 inches.
- d. Nozzles – One pumper nozzle, City of Hermantown Standard thread; and two hose nozzles, 2 1/2 inch (ID), with National Standard Fire Hose Coupling Screw Threads.
- e. Hydrant operating mechanisms shall be provided with Buna-N "O" ring seals preventing entrance of moisture.
- f. The exterior of the hydrant base shall be supplied with a fusion bonded epoxy coating.
- g. Connection shall be a 6-inch mechanical joint with an anchoring tee, tapping tee or tee complete with gland, Cor-Ten or similar low corrosion type bolts, and harnessing lugs. 6-ounce zinc anode caps conforming to ASTM B-418 shall be installed on the bolts on all mechanical joint fittings.
- h. Operating and nozzle cap nuts shall be a pentagon, 1-1/2 inches point to face. Operating nut shall have an O-ring or seal ring to keep water and dirt from entering the bonnet. Opening shall be counterclockwise.
- i. Design of hydrant shall allow for removal of the main and waste valve seats without excavating or disturbing the ground.
- j. Portions of City owned hydrants above the ground line shall be primed and painted chrome yellow. Privately owned hydrants shall be primed and painted blue. Coating below the ground line shall be according to standards.
- k. A traffic flange and operating rod coupling shall be located not more than 2 inches above the ground line and be designed so that in the event of an accident or breaking of the hydrant above the ground line, the main valve will remain closed.
- l. Lower flange on the nozzle section shall be the swivel type.
- m. Hydrants shall be provided with an outlet for drainage in the base or barrel, or between the base and barrel, and those outlets shall be plugged.
- n. All hydrant bolts and nuts below grade shall be 316 stainless steel.
- o. Mechanical joint bolts shall be as specified elsewhere in this section.

- p. Hydrant Markers shall Hy-viz or approved equal and meet the following general requirements: 1) rods shall be 60" tall UV resistant fiberglass; 2) springs shall be zinc plated or type 304 stainless steel; 3) base plates shall be zinc plated steel, type 304 stainless steel, or powder coated steel "top-mount" bracket; and 4) marker shall be high visibility fluorescent orange with white reflective band.

**12. Valves**

Valve sizes ten inches (10") and smaller shall be gate type. Valves twelve inches (12") and larger shall be butterfly type exclusively. All valves shall be made in the North America.

**13. Gate Valves (10" and smaller only)**

Gate valves shall be manufactured and furnished in accordance with an approved pattern and shall conform to the requirements of AWWA C509 or C515 for resilient seated gate valves, and all gate valves must meet such supplementary requirements as may be stipulated in the Contract Drawings or Special Provisions and the provisions hereof.

Unless otherwise specified, the valves furnished shall comply with the following supplementary requirements.

- a. All gate valves shall have a working pressure rating of 350 psi.
- b. Gate valves shall be solid disc with resilient seating.
- c. The wedge shall be ductile iron and fully encapsulated with EPDM rubber.
- d. All valves shall be furnished with triple O-Ring stem seals. The O-Rings above the thrust collar shall be fully replaceable with the valve "open" and under full pressure. A third O-ring shall be provided below the thrust collar.
- e. Valves shall have a two-inch square operating nut opening counter-clockwise.
- f. All valves shall be of the non-rising stem type.
- g. Each valve shall have mechanical joint ends or fusible HDPE stubs of the same pipe diameter and SDR as the main. MJ joints shall be complete with gasket, gland, and bolts. Bolts or valve flange shall be provided with means for preventing the bolt from slipping in the slotted holes.
- h. The exterior of the valve shall be supplied with a fusion bonded epoxy coating.
- i. All exposed bolts on the valve, including stuff box and bonnet bolts shall be 316 stainless steel.
- j. Mechanical joint bolts shall be as specified elsewhere in this section.
- k. Valves shall be manufactured by American Flow Control, Clow, Waterous, Mueller, or equal. All "or equal" valves shall be preapproved by the City Engineer prior to bidding. All valves shall be made in North America. Shop drawings for gate valves shall include a statement attesting to their country of origin.

- l. Gate valve box adapters shall be ¼ inch steel adapter and ¾ inch neoprene gasket. The steel adapter shall be coated with polyurethane protective coating. Adapters shall be manufactured by Adaptor, Inc.

14. Butterfly Valves (12" and larger sizes only)

Butterfly valves shall conform to the requirements of AWWA C504, Class 250B and all butterfly valves must meet such supplementary requirements as may be stipulated in the Contract Drawings or Special Provisions and the provisions hereof.

Unless otherwise specified, valves furnished shall comply with the following supplementary requirements:

- a. All butterfly valves shall have a working pressure rating of 350 psi.
- b. Manual actuator equipped with standard 2-inch square operating nut, split V type or O-ring stem seal and enclosed in a lubricating gear box. For buried installations, valves shall be equipped with a side-mounted actuator designed to accept a valve box. Valves shall be permanently lubricated with no packing adjustment.
- c. Valve disc shall be cast iron conforming to ASTM 126, Class B or ASTM A48, Class 40, alloy cast iron conforming to ASTM A436 or A439, or ductile iron conforming to ASTM A536.
- d. Valves shall open counter-clockwise.
- e. The exterior of the valve shall be supplied with a fusion bonded epoxy coating.
- f. Valves shall be furnished with mechanical joint ends.
- g. All exposed bolts, screws, washers or nuts on the valve shall be 316 stainless steel.
- h. Mechanical joint bolts shall be as specified elsewhere in this section.
- i. Valves shall be manufactured by Clow, Waterous, Mueller or equal. All "or equal" valves shall be preapproved by the City Engineer prior to bidding. All valves shall be made in North America. Shop drawings for butterfly valves shall include a statement attesting to their country of origin.

15. Valve Boxes

Valve Boxes shall be 5 1/4" cast iron screw-type, consisting of the following parts:

Cover	Stay-put type, "WATER" cast thereon, with solid edges (no grooves or flutes on edge)
Top Section	26" length
Extension Section	30" length
Bottom Section	30" length
Base	#6 Round Base

All parts must be interchangeable with Bingham and Taylor #4906 and Tyler #6860. Valve box assemblies shall be manufactured in Northern America or preapproved by the Engineer.

Water valve pavement adjustment rings shall be ESS Brothers pavement adjustment ring or equal. Rings shall be cast iron.

16. Copper Pipe and Fittings

- a. Copper pipe less than 3 inches in nominal diameter shall conform to the requirements of ASTM B88 for Seamless Copper Water Tube, Type K, Soft Annealed temper.
- b. Fittings for Copper Tubing shall be “No-Lead Brass”, having uniformity in wall thickness and strength, and shall be free of defects affecting serviceability. No-Lead Brass shall not contain more than nine one hundredths of one percent (0.09% or less) total lead content by weight. All brass fittings shall meet ANSI/NSF Standard 61. All threads for underground service line fittings shall conform to the requirements of AWWA C800. Unless specified, the fittings furnished shall comply with the following requirements:
  - 1) Quarter (90°) bend corporation stop couplings and eighth (45°) bend corporation stop couplings shall be Mueller H-15068 and H-15063 respectively, or an approved equal. Couplings shall be provided with an inside copper service flare thread on one end and a copper tube flare nut on the other end.
  - 2) Three-part union couplings for connecting copper tubing to copper tubing shall be Mueller H-15400 or an approved equal. Couplings shall be provided with copper tube flare nuts on both ends.
  - 3) Pack joint straight couplings for connecting copper tubing to copper tubing if specified, shall be Ford C44-XX (as appropriate for the required size) or an approved equal. Both ends of couplings shall be pack joints, with split clamp joint nuts with 316 stainless steel set screws.

17. Corporation Stops

Corporation Stops shall be Mueller H-15000 Mueller 300 series, Ford F600 series or an approved equal. Inlet connection shall be a male tap end and shall have Mueller (cc) tapered threads conforming to AWWA Standard. Outlet connection shall be a copper service thread straight coupling connection suitable for use with ASTM B88 Type K copper service tubing and shall be provided with a copper tube flare nut.

18. Curb Stops

Curb Stops shall be quarter turn check, Minneapolis Pattern thread top, with AWWA standard flared copper pipe connections on both ends. Where threaded connections are necessary for HDPE adapters, a flare by threaded adapter shall be used. Curb stops shall be Mueller B-25154N, Ford B22 series, or approved equal.



19. Curb Boxes

Curb Box shall be magnetized tracer box style as specified in 2503/2504 LOCATING WIRE FOR WATER AND SEWER, furnished and installed by the Contractor. Iron pipe for curb box shall be supplied by the City and installed by the Contractor as shown on the Standard Details.

20. Mechanical Joint Bolts

All mechanical joint bolts and nuts used on all buried fittings, valves and hydrants shall be high strength, low-alloy, corrosion resistant, Cor-Ten or similar low corrosion or stainless steel bolts. Bolts shall meet or exceed ASTM A 588 Grade E and AWWA C111. Nuts shall meet or exceed ASTM A563 Grade C3 and AWWA C111. Bolts and nuts shall also have a base zinc plating and a coating of Xylan 1424 polytetrafluoroethylene (PTFE) dry film coating and lubricant. Anode caps shall also be installed as specified below.

21. Zinc Anode for Corrosion Protection

A 12-pound (minimum) zinc anode, packaged in backfill bag and lead wire, shall be attached to an MJ bolt for all fittings, valves, and hydrants as shown in the standard detail W-11.

A 5-pound (minimum) zinc anode, packaged in backfill bag and lead wire, shall be attached to a brass clamp provided on all copper water service pipes as shown in the standard detail W-5.

Anode shall be composed of LME Grade Zinc, Super High-Grade Zinc, or High-Grade Zinc conforming to ASTM B-418 Type II alloy standard. The anode shall be packaged in a low resistance backfill mixture (gypsum) bag and supplied with 10 feet of #12 solid copper lead wire that is connected to galvanized steel core by manufacturer.

22. Magnesium Anode for Locating (Tracer) Wire Continuity

A 1 pound (minimum) magnesium anode shall be provided at all dead ends on tracer wire, and/or at 500 feet maximum intervals. Refer to section 2503/2504 Locating Wire for Water and Sewer elsewhere in this standard.

23. Anode Bolt Caps

Zinc anode bolt caps shall be 6 ounce conforming to ASTM B-418. All MJ bolts shall have anode caps installed.

24. Polystyrene Insulation

Closed cell foam insulation shall be high-load insulation with a compressive strength of 40 PSI.

B. Construction Requirements

1. General Provisions

Requirements for site clearing, excavation, preparing trench, backfilling and restoration are contained in 2451 EXCAVATION, BACKFILL, AND COMPACTION FOR UTILITIES of these specifications and the State of Minnesota Department of Transportation "Standard Specifications for Construction" current edition, and shall govern the execution of work where the specifications therein are not in conflict with more specific requirements contained in this section, the Standard Details, Contract Drawings or the Special Provisions.

All horizontal directional drilling shall be performed in accordance with (2503) HORIZONTAL DIRECTIONAL DRILLING of these specifications.

2. Handling and Inspection

Proper and adequate 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. Unloading, distribution and storage of pipe and appurtenant materials on the job site shall be as approved by the Engineer. All materials shall be handled carefully, as will prevent damage to protective coatings, linings, and joint fittings; preclude contamination of interior areas; and avoid jolting contact, dropping, or dumping.

Before being lowered into laying position, the Contractor shall make a thorough visual inspection of each pipe section and appurtenant units to detect damage or unsound conditions that may need corrective action or be cause for rejection. Inspection procedure shall be as approved by the Engineer, with special methods being required as he deems necessary to investigate suspected defects more definitely. The Contractor shall inform the Engineer of any defects discovered and the Engineer will prescribe the required corrective actions or order rejection. Any HDPE pipe with scratches, cuts or scrapes deeper than 10% of the wall thickness shall not be used unless the damaged section is cut out.

Immediately before placement, the joint surfaces of each pipe section and fitting shall be inspected for the presence of foreign matter, coating blisters, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair as needed.

Store pipe on level surface. Pipe may be placed in pyramidal stacks provided the number of courses recommended by manufacturer is followed and pipe is chocked on each side to prevent roll out of the layers. Cover pipe ends to prevent dirt, debris, wildlife and weather from entering. HDPE pipe stored for more than 3 weeks should be covered for protection from sunlight and weather.

Do not dump pipe from conveyance. Unload pipe 12 inch (300 mm) and smaller by hand with ropes and skids. Unload pipe larger than 12 inch (300 mm) or pipe

bundles with mobile unloading equipment. Use wide slings for hoisting large pipe with boom trucks, cranes or lifts. Reinforced web slings are acceptable; chains, wire ropes or fiber ropes are not acceptable slings. Use of hooks for unloading is also unacceptable.

3. Pipe Laying Operations

Trench excavation and bedding preparations shall proceed ahead of pipe placement as will permit proper placement and joining of the pipe and fittings at the prescribed grade and alignment without unnecessary hindrance. All mainline watermain shall have a minimum 7.5' of bury depth except when on a dead end in which case the watermain shall have a minimum 8' of bury depth. Every reasonable precaution shall be taken to prevent foreign materials from entering the pipe and fittings while they are

being placed in the line. The water main materials shall be carefully lowered into laying position by the use of suitable restraining devices. Under no circumstances shall the pipe be dropped or dumped into the trench.

At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connection, but they shall be no larger than would be adequate. No pipe material shall be laid in water nor when the trench or bedding conditions are otherwise unsuitable or improper. Unless otherwise permitted by the Engineer, bell and spigot pipe shall be laid with the bell ends facing in the direction of laying.

When placement or handling precautions prove inadequate, in the Engineer's opinion, the Contractor shall provide and install suitable plugs or caps effectively closing the open ends of each pipe section before it is lowered into laying position, and they shall remain so covered until removal is necessary for connection of an adjoining unit.

As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material, which shall be thoroughly compacted around the pipe. The joint areas shall remain exposed and precautions shall be taken to prevent the soil from entering the joint space, until the joint seal is affected.

At all times when pipe laying is not in progress, including noon hour and overnight periods, all open ends of the pipe line shall be closed by watertight plugs or other means approved by the Engineer. If water is present in the trench, the seals shall remain in place until the trench is pumped completely dry.

**4. Aligning and Fitting of Pipe**

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe and so as to leave a smooth square-cut end. Cast iron or ductile iron pipe shall be cut with approved mechanical cutters. The electric-arc cutting method, using carbon or steel rod, will be approved for use on the larger size pipe where mechanical cutters are not available. Flame cutting will not be allowed under any conditions. All rough edges shall be removed from the cut ends of pipe and, where rubber gasket joints are used, the outer edge shall be rounded or beveled by grinding or filing to produce a smooth fit.

When necessary to deflect the pipe from a straight line either in the vertical or horizontal plane, to avoid obstructions, or produce a long radius curve, the amount of deflection allowed at each joint shall not exceed the allowable limits established in the following tables:

MAXIMUM PERMISSIBLE DEFLECTION IN LAYING PUSH-ON JOINT FOR DUCTILE IRON PIPE					
Pipe Size	Max. Angle	MAX OFFSET PER PIPE		Approx. Minimum Radius	
		18' length	20' length	18' length	20' length
3" to 12"	5°	19"	21"	205'	230'
16" to 24"	3°	11"	12"	340'	380'
30" to 36"	2°	7.5"	8"	510'	570'

MAXIMUM PERMISSIBLE DEFLECTION IN LAYING MECHANICAL JOINT FOR DUCTILE IRON PIPE			
Pipe Size	Max. Angle	MAX. OFFSET PER PIPE	
		18' length	20' length
4"	8.3°	31"	35"
6"	7.1°	27"	30"
8" to 12"	5.3°	20"	22"
16"	3.5°	13"	15"
18" & 20"	3.0°	11"	12"
24" & 30"	2.3°	9"	10"
36"	2.0°	8"	9"

Connection and assembly of joints shall be accomplished during the setting, aligning and fitting operations, in accordance with the provisions of this specification to the extent that the jointing requirements will permit.

HDPE pipe may be deflected at a maximum radius of 25 times the nominal pipe OD. When a fitting or connection is present, the maximum radius shall be 100 times the nominal pipe OD.

5. Blocking and Anchoring of Ductile Iron Pipe

All plugs, caps, tees, bends and other thrust points shall be provided with reaction backing, or movement shall be prevented by attachment of suitable restraining devices, in accordance with the requirements listed below and the Standard Detail Drawing.

- a. All horizontal bends, plugs, caps and branch tees shall be provided with concrete buttresses.
- b. For 16" and smaller diameter, precast concrete blocks may be used in lieu of cast in place concrete when used in conjunction with "Mega-lug" joint restraints. Precast blocks shall be stepped out as installed to provide similar surface area as the cast in place thrust blocks. Use of "Mega-lug" restraints only without blocking is only acceptable if adjacent pipe is restrained as described below.
- c. All vertical bends, except welded steel joints, exceeding 11-1/4 degrees deflection shall be provided with concrete buttress blocking at the low points with metal tie rod or strapping restraints at the high points.
- d. Offset bends made with standard offset fittings need not be strapped or buttressed, unless installed in combination with another fitting.

All necessary fittings, bands, tie rods, nuts, and washers, and all labor and excavation required for installation of reaction restraints shall be furnished by the Contractor and included in the contract unit price for the pipe installation.

Concrete blocking shall be at least 2 inches nominal thickness.

Concrete buttresses shall be poured against firm, undisturbed ground and shall be formed in such a way that the joints will be kept free of concrete and remain accessible for repairs. The concrete mix used in buttress construction shall meet the requirements for Concrete Mix No. 3G52 of MN/DOT 2461. Buttress dimensions shall be as indicated on the Standard Details.

All metal parts of tie rod or strap type restraints shall be galvanized.

"Megalug" joint restraints by Ebba Iron, Inc., or Uni-Flange Series 1400 "Block Buster" by Ford, may be substituted for rodding and blocking. Retainer (set screw type) glands may not be used in lieu of approved restraints or buttresses. "Megalug" and "Blockbuster" restraints may only be used on ductile iron pipe and shall not be used on any existing cast iron pipe.

When using "Megalug" type restraints in lieu of blocking, the pipe shall be restrained in each direction from the fitting a sufficient distance to prevent joint separation upstream or downstream. The minimum length of restrained pipe

required shall be as shown on the contract drawings or as specified in Special Provisions. If no minimum length for restrained joints is specified, the Contractor shall submit the restrained joint calculations to the Engineer for review prior to construction or restrain a minimum of 42 feet in each direction for pipes 12 inches and smaller in diameter.

6. Blocking of HDPE Pipe

All plugs, caps, tees, bends, and other thrust points shall be provided with concrete blocking if there is an unstrained joint within 42 feet of the thrust point. Blocking is not required when all joints within 42 feet are restrained or fused. When required, concrete blocking shall be installed per the Standard Details.

7. Locating Wire

Locating (tracer) wire shall be installed on all plastic water mains and services in accordance with section 2503/2504 LOCATING WIRE FOR WATER AND SEWER.

8. Electrical Continuity in Ductile Iron Pipe

Provisions shall be made to ensure electrical continuity between all joints, fittings, and valves. Continuity for mechanical joints may be provided using copper clips inserted in the gasket by the manufacturer, copper strap, or cable bond. Megalug joint restraints shall not be used for electrical continuity.

9. Connection and Assembly of Joints

a. General

Where rubber gasketed joints are specified, care shall be taken during the laying and setting of piping materials to ensure that the units being joined have the same nominal dimension of the spigot outside diameter and the socket inside diameter. A special adaptor shall be provided to make the connection when variations in nominal dimension might cause unsatisfactory joint sealing.

Immediately before making the connection, the inside of the bell or socket and the outer surface of the spigot ends shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter. Insertion of spigot ends into the socket or bell ends shall be accomplished in a manner that will assure proper centering and insertion to full depth. The joint seal and securing requirements shall be as prescribed below for the applicable pipe and joint type.

No open ends of water main pipe will be allowed for more than one hour on any pipe section. Caps shall be mechanically attached to the end of the pipe. Taping and bagging the end of the pipe will not be allowed. The Contractor shall weight the pipe as necessary to prevent floatation.

b. Push-On Joints

The circular rubber gasket shall be flexed inward and inserted in the gasket recess of the ball socket. A thin film of approved gasket lubricant shall be applied to either the inside surface of the gasket or the outside surface of the spigot end, or to both. Care shall be taken while inserting the spigot end to prevent introduction of contaminants. The joint shall be completed by forcing the spigot end to the bottom of the socket by the use of suitable pry-bar or jack type equipment. Spigot ends which do not have depth marks shall be marked before assembly to insure full insertion. Field cut pipe shall be filed or ground at the spigot edge to resemble the manufacturer's fabricated detailing.

c. Mechanical Joints

The last eight inches of the outside spigot surface and the inside bell surface of each pipe and appurtenance joint shall be painted with a soap solution after being thoroughly cleaned. The gland shall then be slipped on the spigot end with the lip extension toward the socket or bell end. The rubber gasket shall be painted with soap solution and be placed on the spigot end with the thick edge toward the gland. An approved lubricant provided by the pipe manufacturer may be used in lieu of the soap solution.

After the spigot end is inserted into the socket to full depth and centered, the gasket shall be pressed into place evenly around the entire joint. After the gland is positioned behind the gasket, all bolts shall be installed and the nuts tightened alternately to the specified torque, such as to produce equal pressure on all parts of the gland.

Unless otherwise specified, the bolts shall be tightened by means of a suitable torque-limiting wrench to within a foot-pound range of: 45 to 60 for 5/8" bolts; 75 to 90 for 3/4" bolts; 100 to 120 for 1" bolts, and 120 to 150 for 1-1/4" bolts.

d. Qualifications for Joining HDPE Water Main Pipe

Before being permitted to make joints on the HDPE water main pipe, all joiners shall be qualified and successfully complete a qualification test in the City of Duluth as required in accordance with the Qualifications for Joining PE Pipe, of the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe.

e. Fusion Joining of HDPE Water Main and Service Pipe

All HDPE water main pipe and fittings shall be joined by butt fusion or electrofusion procedures as specified in the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe. Water branch or tap service pipe of any diameter shall be joined by butt fusion except where approved by the Engineer.

Socket couplings may also be used on tap service pipe where approved the Engineer. Unless otherwise directed by the pipe manufacturer's recommendations, the heating tool surface temperature must be minimum 400°F to 450°F maximum.

The use of electrofusion couplings shall be minimized. Electrofusion couplings may not be installed directly on HDPE fittings. All fittings must have a minimum of 2'-0" stub of HDPE pipe butt fused directly to the fitting prior to installation of an electrofusion coupling. Use of an alignment clamp is required for installation of ALL electrofusion couplings. On 12" and larger HDPE pipes, rounding clamps must be used for installation of ALL electrofusion couplings AND prior to electrofusion, ALL couplings shall be checked with a feeler gauge to ensure the gap between the coupler and the pipe is within the manufacturers tolerance.

HDPE pipe shall be prepared prior to fusing by use of an approved peeler. Paint scrapers, wood rasp or together similar device shall NOT be used. The peeler shall remove a strip of material between 0.007" and 0.014" thick. The total cumulative thickness of material removed shall not exceed 0.04" when multiple passes are made with the peeler.

All electrofusion joining shall be completed in accordance with the "MAB Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe" available from the Plastic Pipe Institute web site.

10. Connect to Existing Water Main

This work consists of connecting the new water main to the existing water main, including locating the existing water main and furnishing and installing the proper fittings and adapters or transition couplings needed to make a complete connection. All new water main extensions shall be connected with a wet tap at the existing main.

11. Water Service Installation

a. General Provisions

Water service lines, complete with all required appurtenances, shall be installed as required by the Contract, in accordance with all pertinent requirements for main line installations together with the provisions hereof.

Installation of service lines shall be in accordance with the Standard Detail Drawing(s), the applicable requirements of these construction standards, and the project Special Provisions.

It shall be the responsibility of the Contractor to keep work exposed so the Engineer may obtain an accurate record of the location, depth and size of



each service connection and other pertinent data such as the location of curb stops and pipe ends.

Water service lines shall normally be installed by trenching and be subject to the same requirements as prescribed for the main pipeline installation. Where water service lines are installed alongside of sanitary, or storm sewer service lines, installation shall be such as to maintain the minimum specified clearances between pipelines and provide proper and adequate bearing for all pipes and appurtenances. Subject to minimum clearances, the water service may be laid in a common trench excavated principally for sewer installation, either by widening the trench as necessary or by providing a shelf in the trench wall where ground stability will permit.

Water service lines may be laid directly on any solid foundation soil that is relatively free of stones and hard lumps. However, when specified or ordered, aggregate materials shall be furnished and placed as necessary to secure proper foundation drainage, pipe covering, or backfill support.

Water service lines shall be installed to provide a minimum 7 feet of cover over the top of the pipe AND provide minimum separation distance from other pipes and structures in accordance with the current edition of the 'Recommended Standards for Water Works' published by Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (also commonly referred to as '10 states standards'). In no case shall the water service line be installed with less than 6 inches of clearance to another structure. Where the service pipe may be exposed to freezing due to insufficient cover or exposure from other underground structures, the water pipe shall be insulated as directed by the Engineer.

Water service lines shall be installed on a straight line at right angles to the water main or property lines as directed by the Engineer. Unless otherwise specified, the service line shall be terminated at the curb stop, where it shall be connected to an existing line or, in the case of undeveloped property, capped or plugged at the right of way line, as approved by the Engineer.

Reconnecting existing water service shall be required when installing a new water service and connecting it to an existing water main. The contractor shall confirm the size of each existing water service and provide necessary fittings to adapt from the new service pipe to the existing service pipe.

b. Service Pipe

Minimum pipe size for service installations shall be 1-inch nominal diameter for copper pipe, or 1-inch nominal diameter for HDPE pipe. Larger size pipe will be specified for commercial and industrial tap service and for some domestic service as specifically identified.

Seamless copper service piping of 1-inch to and including 1-1/4 inches in diameter shall be installed in one piece without intermediate joint couplings between the corporation stop at the water main tap and the curb stop. Larger pipe may be furnished in standard cut-lengths of 20 feet or longer and be joined with approved couplings, provided that the installation of pipe less than full standard length in any run be limited to the needs for closure. All pipe and appurtenances shall be joined by means of approved flared type threaded couplings. The flaring of copper tubing ends shall be accomplished only with the use of proper size and type of tools as designed for the purpose, such as will provide accurate sizing and rounding of the ends. Tubing shall be cut squarely and all roughness shall be removed prior to flaring. All couplings shall be tightened securely, so the flared end fits snugly against the bevel of the fitting without leakage. The flared joint couplings shall be made up without the use of joint compound.

High Density Polyethylene (HDPE) service piping of 1 inch to and including 3 inches in diameter shall be installed in one piece without intermediate butt fusion, socket or electrofusion joint couplings between the main and the curb stop transition. For HDPE service pipe 4 inches and larger in diameter, the pipe may be furnished in standard cut-lengths of 40 feet or longer, provided that the installation of pipe less than full standard length in any run be limited to the needs for closure. All pipe and appurtenances shall be joined by means of butt fusion.

c. Service Connections to Main

Connection of seamless copper service lines to ductile iron water main shall be made with an approved corporation stop and saddle. Connection of seamless copper service lines to HDPE main shall be made with an approved electrofusion corp saddle and corporation stop. The water main tap shall be made at an angle of not more than 45 degrees from the horizontal. Service pipe may have a 45-degree bend connected to the corporation stop to bring the pipe to horizontal.

Connection of 2" and smaller HDPE service lines to HDPE water main 12" or smaller shall be made with an approved tapping tee with electrofusion saddle. Connection of 2" and smaller HDPE service lines to HDPE water main larger than 12" shall be made with an approved branch saddle. Connection of 3" and larger HDPE service lines to the HDPE water main of all sizes shall be made with branch saddle or tee.

The water main tap shall be made at an angle of 90 degrees from the horizontal. The service pipe shall be butt fused to the tap fitting.

On HDPE main pipe 12" and larger, rounding clamps must be used for installation of all electrofusion saddles AND prior to electrofusion, all saddles

shall be checked with a feeler gauge to ensure the gap between the saddle and the pipe is within the manufacturers tolerance.

Tapping of HDPE mains shall be performed using only an approved tapping tool designed specifically for the purpose of tapping HDPE pipe. Use of an electric drill with paddle bits or hole saws with serrated teeth for tapping is not allowed.

d. Curb Stop

The service pipe and curb stop coupling depth shall be such as to maintain not less than the specified minimum cover and provide for a standard service box installation where practicable. Curb stop shall be set on a concrete block. The service box shall be threaded over the curb stop coupling. Service boxes shall be installed plumb and be braced effectively to remain vertical during and after completion of backfilling. The service boxes shall be brought to existing surface grade when the final grade has not been established. When the final grade has been established, the Contractor shall extend the service box to finished grade.

The Contractor will furnish all materials except for the iron pipe for curb box stand pipes and caps (if necessary), which will be furnished by the City of Hermantown Public Works Department. The Contractor shall be responsible for picking up the iron pipe at the City of Hermantown Public Works Department facility located at 4971 Lightning Drive.

e. Coordination of Water Service Disruption

The Contractor shall notify property owners of the upcoming water service shutdown at least 24 hours prior to the shutdown.

12. Setting of Valves, Hydrants, Fittings and Specials

a. General

Valves, hydrants, fittings and specials shall be provided and installed as required by the Contract Drawings, Standard Details and Special Provisions, with the exact locations and setting being as directed by the Engineer, and with each installation being accomplished in accordance with the requirements for installation of mainline pipe to the extent applicable. Support blocking, reaction backing, and anchorage devices shall be provided as required by the Standard Details and this specification.

Hydrants shall be installed plumb, with the height and orientation of nozzles as shown in the Contract Drawings or as directed by the Engineer. Unless otherwise specified, the hydrants shall be connected to the mainline pipe with 6-inch diameter branch pipe, controlled by an independent gate valve, and tied back to the tee with a hydrant holding tee or rodding as shown on the Standard Details.

All hydrants and valves shall have a minimum 12-pound bare zinc anode attached to one of the mechanical joint bolts.

Valve boxes shall be centered over the wrench nut of the valve and set on a valve box adapter bracket, and be installed plumb, with the box cover 3/8" below the surface of the finished pavement or at such other level as may be directed. Valve boxes shall not be installed so as to transmit shock or stress to the valve.

Masonry valve pit structures for valves, air vents or meters shall be constructed in accordance with the Standard Detail Drawing or plan details and with the applicable provisions of MN/DOT 2506.

Drainage branches, blow-offs, air vents, and other special appurtenances shall be closed with approved plugs or caps and shall be equipped with suitable blow-off facilities when specified.

All mechanical joint bolts used on all buried fittings, valves and hydrants shall have stainless steel, epoxy coated, or similar low corrosion bolts and nuts and 6-ounce zinc anode caps conforming to ASTM B-418.

The Contractor shall close the hydrant valve, install an end cap on the main and remove the hydrant and valve box.

This work shall consist of relocating hydrants after extending the hydrant leads as shown on the Contract Drawings or at a location outside of the roadbed as directed by the Engineer.

All additional materials furnished under this specification shall be new and like in kind to that in place.

Prior to installation, the hydrant, gate valve, fitting, and all related piping shall be cleaned of all foreign matter and after installation shall be disinfected in accordance with the procedures described in paragraphs No.'s 1227 and 1228 of Section XII "Manual of Water Supply Sanitation" of the Minnesota Department of Health.

b. Hydrant

This work shall consist of furnishing and installing a hydrant after extending the hydrant lead as shown on the Contract Drawings or at a new location outside the roadbed as directed by the Engineer. The work shall be performed in conformance with the applicable provisions of MN/DOT Standard Specifications and the current Standard Practices and Specifications of the City of Hermantown. Hydrant construction requiring a

new connection at the water main shall be performed by the Contractor. The Contractor shall furnish all materials and perform all piping work related to the new connection at the water main.

Where specified in the Plans, and prior to reinstalling, the hydrant drain valve shall be plugged if it is currently open and a tag affixed which states "NO DRAIN – Pump After Using."

c. Butterfly Valve or Gate Valve and Box

This work shall consist of furnishing and installing a butterfly valve or gate valve and valve box in accordance with the applicable MN/DOT Standard Specifications, the City of Hermantown Construction Standards, and as detailed in the Plan.

13. Adjust Valve Box

This work shall consist of adjusting existing water valve boxes to new surface elevations without changing the elevation of the valves.

- No adjusting rings shall be used unless approved by the Engineer. Adjustments shall be made prior to placing the final surfacing course unless otherwise approved by the Engineer.
- Pavement adjustment rings will only be allowed on pavement overlay projects where approved by the engineer. Where used on projects, only one may be used per valve box. All pavement adjustment rings shall be glued into place with a manufacturer recommended adhesive. The Contractor shall measure all valve boxes to determine the appropriate size of each adjustment ring.

When bituminous wearing course is to be held over to the next construction season, all valve boxes shall be adjusted to conform to 3/8 inch below the adjacent interim surface of the bituminous base or binder course prior to winter suspension.

14. Disinfection of 4 inch to 12 inch Ductile Iron Water Mains

Water mains 4" to and including 12" shall have chlorine tablets fixed in each pipe. While the water main is being laid, Calcium Hypochlorite tablets shall be attached to the inside top of each pipe using inorganic adhesive equal or similar to Permatex No. 1. Number of tablets per pipe segment shall be according to the table below to obtain at least a 25-ppm solution.

Pipe Length	Number of 5-Gram Tablets Required*				
	Diameter of Pipe				
	4"	6"	8"	10"	12"
Less than 13'	1	1	1	2	3
18'	1	1	2	3	4
20'	1	1	2	3	4

\*Based on 3.25 grams of available chlorine per tablet.

All pipe and fittings which must be disinfected prior to installation shall be thoroughly swabbed and brushed with a 1% hypochlorite (chlorine) solution or undiluted household bleach.

Procedure for Disinfection and Testing shall be as follows:

- a. Contractor shall fill the main under the direct observation of the Inspector or Engineer after notifying the Public Works Department. Filling shall proceed slowly and stop when water begins to come out the end. Contractor shall provide a tap if the end of the main is not accessible. Do not flush test. Filled main shall sit for 24 hours to allow chlorine to work, or 48 hours if water is less than 41°F.
- b. Contractor shall flush main, hydrant branches, and any Blow-offs under the direct observation of the Inspector or Engineer. Department will arrange to have the City take chlorine test when flushing begins, and a bacteria-turbidity sample when flushing is complete.
- c. Upon passing a bacteria-turbidity test, the Contractor may arrange for a pressure test. The order of the bacteriological test and then the pressure test may be reversed only if the new section is completely disconnected from the city water system.
- d. Engineer will order main opened to system only after bacteria-turbidity test and pressure test pass. At all times prior to this, the new main shall be isolated by valving or other means except for filling, flushing, or taking samples. To insure against possible non-flow contact to the water system, it shall always be necessary to open the hydrant or blow-off before allowing system water to enter the new section.
- e. In the case of failed tests, the City reserves the right to charge the Contractor for water loss and retesting.

15. Cleaning and Disinfection of HDPE Water Mains

Prior to disinfection and testing, all HDPE water mains shall be pigged with a new foam pig to remove dirt, HDPE chips, curls and shavings. Water mains and branch lines less than 100 feet in length and water services are exempt from the pigging requirement, but the pipe shall be cleaned by other methods approved by the Engineer.

Procedure for disinfection shall be in accordance with AWWA C651-Section 5.2 whereby a constant feed of chlorine solution is introduced into the main while it is filled with water at a constant rate. When at least 25 ppm chlorine is measured at the opposite end, the chlorine feed shall be stopped and the solution be allowed to set in the pipe for at least 24 hours. The approximate amount of chlorine bleach required is summarized in the table below.

nominal pipe diameter	actual pipe diameter for HDPE DIPS SDR 11	gallons of water per 100 feet of pipe	gallons of bleach per 100 feet of pipe
4	3.876	61	0.03
6	5.571	127	0.06
8	7.305	218	0.10
10	8.961	328	0.16
12	10.656	463	0.22
Gallons of bleach are based upon an assumed 5.25% chlorine bleach concentration and a target concentration of 25 ppm.			

16. Alternate Disinfection Procedures

When conditions preclude disinfection stated above, the Contractor may use the alternate procedure for disinfecting mains and branch services which consists of thoroughly swabbing pipe and brushing fittings with a 1% hypochlorite solution prior to installation. This method will only be considered acceptable with the prior written approval of the Engineer.

17. Testing Water Main and Services

City of Hermantown will flush up to 2 times at no expense to the owner or contractor. Any necessary flushes beyond 2 will be billed at current retail rate.

a. Bacteriological Test

Sampling and testing for bacteria will be performed by the City. A test result will be provided after both 24 and 48 hours. Both tests must be passed. The Contractor shall be responsible for re-chlorination of the water main in the event the test result fails.

b. Pressure and Leakage Test

Following a passing bacteria test, the water mains shall be subjected to the pressure and leakage tests prescribed herein and in conformance with the pipe manufacturer's recommendations. The Contractor shall furnish the pump, pipe connections, gauges, and measuring equipment, and shall perform the testing under the direct observation of the Engineer.

The order of the bacteriological test and then the pressure test may be reversed only if the new section is completely disconnected from the city water system.

The Contractor may test each valved section, larger sections, or the entire water main so long as the elevation differential between the highest and lowest point does not exceed 110 feet.

All air must be expelled from the pipe. A hydrostatic pressure of not less than 150 pounds per square inch, measured at the lowest point of elevation, shall

be applied by means of a pump connected to the pipe in a satisfactory manner. Higher pressures may be specified in the project's Special Provisions.

The pump water container, and water used shall be disinfected prior to injecting water into the section of main.

For ductile iron mains, pressure shall be maintained for a minimum duration of 2 hours. No drop-in pressure will be allowed for acceptance of the main.

For HDPE mains, fill the main slowly ensuring fill rate does not exceed capacity of air release devices. Once air has been expelled from the system, gradually raise the pressure to 160 psi. Add makeup water as necessary to maintain this pressure as necessary for 4 hours. After 4-hour period, reduce main pressure to the 150-psi test pressure and monitor for 1 hour. Do not increase pressure or add make-up water during this one hour period. The test is passed and considered acceptable if the main pressure does not drop more than 5% (7.5 psi) during the one hour period.

Any defective joints, pipe, fittings, valves, or hydrants revealed during the testing, or before final acceptance of the work, shall be satisfactorily corrected and the test shall be repeated until the specified requirement has been met.

Unless otherwise specified, services shall be tested for pressure and leakage by inspection of all exposed joints while under system pressure.

If specified for pressure testing, Service pipe may be tested at the time of the pressure test of the main, at the Contractor's option. Pressure testing of service pipes may also be completed as a separate operation from main pressure testing by applying a test pressure of 150 PSI.

The connection of services to HDPE water mains with an electrofusion corp saddle and corporation stop or a tapping tee with electrofusion saddle shall be soap tested and tested with air and accepted if it maintains 100 psi for 5 minutes. Accepted electrofusion corp saddle or tapping tee with electrofusion saddle can then be tapped to the main and the tap or punch tee cap reinstalled.

c. Electrical Continuity Test

For ductile iron pipe systems, the Contractor shall perform a continuity test between hydrants or any accessible point of the backfilled system. If the test shows no continuity, the Contractor shall find and repair the broken circuit. Megalug joint restraints shall not be used for electrical continuity.



For HDPE pipe systems, the Contractor shall perform a continuity test on all tracer wire after installation of pipe. If the test shows no continuity, the Contractor shall find and repair the broken tracer wire.

Pipe that fails to meet continuity requirements above will be considered unacceptable and no payment will be made.

d. Retesting

In the case of failed tests, the City reserves the right to charge the Contractor for retests and water loss.

18. HDPE Water Main Repairs on Existing Ductile Iron or Cast Iron Pipe

Where it is deemed convenient and appropriate to repair an existing water main with HDPE pipe, the following applies:

- a. All materials must meet the requirements of this Standard;
- b. For pipe repair length less than 10 feet, a tracer wire is NOT required;
- c. For a pipe repair length between 10 feet to 40 feet, provide tracer wire with one small (1 pound) anode stakes at each end of the repair and do not bring the tracer wire to grade;
- d. For a pipe repair length greater than 40 feet, provide tracer wire and one tracer box at each end of the repair and connect tracer wires to tracer boxes set at grade;
- e. For HDPE pipe repairs to existing cast iron hydrant leads, tracer wire is not required; and
- f. Whenever practical, pipe repairs (regardless of length) should be field located with 'survey grade' GPS equipment to update utility system maps.

C. Method of Measurement

Measurement for reconnecting a new water service to an existing water service will be measured per each by the number services reconnected.

Measurement for connecting to existing water main will be measured per each by the number of acceptable connections.

Hydrants will be measured per each by the number of complete units installed.

Hydrant relocation will be measured by the number of hydrants relocated as specified. Hydrant Assembly installation will be measured per each by the number of complete hydrant assemblies installed.

Adjusting existing valve boxes will be measured per each by the number of boxes adjusted.

Corporation stops of each size and type, except when already included under the Electrofusion Transition Service Saddle and Corporation Stop bid item, will be measured per each by the number of complete units installed.

Electrofusion transition service saddle and corporation stops of each size and type will be measured per each by the number of complete units installed.

Tapping tees with electrofusion saddle of each size and type will be measured per each by the number of complete units installed.

Curb stops and box of each size and type will be measured per each by the number of complete units installed.

Valves of each size and type will be measured separately per each as complete units, including the required valve box setting.

Tracer boxes of each type will be measured per each by the number of complete units installed.

Blow-off valve and fittings will be measured per each by the number of complete units installed, including the required manhole or vault castings, and covers.

Ductile iron fittings will be measured separately by the pound without joint accessories, and shall be the standard weight of fittings as published in AWWA C110. If the Contractor chooses to use compact ductile iron fittings in accordance with AWWA C153, the fittings shall be measured separately by the pound without joint accessories, and shall be the weight of fittings as published in AWWA C153. Or ductile iron fittings may be measured on per each basis as installed for each type of fitting used.

Mainline pipe and service pipe of each kind and size will be measured separately per linear foot by the overall length along the horizontal axis of the pipeline, from beginning to end of each installation and without regard to intervening valves or specials. Terminal points of measure will be the spigot or cut end, base of hub or bell end, center of valves or hydrants, intersecting centers of tee or wye branch service connections, and center of main to center of curb stop. Linear measurement of piping will include the running length of any special fitting (tees, wyes, bends, gates, etc.) installed within the line of measure between specified terminal points. No additional measurement will be made for extra pipe installed due to extra depth required for horizontal direction drilling applications. HDPE fittings are incidental to pipe installation and as such no measurement will be made.

Water service pipe will be measured by the horizontal length, in feet, from the center of the water main to the new curb stop.

Insulation will be measured by the area in square yards of polystyrene insulation board installed to the thickness specified.

**D. Basis of Payment**

Payment for construction of water distribution facilities will be made ONLY under the appropriate Contract Items at the Contract unit price; with all other costs of constructing the complete facility as required by Contract being incidental thereto the extent that the work does not qualify as an Extra Work Item.

Payment for Reconnect Existing Water Service and Connect to Existing Water Main shall be compensation in full for all costs incidental thereto including, but not limited to, all labor, equipment and materials for locating the existing water service or water main, furnishing and installing water main DI mechanical joint sleeves for reconnecting the HDPE water main

to the existing CI water main, furnishing and installing fittings, adapters, transition couplings necessary to make a complete connection.

Payment for Hydrant and Relocate Hydrant shall be compensation in full for all costs incidental thereto including, but not limited to, any additional ductile iron pipe or HDPE hydrant leads, drain pits, blocking, crushed stone, extensions, risers, MJ to HDPE adapters, zinc anode bolt caps, 12-pound bare zinc anode, and fittings necessary to complete the installation.

Payment for Hydrant Assembly shall be compensation in full for all costs incidental thereto including, but not limited to, the hydrant, 6" gate valve and valve box, ductile iron pipe or HDPE hydrant lead, drain pits, blocking, crushed stone, extensions, risers, MJ to HDPE adapters, zinc anode bolt caps, 12-pound bare zinc anode, main line tee or fittings necessary to complete the installation.

Payment for Relocate Hydrant shall be compensation in full for all costs incidental thereto including, but not limited to, any additional ductile iron pipe or HDPE hydrant leads, drain pits, blocking, crushed stone, extensions, risers, MJ to HDPE adapters, zinc anode bolt caps, 12-pound bare zinc anode, main line tee or fittings necessary to complete the relocation.

Payment for Adjust Valve Box shall be compensation in full for all costs incidental thereto, including but not limited to, furnishing extensions as required and replacing any materials damaged by the Contractor's operations.

Payment for Corporation Stop, Electrofusion Transition Service Saddle and Corporation Stop, or Tapping Tee with Electrofusion Saddle shall be compensation in full for all material, labor and equipment necessary to complete the work as described herein including tapping the water main, furnishing and installing the

connection fittings on the main and butt fusing the HDPE water service pipe to the tapping tee with electrofusion saddle.

Payment for Curb Stop and Box shall be compensation in full for all materials, labor and equipment necessary to install the curb box and furnish and install the curb stop and any transition fittings necessary to connect new HDPE water service pipe to the curb stop.

Payment for Butterfly Valve and Box or Gate Valve and Box shall be compensation in full for all costs incidental thereto to furnish and install the valve and valve box complete and in place, including but not limited to the valve and valve box, blocking, MJ to HDPE adapters, zinc anode bolt caps, 12-pound bare zinc anode, and crushed stone. No additional payment will be made for valves installed where new mains are deeper than the minimum depth.

Payment for Water Tracer Box shall be compensation in full for all materials, labor and equipment necessary to furnish and install the tracer box.

Payment for Blow-offs shall be compensation in full for all costs of furnishing and installing the necessary materials complete in place as specified, including all costs of excavation, bedding, backfill, pipe, tapping main, valves, curb stops, caps, blocking, castings, valve box,

tracer wire, and necessary adapters or transition couplings, and other work necessary to complete the work.

Payment for Ductile Iron Fittings for water main shall be compensation in full for all costs of providing the necessary materials complete in place as specified including, but not limited to, furnishing and installing reducers, tees, crosses, bends, plugs, and other work necessary to complete the work.

Payment for Water Service Pipe shall be compensation in full for all labor, equipment, and materials costs of furnishing and installing the pipe complete in place including, but not limited to, trench excavation, foundation preparation, bedding, placement and compaction of encasement materials, coarse filter aggregate, placement and compaction of backfill, cleaning, disinfection, bacteria testing, leakage testing, tracer wire, continuity testing, fittings, hardware, zinc anode bolt caps, 12-pound bare zinc anode, MJ adapters, transition couplings, blocking and anchorage materials, and other work necessary to complete the work. No payment shall be made for water service pipe with a tracer wire that has not passed an electrical continuity test.

Payment for Water Main Ductile Iron (class) shall be compensation in full for all labor, equipment, and materials costs of furnishing and installing ductile iron water main complete in place including, but not limited to, trench excavation, foundation

preparation, bedding, polyethylene encasement, placement and compaction of encasement materials, placement and compaction of backfill, cleaning, disinfection, bacteria testing, leakage testing, continuity testing, fittings, hardware, zinc anode bolt caps, transition couplings, blocking and anchorage materials, and other work necessary to complete the work. No payment shall be made for ductile iron water main pipe that has not passed an electrical continuity test.

Payment for HDPE Water Main SDR 11 shall be compensation in full for all labor, equipment, and materials costs of furnishing and installing HDPE water main including, but not limited to, trench excavation, foundation preparation, bedding, polyethylene encasement, placement and compaction of encasement materials, placement and compaction of backfill, cleaning, disinfection, bacteria testing, leakage testing, tracer wire, continuity testing, HDPE by MJ adapters, HDPE to cast iron transition couplings, fittings, hardware, zinc anode caps, blocking and anchorage materials, and other work necessary to complete the work. All costs of furnishing and installing electrofusion flex restraints and concrete collars on the HDPE Water Main shall be considered incidental to the water main. No payment shall be made for water main pipe with a tracer wire that has not passed an electrical continuity test.

Payment for Polystyrene Insulation shall be compensation in full for all costs incidental thereto including, but not limited to, the extra trench excavation, furnishing and placing polystyrene insulation board, granular backfill, and off-site disposal excess excavated material.

Payment for water main and service construction will generally be made on the basis of the following schedule:

<u>Item</u>	<u>Description</u>	<u>Unit</u>
2504.602	Reconnect Water Service	Each
2504.602	Connect to Existing Water Main	Each
2504.602	Hydrant	Each
2504.602	Relocate Hydrant	Each
2504.602	Hydrant Assembly	Each
2504.602	Adjust Valve Box	Each
2504.602	(size)" Corporation Stop	Each
2504.602	(main size)"x(service size)" Electrofusion Transition Service Saddle and Corporation Stop	Each
2504.602	(main size)"x(service size)" Tapping Tee w/Electrofusion Saddle	Each
2504.602	(size)" Curb Stop and Box	Each
2504.602	(size)" Butterfly Valve and Box	Each
2504.602	(size)" Gate Valve and Box	Each

2504.602	Water Tracer Box	Each
2504.602	Blow-Off	Each
2504.602	(size) Ductile Iron (fitting type)	Each
2504.603	(size)" Type K Copper Service Pipe	Linear Foot
2504.603	(size)" HDPE SDR 11 Service Pipe	Linear Foot
2504.603	(size)" Water Main Ductile Iron (class)	Linear Foot
2504.603	(size)" DIPS HDPE Water Main SDR 11	Linear Foot
2504.603	(size)" DIPS HDPE Water Main SDR 11 (Horizontal Directional Drill)	Linear Foot
2504.604	3" Polystyrene Insulation	Square Yard
2504.608	Ductile Iron Fittings	Pound

## **2504 TEMPORARY WATER SERVICE**

The provisions of MN/DOT 2504 and the City of Hermantown Standard Specifications are supplemented with the following:

### **A. Description**

This work shall consist of providing a temporary water service system to adjacent residents and businesses in accordance with the Plans, the City of Hermantown Standard Specifications & Details, and as directed by the Engineer.

### **B. Construction Requirements**

Temporary water main pipe shall be 2" or 3" HDPE SDR 11 pipe. Temporary water service pipe shall be ¾" HDPE SDR 11 pipe to within 5 feet of the hose bib or building connection. All HDPE connections shall be butt fused or fused fittings, no band clamps will be allowed. Pressure reducing valves shall be provided (when necessary) to control the water pressure of the temporary water service system to a maximum pressure of 80 psi at the house. Fittings and restraints (when necessary) shall be in accordance with City of Hermantown Standards. End caps shall be installed on all temporary water service system pipes when moving the pipe on the ground.

All temporary water service system components shall meet requirements of City of Hermantown Standards for pipe cleaning, bacteria, and pressure & leakage testing. Temporary water service system shall be fully operational and achieve passing test results prior to disconnection of the existing water main. Where pipe is reused from previous stages of construction, it shall be cleaned and completely retested prior to use as a temporary water service system. All temporary water service system pipes shall be protected from construction equipment and local vehicle traffic.

### **C. Submittals and Coordination**

The Contractor shall prepare and submit a Temporary Water Service Installation Plan to Engineer at least 14 days prior to installation. The Plan shall include: planned construction, staging & schedule; connection points; proposed tie-ins; existing

hydrants & shut-off valves; temporary pipe size & materials information; and emergency contact information. Emergency information shall include the name and phone number of at least two personnel available 24 hours per day 7 days a week. Emergency contact personnel shall be familiar with the project and have the authority to make repairs to the temporary water service system within 8 hours of notification from resident. The Contractor shall furnish and deliver emergency contact information "door hangers" to all residents at least 48 hours prior to connecting to the temporary water supply system. The Contractor shall attend a mandatory pre-installation coordination meeting with the Engineer prior to beginning temporary water service system work.

D. Measurement and Payment

No measurement will be made of the various Items that constitute Temporary Water Service but furnishing all such items as specified will be construed to be included in the single Lump Sum payment under Item 2504.601 (Temporary Water Service). Such payment shall be considered full compensation for all costs for labor, equipment, and materials associated with installation, testing, protection, maintenance, removal, and restoration.

For open cut installations, the contractor shall install a loop in the tracer wire at the location of each service connection so that the service may be installed later without splicing the tracer wire.

E. Measurement and Payment

All locating wire installed shall be tested for continuity at the completion of the installation. No payment shall be made for pipe with a tracer wire that has not passed the continuity test.

Tracer wire and boxes shall be supplied by the Contractor. There shall be no measurement or payment for tracer wire. The cost of furnishing and placing locating wire shall be considered incidental to the utility.

*Payment will be made under Item 2503.602 or 2504.602 (type) Tracer Box at the Contract bid price per each, which shall be compensation in full for all materials, labor and equipment necessary to furnish and install the tracer box where specified in the Standard Details, Contract Drawings or Special Provisions.*

## **2505 HORIZONTAL DIRECTIONAL DRILLING**

A. General

This work shall consist of the installation of an underground pipe using the horizontal directional drilling method indicated on the Contract Drawings. Products installed under this section include Pressure Sewer Pipe and Forcemain, Pressure Sanitary Sewer Services, Water Main Pipe and Fittings, Water Services, and Special Connections.

1. Definitions

a. Horizontal Directional Drilling (HDD)

Method of trenchless construction producing continuous bores, using a surface launched, remotely steerable, electronically monitored drilling tool controlled from a mobile drilling frame, and including a field power unit, mud mixing, storage and recycling system, and mobile spoils extraction system.

b. HDD Subcontractor

Firm engaged in the construction of underground sanitary sewer, or water lines and with demonstrated competency using HDD methods of installation of pipe.

2. System Description

The drilling system differs from the micro-tunneling, auger boring or pipe jacking equipment in that operations are performed from the surface; large pits to place and align equipment are not necessary. The drilling frame is sited and aligned to bore a pilot tunnel that conforms to the planned line and grade of pipe. The drilling frame is typically set back from an access pit that has been dug at the location of a tie-in, connection, manhole (or other appurtenance), or other location; and a high pressure/low volume fluid-jet toolhead that uses an inert, environmentally acceptable mixture of bentonite clay and water is launched and guided to the correct invert elevation and line required at the manhole (or other appurtenance). This is called the pilot hole. A real-time guidance system is attached behind or within the toolhead to measure inclination, roll and azimuth. Upon reaching the receiving pit, the toolhead is removed and a reamer with the product pipe attached is joined to the drill string and pulled back through the tunnel created by the pilot hole. For some pipe sizes and soil conditions, the Contractor may also introduce cement into the stabilizing mud mix. A vacuum spoils extraction system removes any excess spoils generated during the installation.

3. Performance Requirements

- a. Contractor shall provide a horizontal directional drilling system compatible with the subsurface conditions and the size, type, depths and lengths of pipe to be installed.
- b. Contractor shall provide all labor, materials, equipment and incidentals necessary to install pipe by horizontal directional drilling as shown on the Drawings and as specified herein.
- c. Contractor shall provide all survey layout, inspection and record-keeping incidental to the drilling pipe installation.
- d. This procedure is applicable to the installation of sanitary sewer and sewer services and water main and water services.

4. Submittals

- a. Submit product data for the drilling fluid including a description of the following items:
  - Manufacturer
  - Components
  - Special Precautions



- Manufacturers recommended method of mixing and application
- Manufacturers recommendation for storage and handling
- Material Safety Data Sheet (MSDS)

b. Certificate of Compliance

Submit Certificates of Compliance for products and materials.

c. Equipment and Construction Procedures

Submit working drawings, manufacturer's data sheets and written procedures describing in detail the equipment, tools and materials to be used along with the proposed method of product pipe staging and installation. This will include, but not be limited to, size, capacity and setup requirements of equipment; location and sizing of drilling and receiving pits; dewatering if applicable; type of cutting tool head; back-reaming tool types and sizes; method of monitoring and controlling line and grade; locations and sizes of product jointing and staging areas; type of equipment for joining pipe; and time requirements of joint fusion. The Contractor shall detail a description of line and grade control and a viable method to eliminate accumulative error due to the inclinometer (pitch or accelerometer) and demonstrate that method in the field prior to commencing drilling operations.

- Grouting techniques to be used for over-excavation, if any, including equipment, pumping procedures, grout types and mixtures.
- Proposed procedures, materials and equipment for lubricating the exterior of the pipe during pulling.
- Details of spoil removal system, including equipment type, number and disposal location.
- Proposed methods, materials and equipment for removing and clearing obstructions so that the HDD can advance forward.
- Furnish compliance submittals showing all fabrication and construction details for the directional drilling installation of the pipe.

The Contractor shall submit a construction schedule with starting and completion dates for each of the procedure tasks.

If the Contractor determines that modifications to the methods and equipment as stated in the submittal are necessary during construction, the Contractor shall submit a revised plan.

d. Contractor Qualifications

- Submit the documentation showing five years of HDD and references for at least three jobs of similar magnitude and detail completed within the past five years. Information must include, but is not limited to, date and duration of work, location, pipe information, project owner information (including a name and phone number), and the contents of the pipeline.
- Submit references for any subcontractors that may be used on site.

e. Record Drawings:

After completion of pilot hole drilling, submit tabulation of pilot hole coordinates as required under "Pilot Hole" paragraph below.

5. Qualifications of the Directional Drilling Contractor

The HDD contractor shall be trained and certified to operate the Horizontal Directional Drilling equipment with at least five years of experience in directional drilling, obtained over the last five years. Perform HDD operations under the constant direction of a drilling supervisor who shall remain on site and be in responsible charge throughout the drilling operation. The supervisor shall have supervised directional drilling and a minimum of 10,000 linear feet of pipe. Submit a list of field supervisory personnel and boring machine operator(s) and their experience with HDD operations. At least one of the field supervisors listed must be at the site and responsible for all work at all times when HDD operations are in progress, and both that person and the HDD machine operator shall have been employed with the HDD specialty contractor for a minimum continuous period of one year immediately prior to this work. HDD specialty subcontractor shall not mobilize to the site until the résumé of the Contractor's field supervisory personnel and boring machine operator have been reviewed by the Engineer.

6. Delivery, Storage and Handling

Check the materials upon delivery to assure that proper material has been received. Store drilling fluid components in accordance with manufacturer's recommendations and out of the effects of inclement weather.

7. Materials

Bentonite for drilling fluid shall be high quality Wyoming bentonite composed primarily of sodium montmorillonite.

8. Drilling Site

Additional work space and access may be acquired by Contractor only with approval of Owner and applicable property owners. Expense of acquiring additional work space shall be borne by Contractor. Site access, clearing, grading, and preparation necessary for construction operations shall be performed as required.

9. Quality Assurance

Fusing of polyethylene pipe shall be done by qualified fusers. Certification of personnel and fusing of pipe shall comply with the requirements for gas lines in the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe.

B. Products

1. Carrier Piping

Carrier piping shall be as specified in 2503 PIPE SEWER - PRESSURE, 2504 WATER MAIN AND SERVICE LINE INSTALLATION or the 2015 Standard Specifications for Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe (Gas Operations and Maintenance Manual – Section 14 through Section 29).

The pressure rating specified for the carrier pipe in their respective specifications sections shall be considered a minimum. Provide a higher class of pipe if required by the loads imposed by pulling operation.

2. Drilling Fluids

Drilling fluid composition shall meet permit requirements and environmental regulations.

3. Water

Contractor shall procure, transport, and store water as required for his operations.

4. Locating Wire

Locating (tracer) wire shall be as specified in 2503/2504 LOCATING WIRE FOR WATER AND SEWER.

C. Execution

1. Joining Pipe

Pipe fusing shall be done by qualified fusers. Certification of personnel and fusing of pipe shall comply with the requirements for gas lines in the Standard Specifications for High Pressure Gas Mains, Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe, included in these specifications. All sanitary sewer main and water main shall be butt fused. Sanitary sewer and water branch or tap service pipe of any diameter shall also be butt fused.

2. Monitoring

Contractor shall at all times provide and maintain instrumentation which will accurately locate pilot hole position in X, Y, and Z axis relative to ground surface. Drilling fluid flow rate and pressure shall also be monitored. Engineer and Owner shall have access to this data at all times during the operation.

3. Pilot Hole

A pilot hole shall be drilled along the path shown on Drawings to the following tolerances:

- a. Elevation: Plus 0.5 feet, minus 0.5 feet for low pressure sanitary sewer and plus 0 feet, minus 1 foot for water main.
- b. Alignment: Plus or minus 1 foot for low pressure sanitary sewer and plus or minus 2 feet for water main.

- c. Curve Radius: minimum 250 feet or pipe manufacturer's recommendation, whichever is greater.
- d. Entry Point: At the location shown on Drawings.
- e. Exit Point: Pilot hole shall penetrate ground surface within plus or minus 10 feet of alignment shown on Drawings and within plus 20 feet and minus 0 feet of length shown on Drawings. In all cases, pipe shall remain within easement and right-of-way areas.

Contractor shall plot actual horizontal and vertical alignment of pilot bore at intervals not exceeding 25 feet for low pressure sanitary sewer and 50 feet for water main. This "as-built" plan and profile shall be updated as pilot bore is advanced.

In all cases, right-of-way restrictions shall take precedence over the tolerances listed above. Regardless of the tolerance achieved, no pilot hole will be accepted if it will result in any or all of pipeline being installed in violation of right-of-way restrictions. In all cases, concern for adjacent utilities and structures shall take precedent over the tolerances listed above. Specification of tolerances does not relieve Contractor from responsibility for safe operations or damage to adjacent utilities and structures.

After completion of pilot hole drilling, Contractor shall provide a tabulation of coordinates to Engineer, referenced to drilling entry point, which accurately describes location of pilot hole.

4. Reaming and Casing Pipe Pull-Back Operation

General: Upon completion of pilot hole drilling, hole shall be enlarged by reaming and preassembled pipeline pull section shall be installed in hole. Pipeline shall be preassembled to provide one continuous pulling operation. Pipeline shall be temporarily capped before pulling operations to prevent any drilling fluid, water, or debris from entering pipeline.

Prereaming: Prereaming operations shall be conducted at discretion of Contractor. All provisions of this specification relating to simultaneous reaming and pulling back operations shall also pertain to prereaming operations.

Backreaming: Backreamer must be of large enough diameter to insure a competent tracer wire can also be pulled back with the pipe

Pulling Loads: The maximum allowable tensile load imposed on the pipeline pull section and **used for setting weak-link devices** for polyethylene pipe shall be in accordance with ASTM F 1804 "Standard Practice for Determining Allowable Tensile Load for Polyethylene (PE) Gas Pipe During Pull-In Installation." The maximum allowable tensile loads for polyethylene pipe shall be within the values shown in the following table for pull durations of 1 to 12 hours. For longer pull durations, these values will be recalculated by the Engineer. If more than one value

is involved for a given pull section, the lesser value shall govern. The Contractor shall maintain accurate records of pull forces at all times for review by the Engineer.

### **MAXIMUM ALLOWABLE TENSILE LOAD FOR MDPE AND HDPE PIPE**

<b>WATER &amp; SEWER PIPE (HDPE)</b>				
<b>SIZE</b>	<b>SDR</b>	<b>LBS.</b>	<b>SDR</b>	<b>LBS.</b>
3/4" IPS	11.0	348		
1" IPS	11.0	546		
1 1/4" IPS	11.0	870		
1 1/2" IPS	11.0	1,140		
2" IPS	11.0	1,781		
3" IPS	11.0	3,868		
4" DIPS	11.0	7,274		
6" DIPS	11.0	15,031		
8" DIPS	11.0	25,858		
10" DIPS	11.0	38,900		
12" DIPS	11.0	55,011	9.0	65,741
14" DIPS	11.0	73,906	9.0	88,323
16" DIPS	11.0	95,587	9.0	114,232
20" DIPS	11.0	14,307	9.0	176,304
24" DIPS	11.0	210,154	9.0	251,147

**Torsional Stress:** A swivel shall be used to connect pipeline pull section to reaming assembly to minimize torsional stress imposed on section.

**Pull Section Support:** Pull section shall be supported as it proceeds during pull-back so that it moves freely and pipe is not damaged.

**External Collapse Pressure:** Pull section shall be installed in reamed hole in such a manner that external pressures are minimized. Any damage to pipe resulting from external pressure during installation shall be the responsibility of Contractor.

**Buoyancy Modification:** Buoyancy modification shall be used at the discretion of Contractor. Any buoyancy modification procedure proposed for use shall be submitted to Engineer for acceptance. No procedure may be used which has not been reviewed by Engineer. Contractor will be responsible for any damage to the pipeline resulting from buoyancy modification.

#### **5. Drilling Fluids**

**General:** Drilling fluids shall be in compliance with environmental regulations.

**Recirculation:** Contractor shall employ his best efforts to minimize excess drilling fluid by recirculating surface returns. This shall include, but not be limited to, provision of a solids control system sized and configured to remove spoil from drilling fluid surface returns so that fluid may be returned to active system without hindering drilling progress.

Inadvertent Returns: Contractor shall employ his best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than entry and exit points shall be minimized. In the event that annular circulation is lost, Contractor shall take steps to restore circulation. If inadvertent surface returns of drilling fluids occur, they shall be immediately contained with hand placed barriers (hay bales, sandbags, silt fences, etc.), and collected using pumps, where practicable. If amount of surface return is not great enough to be collected, affected area shall be flushed with fresh water and fluid shall be allowed to dry and dissipate naturally. If amount of surface return exceeds that which can be contained with hand-placed barriers, small collection sumps (less than 5 cubic yards) may be used. If amount of surface return exceeds that which can be contained and collected in small sumps, drilling operations shall be suspended until surface return volumes can be brought under control. Clean-up of inadvertent returns shall be the responsibility of Contractor.

Disposal: Disposal of excess drilling fluids and spoil shall be the responsibility of Contractor and shall be conducted in compliance with environmental regulations, right-of-way and workspace agreements, and permit requirements. Drilling fluid and spoil disposal procedures proposed for use shall be submitted to Engineer for acceptance. No procedure may be used which has not been reviewed by Engineer.

6. Damage to Surfaces

The contractor will be responsible for restoration of damage caused by drilling, pulling pipe or drilling equipment to surrounding street, parking lot and driveway pavement, sidewalk and curb and gutter and turf by the contractor's equipment at no cost to the City.

7. Locating Wire

The locating wires shall be pulled along with the pipe. **The Contractor must pull a minimum of two (2) wires in the event one locating wire does not pass the continuity test.** The Contractor shall be responsible for the installation of a locating wire with electrical continuity throughout the entire length. The locating wire shall be made accessible as shown on the Standard Details or the Contract Drawings. The cost of furnishing and placing locating wire shall be considered incidental to the pipe.

D. Testing

1. Pressure and Leakage Test

Pressure and leak test of carrier piping shall be as specified in 2503 PIPE SEWER - PRESSURE, 2504 WATER MAIN AND SERVICE LINE INSTALLATION or the 2015 Standard Specifications for Transmission Line, and Service Installation, Welding Qualifications and Qualifications for Joining PE Pipe, included in these specifications.

2. Testing Locating Wire Continuity

Test locating wire continuity after installation of each section of continuous tracer wire. The Contractor shall be responsible for the installation of at least one locating wire with electrical continuity throughout the entire length. No payment shall be made for a pipe with a tracer wire that has not passed a continuity test.

E. Measurement and Payment

Pipe placed by horizontal directional drilling shall be paid for under the applicable utility. No payment shall be made for a pipe with a tracer wire that has not passed a continuity test.

**2506 MANHOLES AND CATCH BASINS**

Manhole and Catch Basin construction and reconstruction, both storm and sanitary, shall be performed in accordance with the provisions of MN/DOT 2506, except as modified below:

A. Materials

1. Sanitary Manholes

All sanitary manholes, air-release manholes and cleanout manholes shall meet the requirements of **City Standard Detail San-11**. The Contractor shall be responsible for providing openings in the manhole section at the proper locations according to the contract drawings. A 27-inch nominal diameter opening shall be provided in the cone. Unless otherwise shown in the City Standard Details or Plans, the cone sections shall be **concentric**. No steps will be allowed in the manholes. Manhole structures shall be sectional precast concrete manhole units conforming to the requirements of MN/DOT 3622. "O" ring gaskets conforming to MN/DOT 3726 shall be used in the joints in the barrel sections. All manholes must have **integral concrete base**. Manhole flexible sleeves for sanitary manholes shall be NPC Kor-N-Seal1, Press Seal PSX Direct Drive, Z-Lok Boot Connector, or approved equal. All pipe sleeves must be water tight.

2. Storm Manholes and Catch Basins

Storm sewer structures shall be sectional precast concrete manhole units conforming to the requirements of MN/DOT 3622 and MN/DOT Standard Plates 4005M (Design F), 4006L (Design G), 4020J, or 4024A (Design SD). A 27-inch nominal diameter opening shall be provided in the cone or flat top cover. Unless otherwise shown in the Plans, the cone sections shall be **concentric** and openings in flat top covers shall be **centered**. "O" ring gaskets conforming to MN/DOT 3726 shall be used in the joints in the barrel sections. No steps will be allowed in the manholes.

3. Catch Castings

Catch basin frame castings shall conform to **City Standard Details STORM-2 and STORM-3**. Catch basin grate castings shall be 816 on MN/DOT Standard Plate 4154B. Catch basin curb box castings shall be 823A on MN/DOT Standard Plate 4160D. Unless otherwise noted in the project Special Provisions, catch basin castings shall be supplied by the Contractor.

4. Manhole Castings

Manhole Casting Assemblies with lids shall conform to **City Standard Details San-1 and STORM-1** for sanitary and storm manholes. Unless otherwise noted in the project Special Provisions, manhole castings shall be supplied by the Contractor.

5. Manhole Adjustment Rings

The manhole adjusting rings shall be molded from high-density polyethylene as defined in ASTM D-1248. The complete adjustment system utilizing the HDPE rings shall consist of the rings, sealed to the manhole structure, casting and one another by means of an approved butyl sealant. The Contractor shall utilize a combination of “wedge” rings and “flat” rings to achieve proper slope of the casting. Shims shall not be used. Concrete adjustment rings shall not be used.

6. Casting Extensions

Casting Extensions shall be Neenah R-1979 or ESS Brothers paving adjustment ring. Extensions shall be cast iron.

7. Non-Shrink Grout or Cement-Base Polymer Modified Patching and Repair Mortar

Non-shrink grout shall be a non-metallic type grout which is durable in wetting and drying, freezing and thawing conditions and shall conform to the requirements set forth in ASTM C 1107-01. Cement-based polymer modified patching mortar shall conform to the requirements set forth in ASTM C 109, ASTM C 490-77 and ASTM C 807-83 (modified).

8. Bedding

Manholes and Catch Basins shall be bedded on granular material meeting MN/DOT 3149.2.H Coarse Filter Aggregate.

8. Structure Backfill

Unless otherwise noted in the Plans, or directed by the Engineer, manholes and catch basins shall be backfilled with granular material meeting MN/DOT 3149.2.D.1 Granular Backfill.

B. Construction Requirements

1. Manholes and Catch Basins shall be bedded on 6-inches of Coarse Filter Aggregate.
2. When using plastic pipe, manhole water stops supplied by the manufacturer shall be installed.



3. All annular wall space surrounding the in place pipes shall be completely filled with mortar or concrete and the inside bottom of each manhole shall be shaped with fresh concrete to form free flow through invert troughs as directed. The troughs shall be as deep as a half-pipe and the shelves shall slope up 3 inches from the trough to the wall.
4. When a sewer connects with an existing manhole or catch basin, the Contractor shall make a suitable connection through the wall of the manhole or catch basin and shall reshape the invert to assure a smooth and unobstructed flow line through. All pipe connections to existing manholes shall be water tight.
5. Non-shrink grout or cement-based polymer modified patching mortar shall be used to patch lifting holes in manholes and catch basins.
6. The Contractor shall utilize a combination of flat and sloping manhole adjustment rings to adjust the casting to the slope and grade as specified below.
7. Manhole casting assemblies with lids shall be installed in accordance with Standard Details SAN-3 and STORM-4. The straightedge will be placed across the center of the casting and will touch both sides of the pavement. The measurement will be taken at the center of the casting. Castings that are measured at more than 3/8 inch below the pavement prior to final acceptance of the project will be raised to the prescribed depth of 3/8 inch. All costs associated with this corrective action will be assumed by the contractor.
8. Casting Extensions shall only be used where approved by the engineer on pavement overlay projects. Casting extensions shall not be used to adjust incorrectly installed manhole castings. Where casting extensions are installed, only one may be used per casting to achieve the proper height adjustment. All casting extensions shall be glued into place with a manufacturer recommended adhesive. The Contractor shall measure all manhole castings to determine the appropriate size of each casting extension.
1. All sanitary manholes must pass a vacuum test as specified elsewhere in this specification. Any manholes which do not pass the vacuum test or have visible leakage within the manhole will not be accepted.
2. All storm manhole castings and catch basin castings shall be wrapped with geotextile fabric as shown on the standard details.

**C. Basis of Payment**

Payment for Drainage Structures, Manholes and Catch Basins shall be at the contract unit price per unit of measure and shall include, in addition to the MN/DOT 2506.5 Basis of Payment, furnishing and placing granular materials for bedding and structure backfill.

**2506 CONNECT INTO EXISTING SEWERS**

MN/DOT 2506 is supplemented with the following:

This work consists of constructing connections into existing drainage structures in accordance with the applicable MN/DOT Standard Specifications and the following:

Connections to existing sanitary manholes shall be made with core drill hole and water tight pipe sleeve.

Measurement will be made by the number of connections constructed as specified.

Payment will be made under Item 2506.602 (Connect Into Existing MH OR CB) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto, including but not limited to, all materials and labor necessary to install proposed concrete pipe into an existing drainage structure. Any damage caused to the existing drainage structure shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

## **2506 MANHOLE FRAME SEAL (INTERNAL/EXTERNAL)**

Internal or External type manhole seals with stainless steel compression bands shall be used.

All new construction of manholes shall use external frame seals. Internal frame seals will be reviewed by case as approved by the engineer and public works director.

### **A. General**

#### **1. Work Required**

An internal or external flexible rubber frame seal, and where allowed by the Engineer, an interlocking extension or extensions, meeting the requirements of this section, shall be used to seal the entire chimney section of sanitary manholes, air release manholes, clean out manholes and all other structures identified on the Contract Drawings or in the Special Provisions. The seal and extension or extensions shall extend from the frame down to the top of the cone.

#### **2. System Description**

Performance Requirements - The frame seal shall be capable of repeated vertical movement of the frame of not less than 2 inches and/or repeated horizontal movement of not less than ½ inch after installation and throughout its design life.

#### **3. Quality Assurance**

Acceptance Testing - Manhole frame seals shall be visually inspected after installation to insure that the seal is properly positioned, tight against the manhole and frame surfaces, that no voids or leakage points exist and that the bands are securely locked in place. Any seals failing this test shall be reworked as necessary and retested at no additional cost to the owner.

Any seals not passing this visual inspection may, at the Contractor's option, be tested for leakage using a method approved by the Engineer.

B. Products

An internal or external manhole frame seal, as shown on the Standard Details, with extensions where needed to cover the entire chimney area, shall be installed on all sanitary manholes air release manholes, clean out manholes and all other structures identified on the Contract Drawings or in the Special Provisions in accordance with the manufacturer's instructions.

Frame seals shall consist of a flexible rubber sleeve, interlocking extensions and stainless-steel expansion bands as manufactured by Cretex Specialty Products or a pre-approved equal conforming to the following requirements.

The seal shall remain flexible throughout a 25-year design life, allowing repeated vertical movement of the frame of not less than 2 inches and/or repeated horizontal movement of not less than ½ inch. The sleeve portion of the seal shall be either double or triple pleated with a minimum unexpanded vertical height of either 8 inches or 10 inches respectively. The sleeve and extension shall have a minimum thickness of 3/16 inches and shall be made from a high quality rubber compound conforming to the applicable requirements of ASTM C-923, with a minimum 1500 psi tensile strength, a maximum 18% compression set and a hardness (durometer) of 48+5. The bands shall be integrally formed from 16 gauge stainless steel conforming to ASTM A-240, Type 304, with no welded attachments, shall have a minimum adjustment range of 2 diameter inches and a positive locking mechanism. Any screws, bolts or nuts used for this mechanism shall be 316 stainless steel conforming to ASTM F-593 and 594.

C. Equipment

The contractor shall have a manufacturer's recommended installation tool and all other equipment/tools necessary to install the frame seals.

D. Execution

1. Field Measurements

The Contractor shall measure the manhole to determine the information required on the manufacturer's "Sizing and Ordering" procedure. This information is needed to obtain the proper size of bands, the size and shape of the rubber sleeve and the need for and size of any extensions.

2. Surface Preparation for Seals

All sealing surfaces shall be reasonably smooth, clean, and free of any form offsets or excessive honeycomb. All loose and protruding mortar and brick that would interfere with the seal's performance shall be removed and the areas of the manhole frame, chimney and/or cone/corbel cleaned by wire brushing. All sealing surfaces shall be reasonably smooth and circular, clean and free of any loose material or excessive voids. Repair mortar, Non-Shrink Grout or Cement-Base Polymer Modified Patching and Repair Mortar shall be used to prepare a uniformly vertical 3" - 4" wide surface for the sleeve and extensions to seal against, if any adequate surface does not exist.

Detail surface preparation, including providing a vertical surface on a cone when none exists, shall be in accordance with the frame seal manufacturer's instructions.

The top portions of the cone shall have a minimum 2 inch high vertical surface. The preparation of this vertical surface when none exists shall be in accordance with the frame seal manufacturer's instructions.

3. Installation of Frame Seal

The frame seals and extensions shall be installed in accordance with the manufacturer's instructions.

1. Frame Seal Type

All manholes specified to have chimney seals located within the roadway shall have **internal** type seals. All manholes specified to have chimney seals located outside of the roadway shall have **external** style seals.

E. Measurement and Payment

All costs for furnishing and installing a frame seal and where allowed by the Engineer, an extension or extensions, shall be included in the unit price bid for manhole frame seals.

**2506 MANHOLE VACUUM TESTING**

A. Description

Conduct vacuum testing on manholes using vacuum testing equipment acceptable to Engineer.

Isolate manhole to be tested by plugging inlet and outlet pipes with inflatable stopper or other suitable test plugs. Securely brace plugs to avoid plugs being drawn into manhole. Plug lift holes with a non-shrink grout.

Place vacuum test equipment inside of top cone section and conduct vacuum test in accordance with manufacturer's recommendations. Operate vacuum pump until 10 in. of mercury is obtained.

Shut off vacuum pump and measure time for vacuum to drop from 10 to 9 inches of mercury. Manhole test is acceptable if the time exceeds the values in the table below:

Minimum Test Time for 48-inch Diameter Manhole			
Depth/Feet	Test Time/Seconds	Depth/Feet	Test Time/Seconds
8	20	20	50
10	25	22	55
12	30	24	59
14	35	26	64
16	40	28	69
18	45	30	74

If test fails, repair or seal manhole using non-shrink grout or other materials that are approved by Engineer. Retest until an acceptable test is obtained. Test may be conducted before or after backfilling.

**B. Basis of Payment**

All costs for furnishing and installing the equipment, maintenance, and labor necessary to perform the testing shall be included in the unit price for Manhole Vacuum Testing where a bid item is included. Where no bid item is included, manhole vacuum testing shall be incidental.

**2521 WALKS**

Walks shall be constructed in accordance with the provisions of MN/DOT 2521 and the following:

Payment for 4-inch Concrete Walk shall include all costs of root cutting, excavation, disposing of excavated materials, grading, furnishing, placing and compacting the 4 inch Class 5 Aggregate base.

**2521 CONCRETE WALK (ADA)**

This work shall consist of constructing Concrete Walk, including necessary Subgrade Preparation, Aggregate Base, and Grading as indicated in the Plan, in accordance with the provisions of MN/DOT 2112, 2211, 2521, other Contract provisions, and the following:

**A. Construction Requirements**

1. Concrete Walk – The walk shall be constructed as detailed in the Plan and conform to the requirements of MN/DOT 2521, Walks.

To avoid corner breaks, all walk edges shall be formed and constructed perpendicular to the back of curb and gutter sections and concrete structures for a one-foot minimum distance.

All existing signs shall be salvaged and reinstalled as directed by the Engineer or as indicated in the Plan.

2. Grading – If not otherwise detailed in the Plan, all fill sections shall be graded flush with the top of walk for a minimum 18 inches from the edge of walk and then down at a maximum 1:3 slope to existing terrain. The Contractor shall blend in the toe of fill slope and adjacent areas so as not to adversely affect drainage.
3. Landings – An initial landing is the first required landing of a pedestrian ramp. All initial landings required at the top of a ramped sloped surface (>2% longitudinal slope), shall be formed and placed separately in an independent concrete pour. This does not include initial landings placed at roadway grade such as depressed corners, parallel ramps, rural flat landings, or flat cut-throughs. Secondary landings

consist of all landings beyond the initial landing. These secondary landings do not require a separate landing pour. All landings adjacent to push buttons shall be formed and placed separately in an independent concrete pour, regardless of ramp type.

Wet casting or drill and grouting of dowel bars will be required in accordance with the details shown in MN/DOT Standard Plan 5-297.250 Sheet 5 of 5. These bars may be either smooth or deformed and shall be installed with 2 inch minimum concrete cover.

When not accounted for in the Plan, payment for these bars will be made under Item 2301.602 (Drill & Grout Reinforcement Bar (Epoxy Coated)) by the Each at the Predetermined Price of \$10.00 per bar furnished and installed. All necessary subgrade preparation and aggregate base placement for the entire ramp construction limit shall be done before the initial landing is constructed at each location.

B. Method of Measurement

Measurement of Concrete Walk will be made by top surface area.

C. Basis of Payment

Payment will be made under Item 2521.618 (Concrete Walk) at the Contract bid price per square foot, including the area of walk under the truncated domes, which shall be compensation in full for all costs of furnishing, and installing the required material. In areas where Directional Curb is constructed, the triangular area that is behind the projected back of curb line will be paid for as Concrete Walk at the Contract bid price for Item 2521.618 (Concrete Walk). All excavation or borrow including hauling or disposal that is necessary to meet the walk grades in the Contract shall be incidental unless specifically provided for in the Plan. If common borrow requirements exceed 8 cubic yards (CV) at any individual site/quadrant, than the common borrow required at that location and not specifically accounted for in the Plan will be paid for at \$20 per cubic yard (CV).

If the Plan calls for payment of Aggregate Base and/or other Grading items for a pedestrian facility, then payment will only be made for the locations specifically provided for in the Plan. All salvaging and reinstalling of signs as a result of concrete walk construction shall be incidental unless specifically provided for in the Plan.

## **2531 CONCRETE CURBING**

Concrete curb, concrete curb and gutter, medians, and driveway pavement, shall be constructed in accordance with the provisions of MN/DOT 2531 except as modified below:

- A. Payment for driveway pavement shall include excavating, grading, and furnishing and placing 12 inches of Class 5 Aggregate Base.

- B. All concrete gutters shall be stamped at the junction with all catch basins with a "NO DUMPING, LEADS TO LAKE" stamp meeting the requirements of City of Hermantown Standard Detail **STORM-5** listed in Appendix A.
- C. Where the Engineer requires replacement of unacceptable concrete curb and gutter work, the Contractor shall drill and grout 2 No. 4 x 12 inch long reinforcement bars (Epoxy coated) at each connection. Reinforcement bars shall be placed a minimum of 3 inches from face and back of gutter section. No measurement will be made for drill and grout reinforcement bars for replacement concrete curb and gutter. All costs for drill and grout reinforcement bars for replacement concrete curb and gutter shall be incidental, and no payment will be made.

#### **2531 CONCRETE CURB AND GUTTER (ADA)**

This work shall consist of constructing Concrete Curb and Gutter and the necessary Aggregate Base in accordance with the provisions of MN/DOT 2531, other Contract provisions, and the following:

A. Construction Requirements

Concrete Curb and Gutter - The curb and gutter shall be constructed to meet the details in the Plan. The transition from the existing curb and gutter section to the new curb and gutter section should occur within 5-10 feet of the point where the curb and gutter construction begins. The gutter inslope shall be constructed as detailed in the Plans. The gutter inslope transitions shall occur outside of the zero height curb area. The proposed gutter width shall be modified as necessary so as not to protrude into the adjacent travel lane with approval from the Engineer.

At all locations where new curb and gutter meets existing curb and gutter, place saw cut to leave a minimum 3 feet of in place curb and gutter between an existing joint and the proposed saw cut. If the 3 foot minimum cannot be maintained, place the saw cut over the existing joint. At this saw cut location the Contractor shall drill and grout 2 No. 4 x 12 inch long reinforcement bars (Epoxy coated). Reinforcement bars shall be placed a minimum of 3 inches from face and back of gutter section. When not accounted for in the Plan, payment for these bars will be made under Item 2301.602 (Drill & Grout Reinforcement Bar (Epoxy Coated)) by the Each at the Predetermined Price of \$ 10.00 per bar furnished and installed. The Contractor shall not be eligible for compensation at the Predetermined Price above for drill and grout reinforcement bar work when required for replacement of unacceptable work.

The Contractor must form, at a minimum, the top 1.5 inches of the gutter face. The Contractor shall not use the existing roadway edge as a form for the top 1.5 inches of the gutter face unless approved by the Engineer.

If the gutter flow line in front of the proposed curb ramps exceeds 2.0% slope, the flow line should be adjusted to allow a flatter slope in front of the curb ramps, but still provide positive drainage. The bituminous patch in front of the truncated domes must not exceed 5% measured perpendicular to the flow line. In no case shall a newly constructed curb and gutter flow line exceed 8% unless the roadway profile exceeds 8%.

The Contractor shall not alter any existing drainage patterns unless called for in the plans or approved by the Engineer.

The Contractor shall construct a contraction joint through the curb and gutter section at the bottom of the curb height transitions where the curb height equals zero inches. If any curb and gutter joints fall within the PAR, they shall meet MN/DOT 2521.3C.

When constructing directional curb where truncated domes are placed perpendicular to the path of travel, the concrete between the grade break/edge of truncated domes and the gutter toe shall be constructed integral.

B. METHOD OF MEASUREMENT

Measurement of Concrete Curb and Gutter will be by the linear foot measured at the face of the curb.

C. BASIS OF PAYMENT

Payment will be made under Item 2531.603 (Concrete Curb and Gutter) at the Contract bid price per linear foot, which shall be compensation in full for all costs of furnishing and installing the required material including Aggregate Base.

**2531 PEDESTRIAN CURB RAMP – TRUNCATED DOME SYSTEMS**

This work consists of furnishing and installing Truncated Dome Systems (detectable warning surfaces) at pedestrian curb ramps in compliance with the Public Rights-of-Way Accessibility Guidelines (PROWAG). This work shall be performed in accordance with the applicable MN/DOT Standard Specifications, these Special Provisions, the details in the Plan, and the following:

A. Construction Requirements

The Contractor shall select a truncated dome product from the approved products list at:

<http://www.dot.state.mn.us/products/miscmaterials/truncateddomes.html>.

The truncated domes shall be placed in concrete and shall be pressed firmly into the concrete to the point that concrete fills the vent holes on the truncated dome plates. No cutting of truncated domes will be allowed unless approved by the Engineer. Any swelling of the concrete that occurs around the truncated domes must be screeded off and the surrounding concrete shall be finished flush with



the truncated dome plate edge. To ensure that the truncated domes are well seated in concrete, the Contractor should provide a 3 inch minimum border around the edges of the truncated domes.

The Contractor will be allowed to interchange 9 foot 5 inch and 10 foot radial truncated domes when either is called for in the Plan. If the Contractor does make a substitution, the Contractor will be required to modify the curb line radius to match the truncated domes and meet the detectable edge requirements shown on MN/DOT Standard Plan Sheet No. 5-297.250 (Sheet 4 of 4). The Contractor will be allowed to adjust plan locations of zero inch height curb up to 6 inches laterally to make field fit adjustments for radial truncated domes placement.

B. Material Requirements

Square or rectangular truncated dome area will be measured by the square foot. Radial Truncated Domes will be measured along the long cord and multiplied by 2 feet to compute square feet.

C. Basis of Payment

Payment will be made under Item 2531.618 (Truncated Domes) at the Contract bid price per square foot, which shall be compensation in full for furnishing and installation of truncated domes. If additional radial domes are required and not called for in the plans they will be paid for at 4 square feet per each additional plate.

**2540 MAIL BOX SUPPORT**

This work shall consist of removing existing mailbox supports and furnishing and installing new Mail Box Supports in accordance with the applicable MN/DOT Standard Specifications, Standard Plate 9350B, and the following:

- A. It is the Contractor's responsibility to coordinate with property owners and the local postal authority as to establishing and installing permanent mailbox location(s).

The in place mail box and support shall be removed with as little damage as possible and offered to the property owner. If the owner does not want the support or the mail box the Contractor shall dispose of it off the Right-of-Way in accordance with MN/DOT 2104.3.D.3. The contractor shall supply and install a new mail box and support in accordance with the plans and specifications. It is the responsibility of the property owner to install their own salvaged mail box.

All removal and replacement operations shall be done in such a manner so as to cause no interruption of mail delivery if at all possible. In no case shall the owner or resident be without a mailbox installation for more than 24 hours.

- B. Measurement will be made by the number of Mail Box Supports furnished and installed as specified in the Plan.
- C. Payment will be made under Item 2540.602 (Mail Box Support) at the Contract bid price per each, which shall include but not be limited to all items as specified above, except those that the Contract specifically designates as having been included for payment under separate items.

#### **2540 RELOCATE MAIL BOX SUPPORT**

This work shall consist of relocating existing mailbox supports in accordance with the applicable MN/DOT Standard Specifications, Standard Plate 9350A, and the following:

- A. It is the Contractor's responsibility to coordinate with the local postal authority as to where the temporary location(s) shall be and to notify the postal patrons of the locations.

The in-place mail box, or a new mail box if furnished by the owner, attached distribution box and/or sign, if present, shall be salvaged and installed at the new location as staked in the field by the Contractor. All depressions resulting from the relocation process shall be filled.

All relocation operations shall be done in such a manner so as to cause no interruption of mail delivery if at all possible. In no case shall the owner or resident be without a mailbox installation for more than 24 hours.

- B. Measurement will be made by the number of Mail Box Supports relocated, as specified in the Plan.
- C. Payment will be made under Item 2540.602 (Relocate Mail Box Support) at the Contract bid price per each, which shall include but not be limited to all items as specified above, except those that the Contract specifically designates as having been included for payment under separate items.

#### **2575 TURF ESTABLISHMENT**

Turf establishment shall be performed in accordance with the provisions of MN/DOT 2575, except as modified below:

- A. Lawn type sod shall be placed on all disturbed turf areas in well-established lawns and around all culvert ends and storm sewer inlets and outlets as directed by the Engineer.
- B. Where the new sod meets the existing, a sod cutter shall be used to make the new sod level with the existing and to eliminate the ragged appearance of the existing sod caused by excavation.
- C. Areas of disturbed soil located on private property will be topsoiled and sodded immediately after the underlying work is completed. No additional compensation will be made for this early sodding.

- D. Topsoil salvage material shall be placed to a thickness of 4 inches on all disturbed turf areas to be sodded and seeded in accordance with the provisions of MN/DOT 2106. Where the salvage topsoil material found on site is inadequate, topsoil borrow shall be provided in turf establishment areas in accordance with the provisions of MN/DOT 2574.
- E. Turf establishment on disturbed turf areas not designated for sodding shall consist of seeding, fertilizing and mulching. Unless otherwise provided in the Plans, turf establishment by seeding shall include:
  - 1. Seed, Mixture No. 25-151 (High Maintenance Turf) as specified in MN/DOT 3876, shall be applied at the rate of 120 pounds per acre.
  - 2. Fertilizer, Type 3, (analysis 22-5-10) as specified in MN/DOT 3881 shall be applied at the rate of 350 pounds per acre.
  - 3. Hydraulic Matrix, Type FRM as specified in MN/DOT 3884 shall be applied at the rate of 3,900 pounds per acre.
- F. Seed shall be placed with a hydroseeder, unless otherwise approved by the Engineer.
- G. Final acceptance of turf establishment will not be made until area restored has a satisfactory stand of grass established. Project payment retainage will be held until final acceptance of turf establishment.
- H. Payment for sodding at the contract price per square yard shall include importing or salvaging and placing 4 inches of topsoil, shaping, or otherwise preparing the ground, cutting as required, furnishing, laying the sod on the areas designated to be covered, and pressing the sod into the underlying soil by rolling or tamping, and staking or stapling as necessary for sloped areas.
- I. Payment for turf establishment shall include importing or salvaging and placing 4-inches of topsoil, shaping, or otherwise preparing the ground, seeding, fertilizing and hydromulching the disturbed turf areas not designated for sodding. Final acceptance of turf establishment will not be made until the area restored has a satisfactory stand of grass established. A satisfactory stand of grass shall be defined as a consistent root of growth 3-inches or more. Root growth shall be determined on a random sample basis of plugs taken by the engineer when the contractor determines that the root growth has been obtained. Turf will not be accepted until the minimum root growth has been obtained.
- J. Upon expiration of the sod maintenance period on individual areas or sections of the Project, the Engineer will make an inspection of the work and will accept all sod that is in normal, healthy growing condition. No payment will be made for sod that is not in acceptable condition at the time of the final inspection an amount will be deducted from any moneys due or that may become due the Contractor equal to 100 percent of the Contract bid price per unit of measure of unacceptable sod. Sod that is within 3 m (10 feet) of the shoulder or is directly abutting a roadway surface that is acceptably maintained, but dies out due to salt or winter maintenance activities beyond the Contractor's control, may be paid for at 100 percent of Contract price provided that the sod has been maintained for at least 20 calendar days prior to December 1."

**City of Hermantown, Minnesota**  
**Public Works Department**

**Standard Specifications  
for Construction  
2022 Edition**

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<b>SAN-3</b>	EXTERNAL MANHOLE FRAME SEAL
<b>SAN-4</b>	CONSTRUCT INSIDE DROP STRUCTURE
<b>SAN-5</b>	HDPE SANITARY SEWER PRESSURE LATERAL CONNECTION
<b>SAN-6</b>	HDPE FORCE MAIN TO GRAVITY MAIN MANHOLE
<b>SAN-7</b>	AIR-RELEASE MANHOLE
<b>SAN-8</b>	CLEANOUT MANHOLE
<b>SAN-9</b>	POLYETHYLENE MH ADJUSTING RING - FLAT
<b>SAN-10</b>	POLYETHYLENE MH ADJUSTING RING – WEDGE
<b>SAN-11</b>	PRECAST MECHANICAL JOINT SEWER MANHOLE

### **STORM SEWER DETAILS**

<b>STORM-1</b>	STORM MANHOLE CASTING
<b>STORM-2</b>	CATCH BASIN/CURB BOX CASTINGS
<b>STORM-3</b>	CATCH BASIN CASTINGS
<b>STORM-4</b>	STORM MANHOLE
<b>STORM-5</b>	GUTTER STAMP

### **WATER SYSTEM DETAILS**

<b>W-1</b>	PLUG BLOCKING FOR WATER MAIN
<b>W-2</b>	THRUST BLOCKING FOR WATER MAIN
<b>W-3</b>	FIRE HYDRANT SETTING DETAIL – DUCTILE IRON
<b>W-3A</b>	FIRE HYDRANT SETTING DETAIL – HDPE

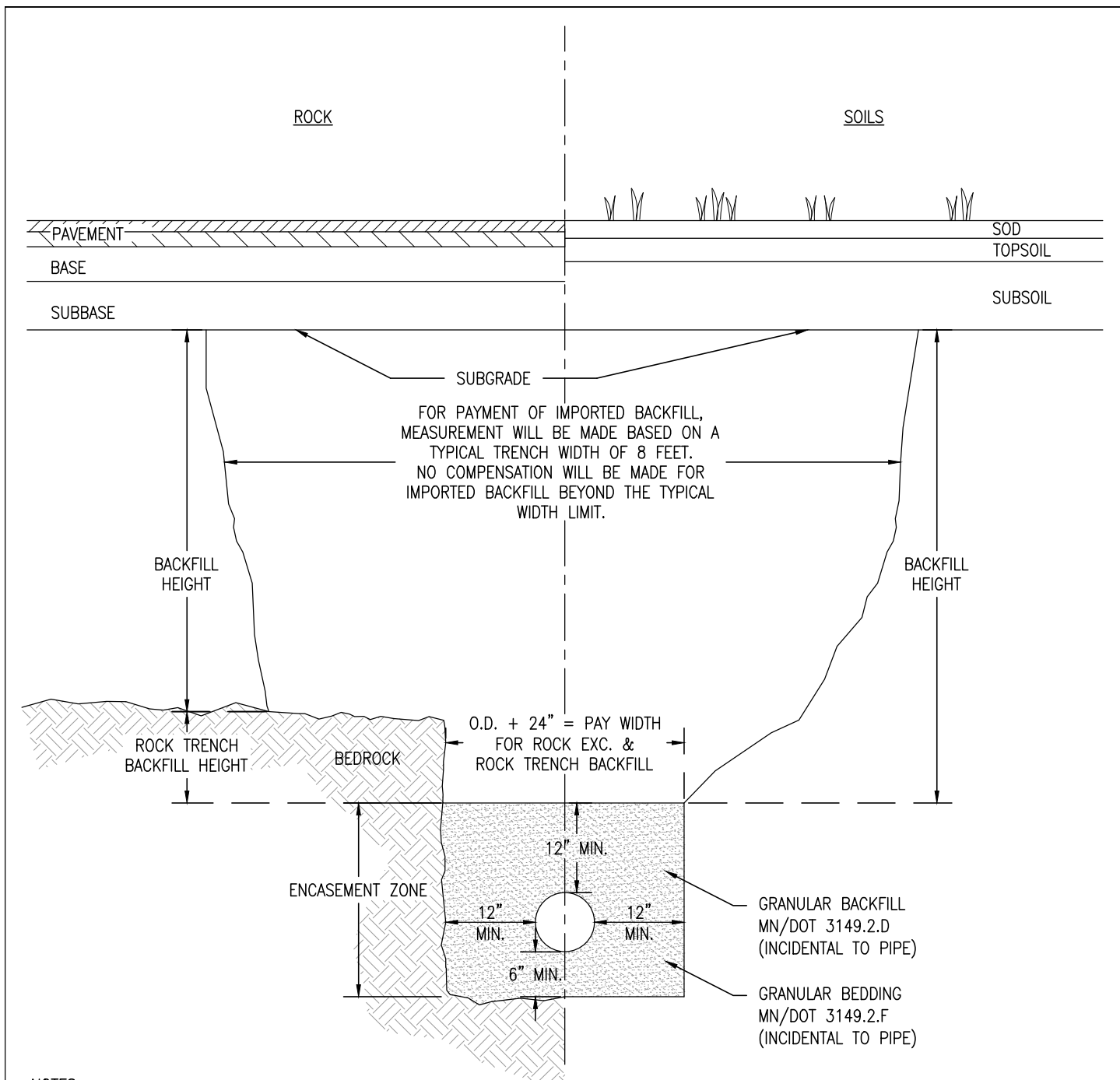
<b>W-4</b>	TYPICAL COPPER WATER SERVICE – ¾", 1", 1 ¼", AND 2"
<b>W-4A</b>	TYPICAL HDPE WATER SERVICE – 1", 1 ¼", AND 2"
<b>W-4B</b>	4" AND LARGER WATER SERVICE – HDPE
<b>W-4C</b>	4" AND LARGER WATER SERVICE – DUCTILE IRON
<b>W-4D</b>	4" AND LARGER WATER SERVICE WITH CAP – HDPE
<b>W-5</b>	STRAPPING WATER MAIN VERTICAL OFFSETS
<b>W-6</b>	2" HDPE WATER MAIN CONNECTION TO DI OR CI
<b>W-7</b>	EXCAVATION FOR TAPPING SLEEVE AND VALVE
<b>W-8</b>	WATER SERVICE INSULATION
<b>W-9</b>	CAST IRON WATER MANHOLE FRAME AND COVER
<b>W-10</b>	WATER VALVE BOX – DUCTILE IRON MAIN
<b>W-10A</b>	WATER VALVE BOX – HDPE MAIN
<b>W-11</b>	ANODE CONNECTION

#### **STREET DETAILS**

<b>STR-1</b>	DRIVEWAY AND ALLEY ENTRANCES
<b>STR-2</b>	TYPICAL STREET RESTORATION OVER TRENCH
<b>STR-3</b>	TYPICAL URBAN STREET SECTION
<b>STR-4</b>	TYPICAL RURAL STREET BITUMINOUS SECTION
<b>STR-5</b>	TYPICAL RURAL STREET GRAVEL SECTION
<b>STR-6</b>	PERFORATED PIPE DETAIL

#### **TRANSPORTATION DETAILS**

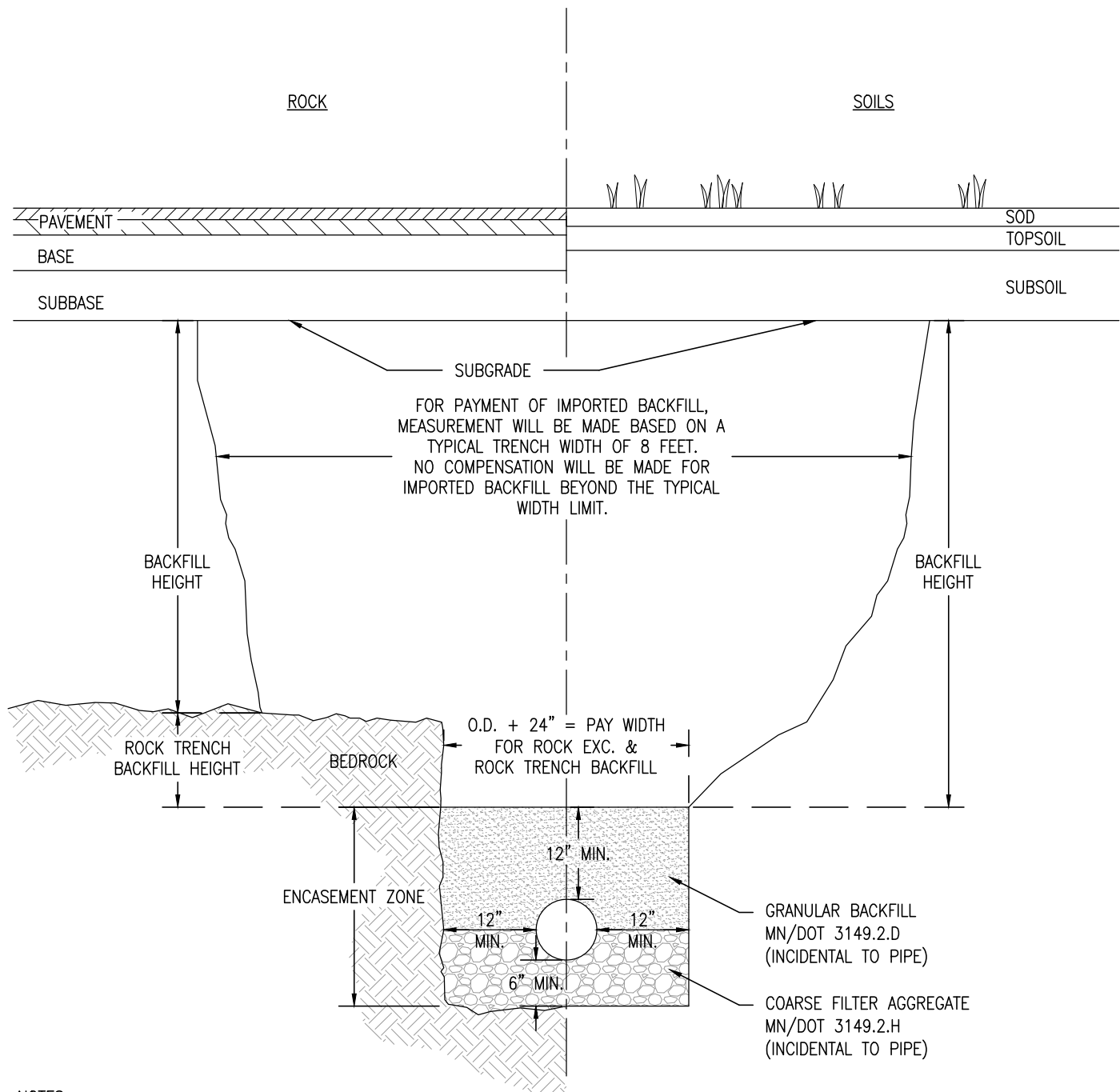
<b>T-1</b>	SIGN INSTALLATION DETAIL
<b>T-2</b>	911 ADDRESS SIGN



NOTES:

1. EXCESS EXCAVATION MATERIAL SHALL BE DISPOSED OF OFF PROJECT R.O.W. (INCIDENTAL)
2. PAY WIDTH FOR ROCK EXCAVATION SHALL BE BASED ON OUTSIDE DIAMETER OF PIPE PLUS 24".
3. A MINIMUM OF 1 CUBIC YARD OF STRUCTURE EXCAVATION, CLASS R, WILL BE PAID FOR EVERY 10' OF PIPE WHERE ROCK REMOVAL IS REQUIRED.
4. TRENCH STABILIZATION BEDDING MATERIAL MAY BE USED IN AREAS AS DETERMINED BY THE ENGINEER.
5. ENCASEMENT ZONE MATERIAL SHALL BE COMPACTED TO 95% OF MAXIMUM STANDARD PROCTOR DENSITY.
6. BACKFILL SHALL BE SELECT GRADING MATERIAL FOUND ON-SITE WHEN DEEMED SUITABLE BY THE ENGINEER OR AS OTHERWISE DEFINED IN THE PROJECT SPECIAL PROVISIONS. WHEN ON-SITE MATERIAL IS NOT SUITABLE AND WHEN BACKFILL MATERIAL IS NOT SPECIFIED, IMPORTED MATERIAL MEETING MN/DOT 3149.2.D.1 GRANULAR BACKFILL SHALL BE PROVIDED. USE OF NATIVE ON-SITE MATERIAL IS INCIDENTAL.
7. COMPACT BACKFILL MATERIALS TO 100% OF MAXIMUM STANDARD PROCTOR DENSITY FOR THE UPPER 3' BELOW THE SUBGRADE, AND TO 95% OF MAXIMUM STANDARD PROCTOR DENSITY BELOW THE UPPER 3'.

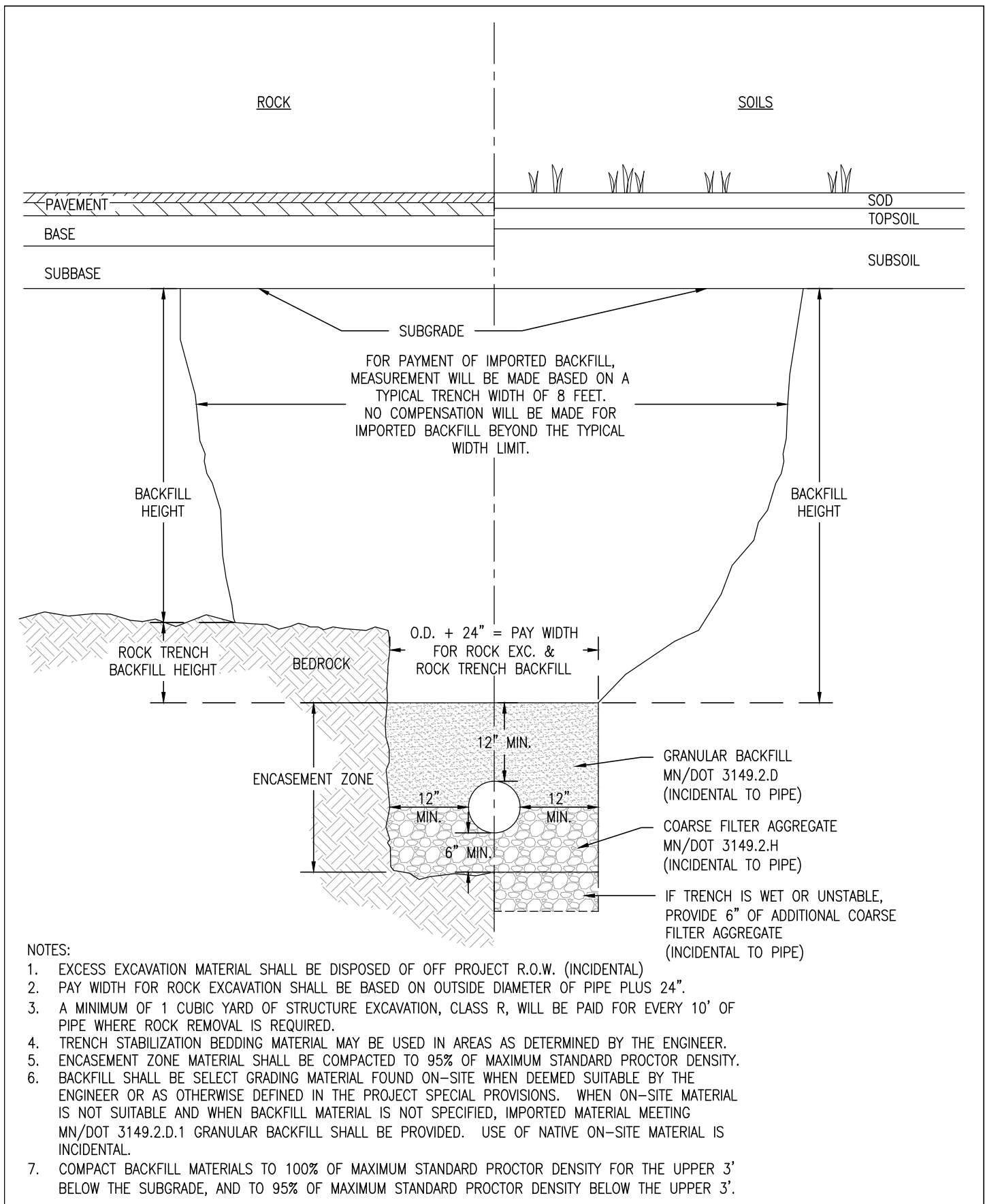
	DUCTILE IRON, PE WATER MAIN, PRESSURE SEWER, & FORCE MAIN BEDDING	EX-1	NO SCALE
	CITY OF HERMANTOWN STANDARD DETAIL PUBLIC WORKS DEPARTMENT	APPROVED 4/19/2022	



NOTES:

1. EXCESS EXCAVATION MATERIAL SHALL BE DISPOSED OF OFF PROJECT R.O.W. (INCIDENTAL)
2. PAY WIDTH FOR ROCK EXCAVATION SHALL BE BASED ON OUTSIDE DIAMETER OF PIPE PLUS 24".
3. A MINIMUM OF 1 CUBIC YARD OF STRUCTURE EXCAVATION, CLASS R, WILL BE PAID FOR EVERY 10' OF PIPE WHERE ROCK REMOVAL IS REQUIRED.
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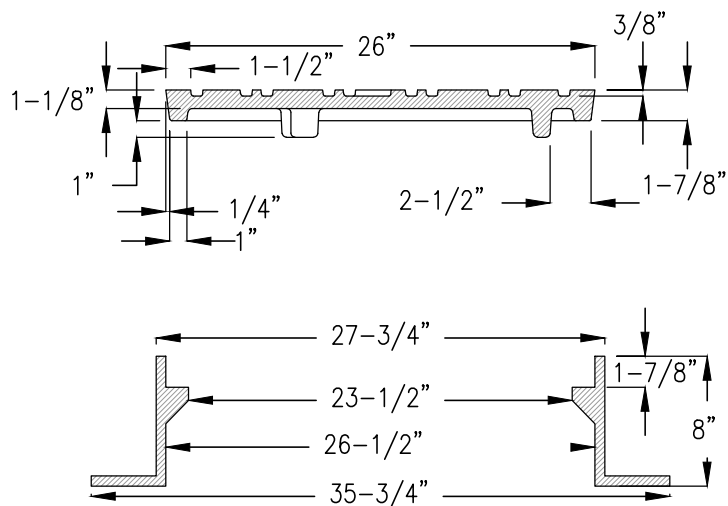
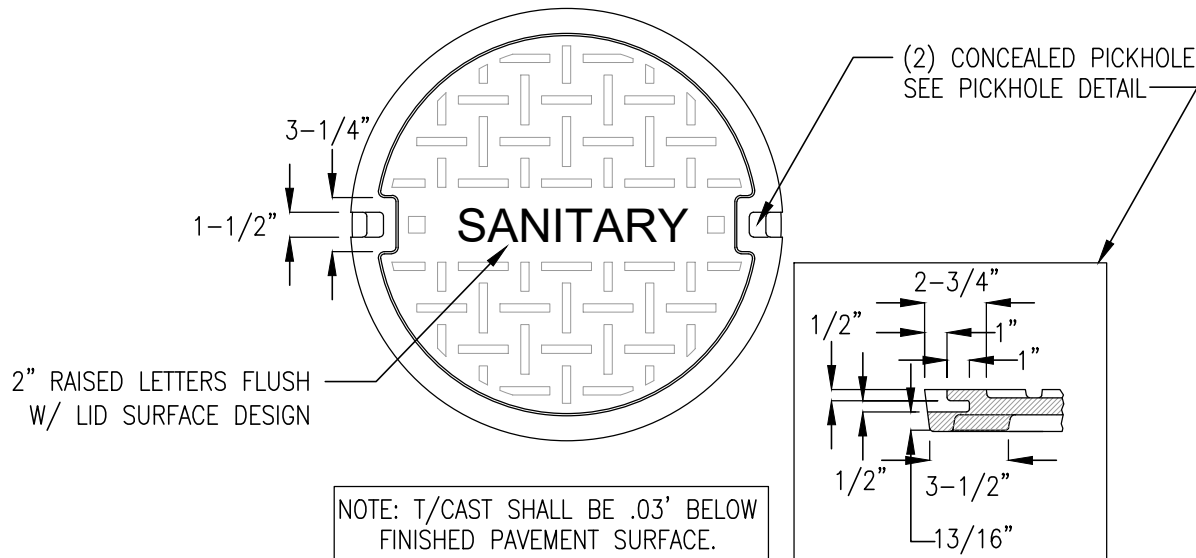


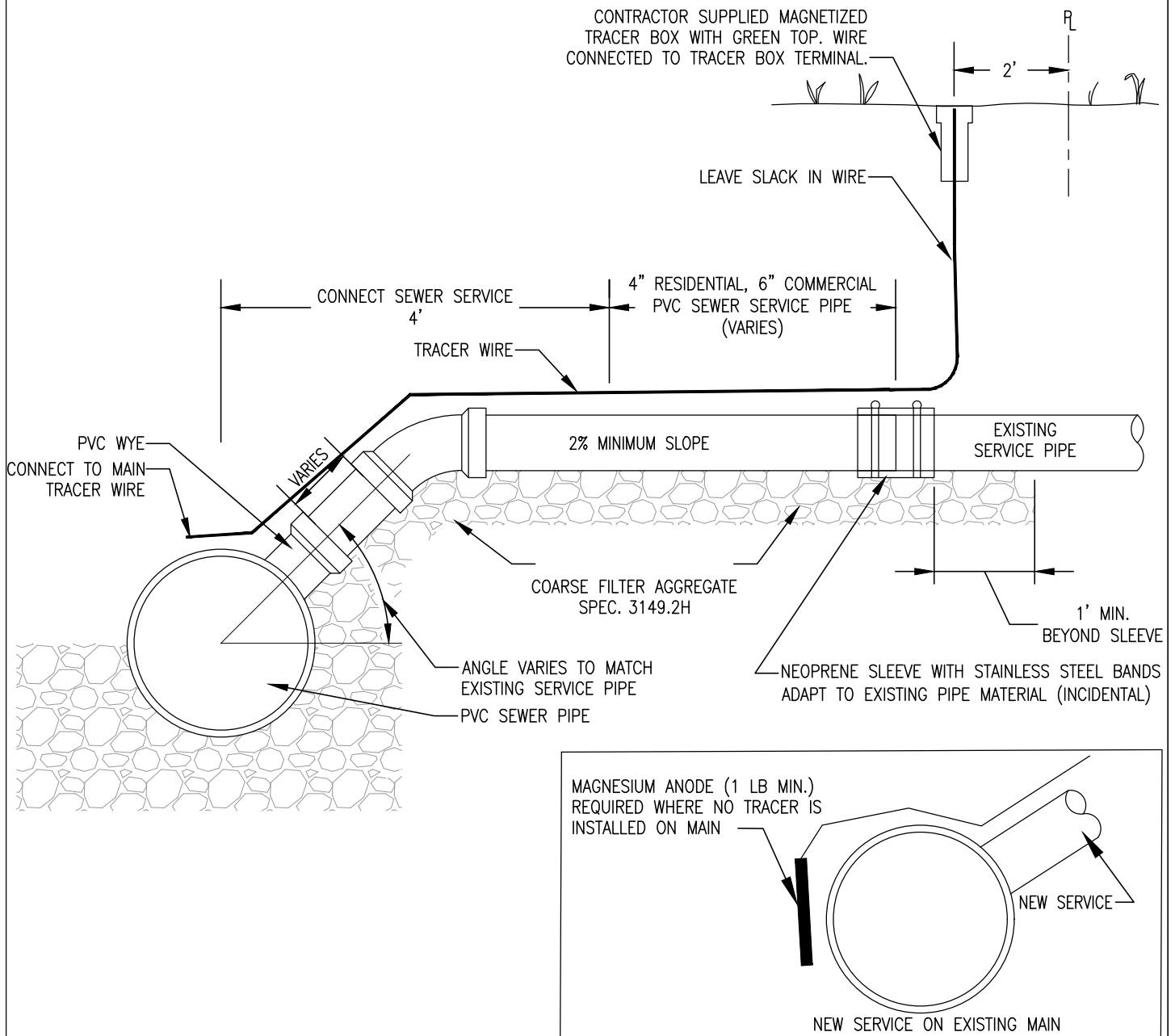


	CONCRETE STORM SEWER BEDDING	EX-3	NO SCALE
	CITY OF HERMANTOWN STANDARD DETAIL PUBLIC WORKS DEPARTMENT	APPROVED 4/19/2022	

WGT. 298 LBS		MATERIAL: GRAY IRON CLASS 35B
WGT. 122 LBS	TOTAL WEIGHT 420 LBS.	SPEC.: ASTM A-48-74

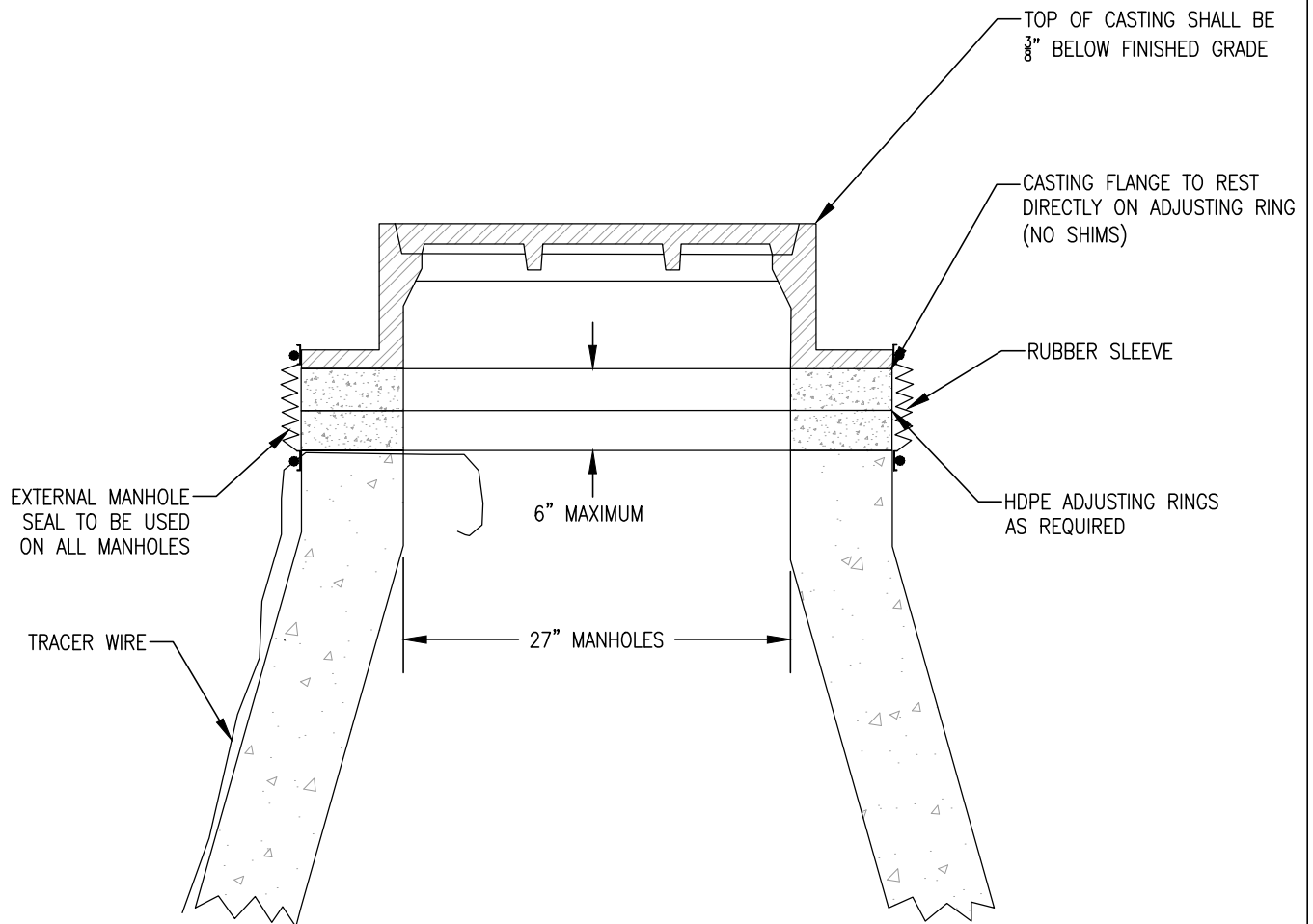
NOTE: SUITABLE FOR HS25 WHEEL LOADS





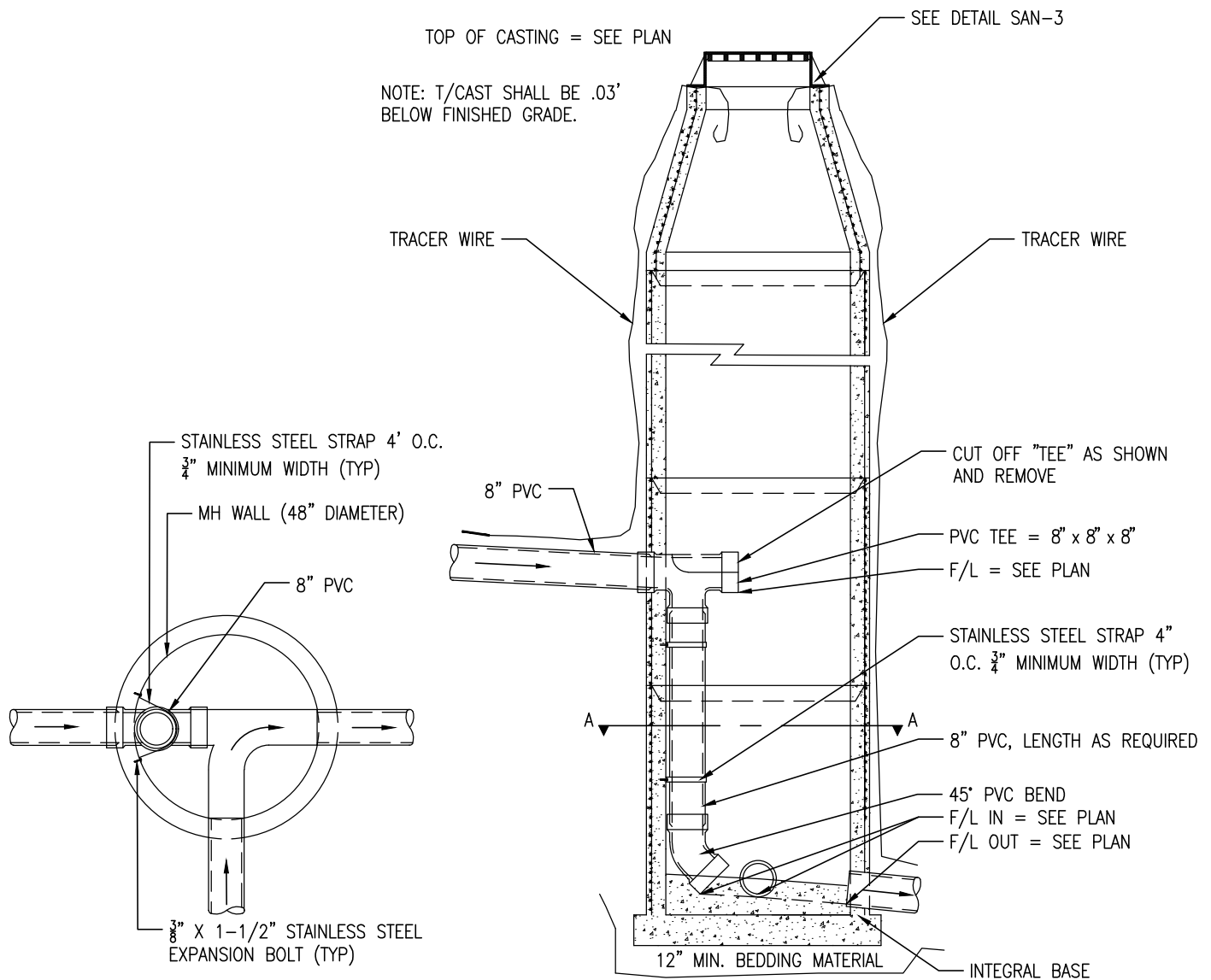
#### NOTES

1. BID ITEM FOR PVC WYE INCLUDES FURNISHING AND INSTALLING WYE IN SEWER MAIN.
2. CONNECT SEWER SERVICE INCLUDES 6" PVC SEWER SERVICE PIPE (TO 4' FROM C/L) AND ALL FITTINGS
3. 6" PVC SEWER SERVICE PIPE IS INTENDED FOR THE RECONSTRUCTION OF SEWER SERVICES (WHEN FOUND TO BE IN NEED BY THE ENGINEER) COMPLETE IN PLACE FROM 4.0' BEYOND THE C/L OF THE SEWER MAIN TO A POINT DESIGNATED BY THE ENGINEER
4. FOR NEW SERVICES, PIPE TO STOP AT RIGHT OF WAY
5. #12 GAUGE GREEN INSULATED COPPER TRACER WIRE SHALL BE INSTALLED WITH SANITARY SEWER MAINS AND SERVICES. TRACER WIRE TERMINAL BOXES SHALL BE INSTALLED DIRECTLY ABOVE THE SEWER SERVICE OR AS DETERMINED BY THE ENGINEER
6. FOR SERVICES, TRACER WIRE SHALL RUN FROM THE WYE AND TERMINATE IN A FLUSH MOUNTED TRACER BOX WITH A GREEN CAST IRON LOCKABLE TOP.
7. THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. SPLICES IN THE TRACER WIRE SHOULD BE MADE WITH SPLIT BOLT CONNECTORS. WIRE NUTS SHALL NOT BE USED. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.

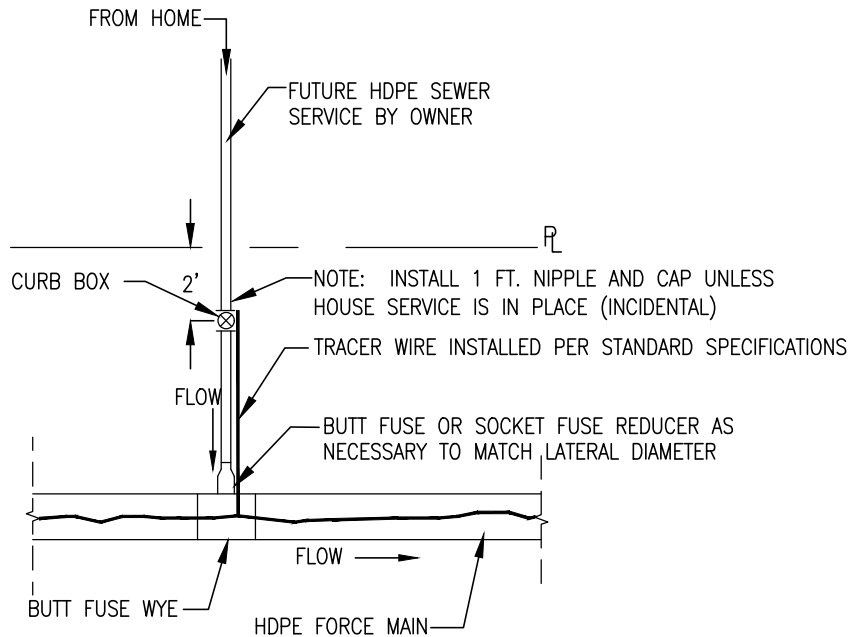
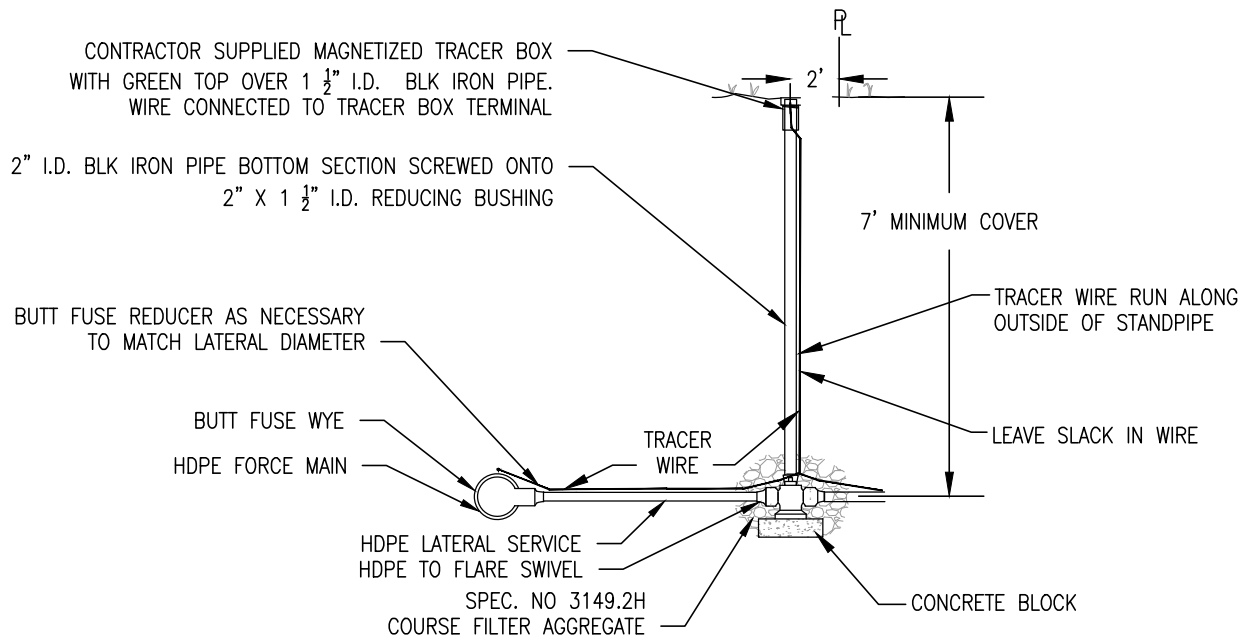


NOTE:

1. ALL SEALS SHALL EXTEND FROM THE CASTING TO THE CONE
2. TRACER WIRE REQUIRED ON ALL SANITARY SEWER MAINS

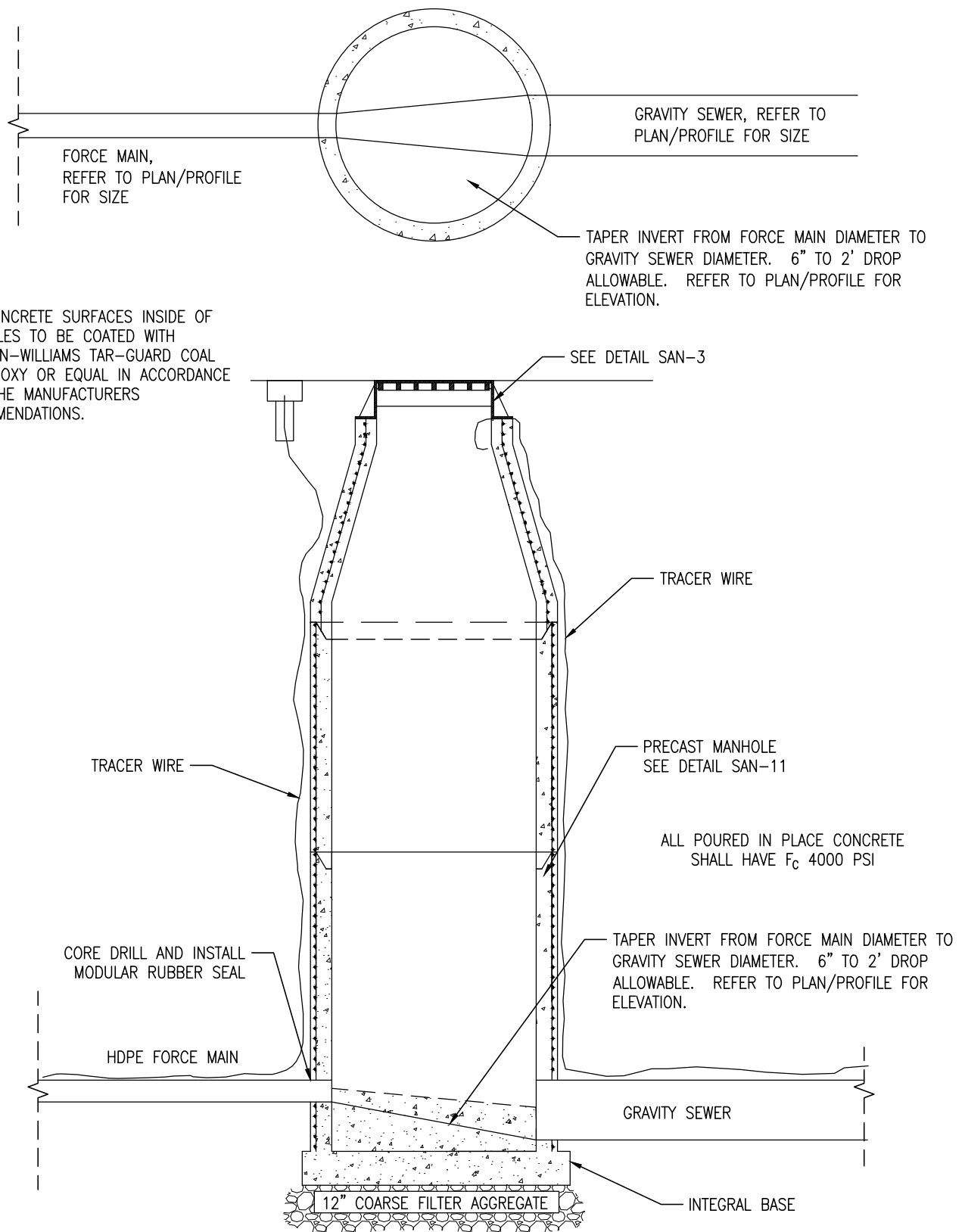


NOTES: REFER TO PLAN/PROFILES FOR ELEVATIONS



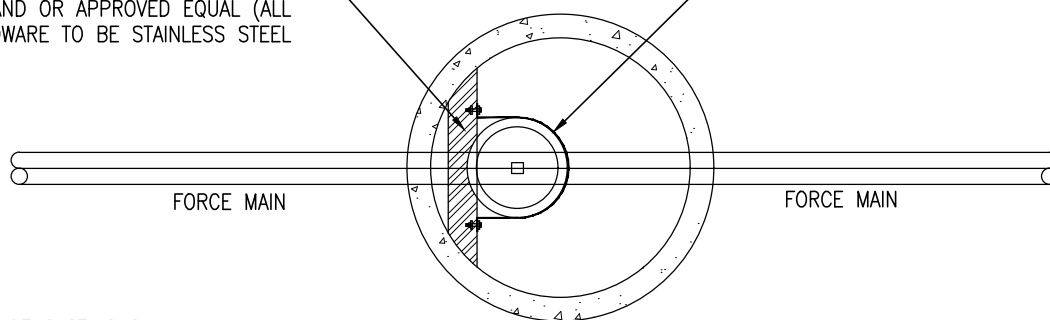
NOTES:

1. #12 GAUGE GREEN INSULATED COPPER TRACER WIRE SHALL BE INSTALLED WITH THE NON-CONDUCTIVE SERVICE PIPE. TRACER WIRE INSTALLATION REQUIRES ACCESS POINTS AT LEAST EVERY 300 FEET.
2. THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. SPLICES IN THE TRACER WIRE SHOULD BE MADE WITH SPLIT BOLT CONNECTORS. WIRE NUTS SHALL NOT BE USED. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.
3. TRACER WIRE SHALL RUN FROM THE WYE AND TERMINATE IN A FLUSH MOUNTED TRACER BOX WITH A GREEN CAST IRON TOP.



1-1/2" X 1-1/2" S.S. SUPPORT BRACKETS  
WITH S.S. BAND OR APPROVED EQUAL (ALL  
PARTS AND HARDWARE TO BE STAINLESS STEEL)

AIR VACUUM RELEASE VALVE



FORCE MAIN

FORCE MAIN

NOTE: TOP OF CASTING SHALL  
BE .03' BELOW FINISHED GRADE

SEE DETAIL SAN-3

MAGNETIZED TRACER WIRE BOX

6" POLYSTYRENE INSULATION  
BOARD (DOW STYROFOAM HI 40,  
CERTIFOAM 40, OR EQUIVALENT)

1/2" TREATED PLYWOOD  
SUPPORTED BY 1" S.S. ANGLE  
IRON W/ STAINLESS LAG BOLTS  
INCIDENTAL TO MH CONSTRUCTION

ALL POURED IN PLACE CONCRETE  
SHALL BE F<sub>c</sub> 4000 PSI

8' X 8' X 3"  
POLYSTYRENE INSULATION

MAGNETIZED TRACER WIRE BOX

PRECAST MANHOLE  
SEE DETAIL SAN-11

3" X 12" X 4'  
INSULATION STRIPS

1-1/2" X 1-1/2" S.S.  
SUPPORT BRACKET WITH S.S.  
BAND OR APPROVED EQUAL

TRACER WIRE

TRACER WIRE

AIR VACUUM RELEASE VALVE  
APCO MODEL 443,  
VAL-MATIC 801WA, OR  
APPROVED EQUAL

ELECTROFUSION SERVICE SADDLE  
WITH 2" BRASS INSERT

CORE DRILL AND  
INSTALL MODULAR  
RUBBER SEAL

HDPE FORCE MAIN

2" GALVANIZED IRON PIPE

2" PE FULLY PORTED THREADED  
BALL VALVE

HDPE FORCE MAIN

CONCRETE SUPPORT,  
MIN. 8" HIGH



INTEGRAL BASE

NOTE: MANHOLE TO MEET ALL REQUIREMENTS OF SAN-11



1-1/2" X 1-1/2" S.S. SUPPORT BRACKETS  
WITH S.S. BAND OR APPROVED EQUAL (ALL  
PARTS AND HARDWARE TO BE STAINLESS STEEL)

CLEANOUT

FORCE MAIN

NOTE: TOP OF CASTING SHALL  
BE .03' BELOW FINISHED GRADE

SEE DETAIL SAN-3

MAGNETIZED TRACER WIRE BOX

6" POLYSTYRENE INSULATION  
BOARD (DOW STYROFOAM HI 40,  
CERTIFOAM 40, OR EQUIVALENT)

1/2" TREATED PLYWOOD  
SUPPORTED BY 1" S.S. ANGLE  
IRON W/ STAINLESS LAG BOLTS  
INCIDENTAL TO MH CONSTRUCTION

2" CAMLOCK COUPLER 3" BELOW PLYWOOD

2" PE FULLY PORTED  
THREADED BALL VALVE

1-1/2" X 1-1/2" S.S. SUPPORT  
BRACKET WITH S.S. BAND OR APPROVED  
EQUAL BELOW VALVE AND EVERY 4'  
(ALL PARTS AND HARDWARE TO BE  
STAINLESS STEEL)

TRACER WIRE

ALL POURED IN PLACE CONCRETE SHALL  
BE  $F_c$  4000 PSI

PRECAST MANHOLE  
SEE DETAIL SAN-11

PE 45° BEND

PE WYE

HDPE FORCE MAIN

HDPE FORCE MAIN

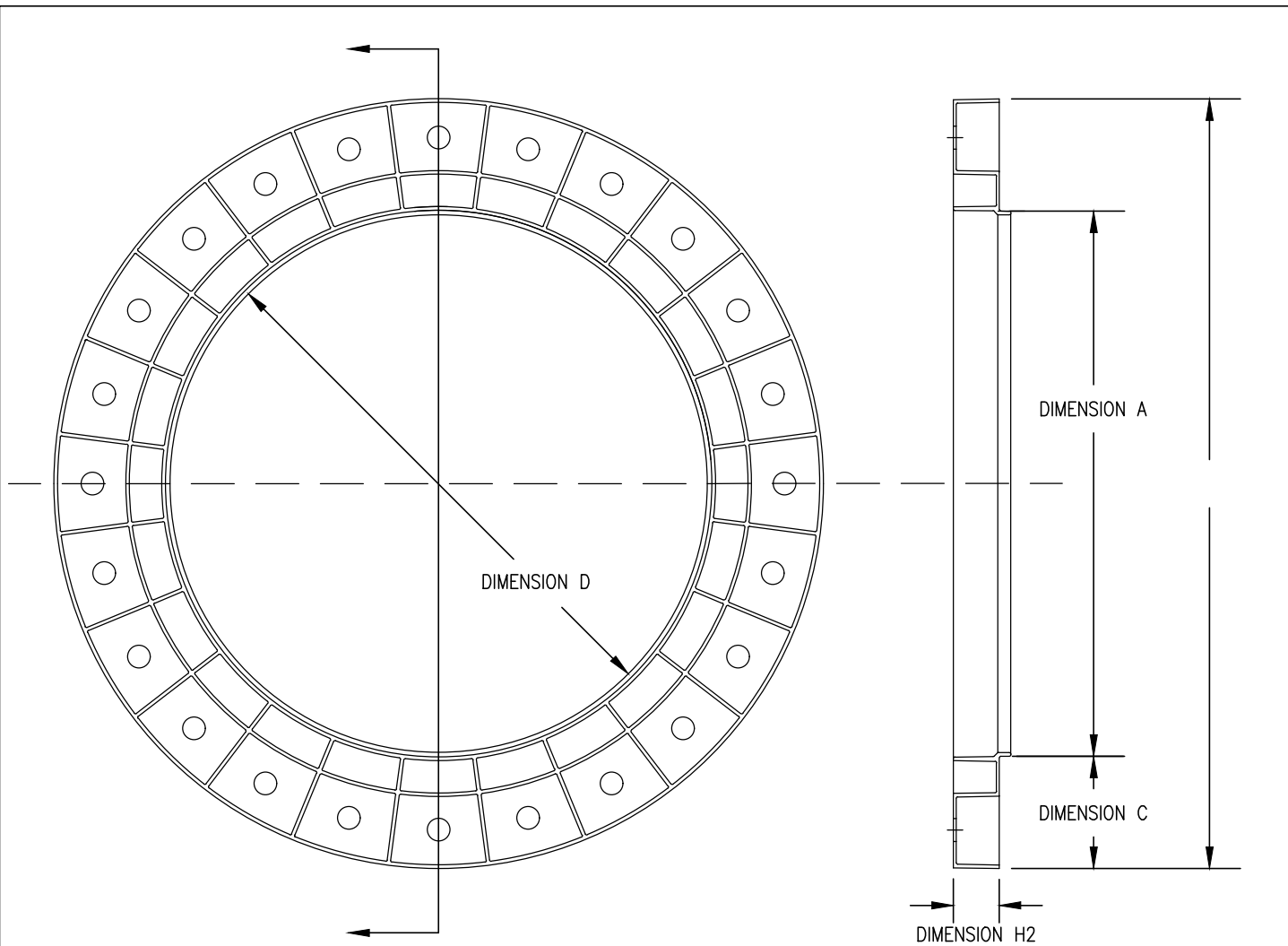
TRACER WIRE

CORE DRILL AND  
INSTALL MODULAR  
RUBBER SEAL

CONCRETE SUPPORT  
MIN. 8" HIGH

12" COARSE FILTER AGGREGATE

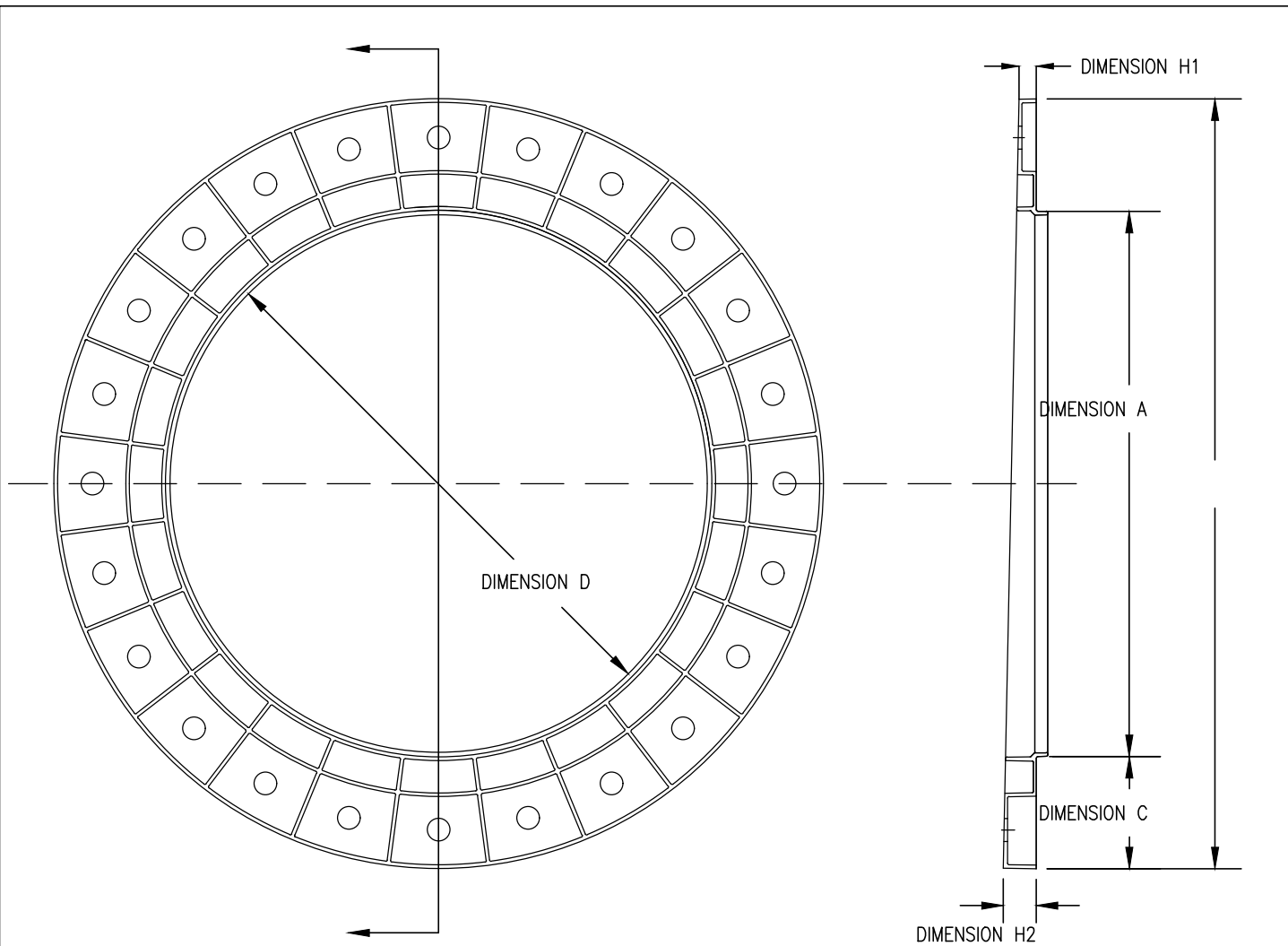
INTEGRAL BASE



DIMENSION SCHEDULE					
CONE SIZE	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION D	DIMENSION H1
27.00	26.75	36.50	5.00	26.25	1.20, 1.50, 2.00, 4.00

**DESCRIPTION**

1. PLASTIC INJECTION MOLDED ADJUSTMENT RING
2. MOLDED FROM HIGH DENSITY POLYETHYLENE AS DEFINED IN ASTM SPECIFICATION D1248
3. ACTUAL RESIN PROPERTIES WILL VARY ALLOWING FOR THE UTILIZATION OF A MAXIMUM PERCENT OF RECYCLED MATERIAL
4. THE PERCENT OF POST CONSUMER WASTE TO INDUSTRIAL WASTE WILL VARY WITH AVAILABILITY AND PROPERTY RETENTION NEEDS
5. COLOR, SHADE AND UNIFORMITY WILL VARY WITH THE MIX OF THE POST CONSUMER AND INDUSTRIAL WASTE MATERIALS
6. DIMENSIONS SHOWN ARE NOMINAL – ACTUAL SIZE WILL VARY WITHIN ALLOWABLE TOLERANCE AND REQUIRED FIT

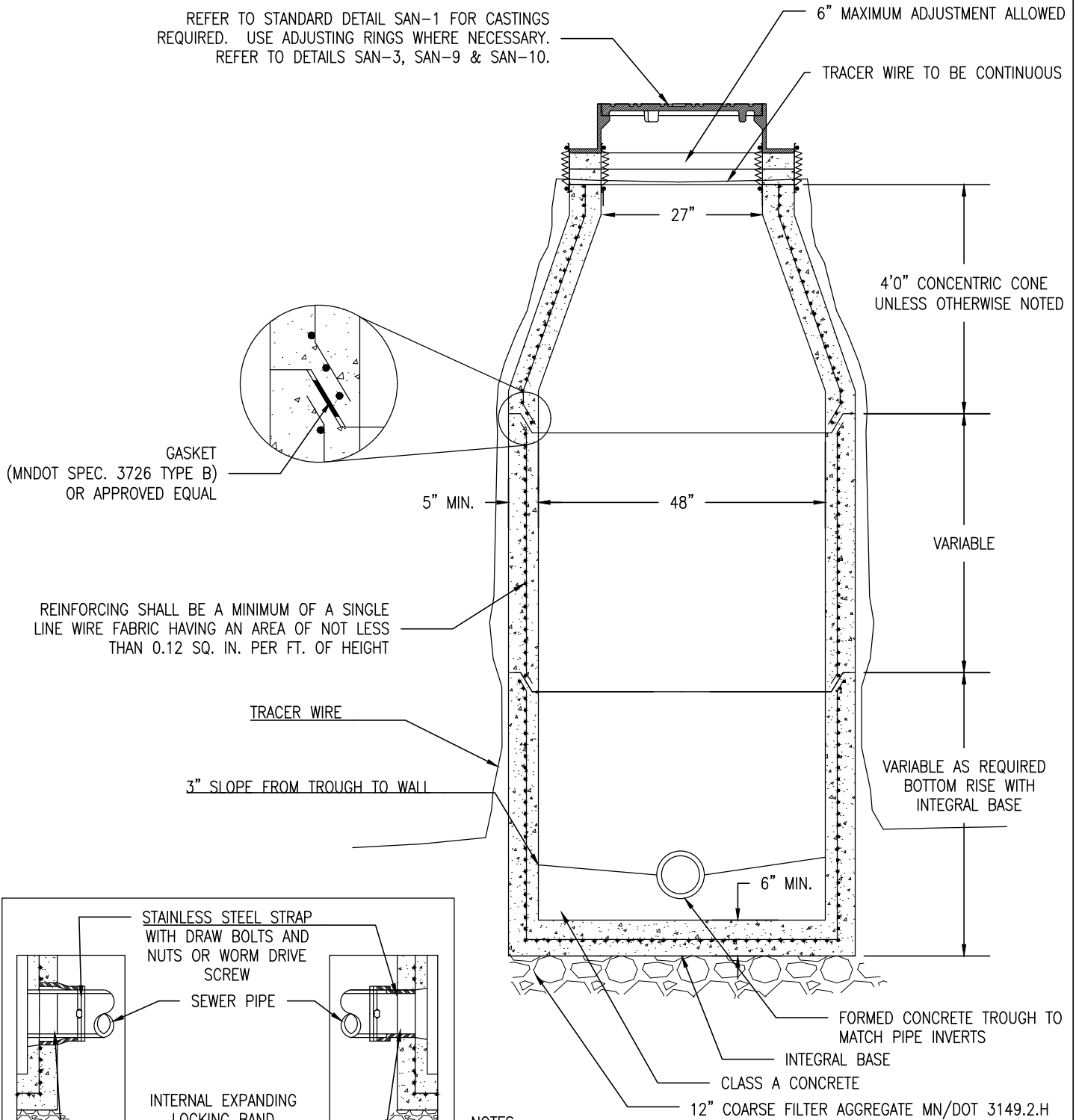


DIMENSION SCHEDULE					
CONE SIZE	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION D	DIMENSION H1-H2
27.00	26.75	36.50	5.00	26.25	0.75 - 1.50

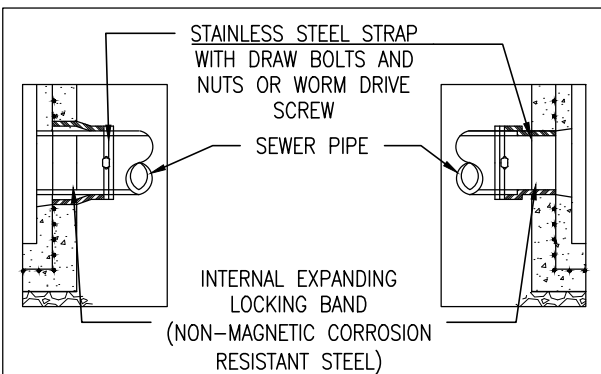
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6. DIMENSIONS SHOWN ARE NOMINAL - ACTUAL SIZE WILL VARY WITHIN ALLOWABLE TOLERANCE AND REQUIRED FIT

REFER TO STANDARD DETAIL SAN-1 FOR CASTINGS  
REQUIRED. USE ADJUSTING RINGS WHERE NECESSARY.  
REFER TO DETAILS SAN-3, SAN-9 & SAN-10.



REINFORCING SHALL BE A MINIMUM OF A SINGLE  
LINE WIRE FABRIC HAVING AN AREA OF NOT LESS  
THAN 0.12 SQ. IN. PER FT. OF HEIGHT



PIPE SLEEVE DETAIL

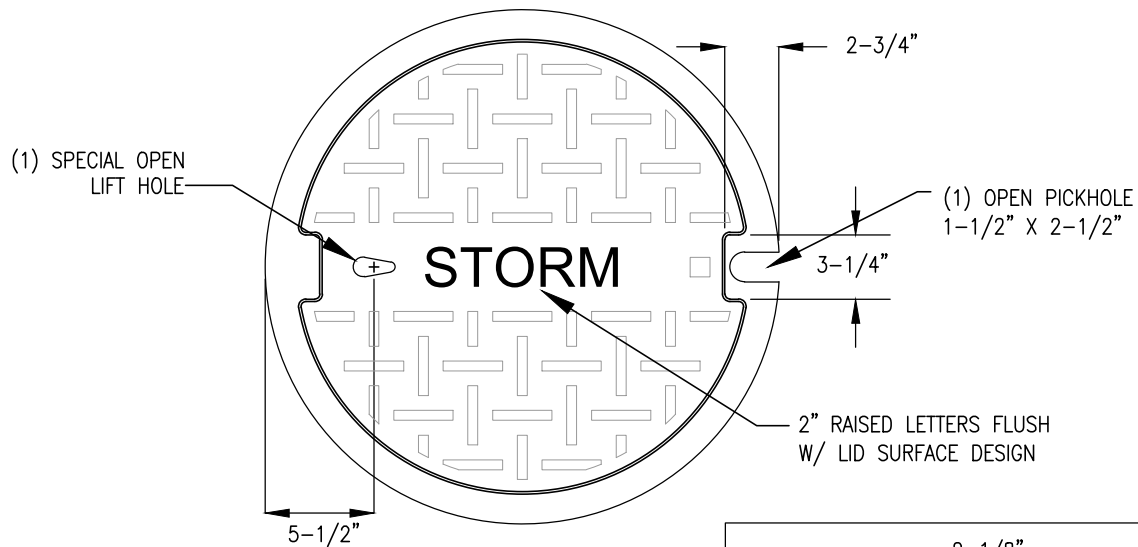
1. ALL PIPE SLEEVES MUST BE WATER TIGHT

NOTES

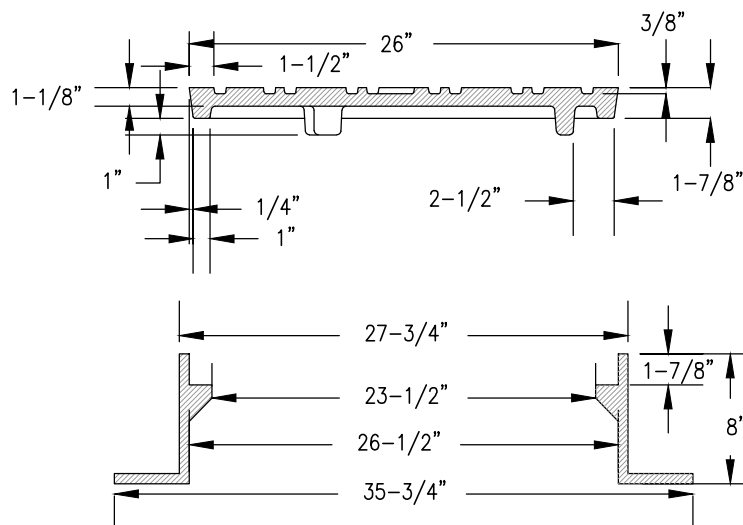
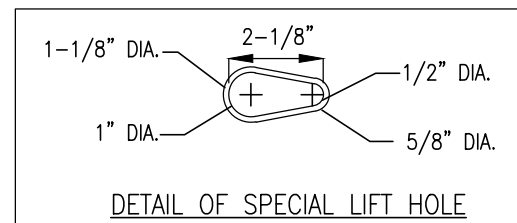
1. SANITARY MANHOLES SHALL NOT HAVE STEPS.
2. ALL SANITARY MANHOLES SHALL BE VACUUM TESTED.
3. ALL SANITARY MANHOLES SHALL BE WATERTIGHT. ANY OBSERVABLE WATER SEEPAGE THROUGH THE END OF THE WARRANTY PERIOD SHALL BE CAUSE TO REJECT MANHOLES.
4. AN INSIDE DROP IS REQUIRED PER DETAIL SAN-4 ANYTIME THE DROP IS GREATER THAN 2.0'.

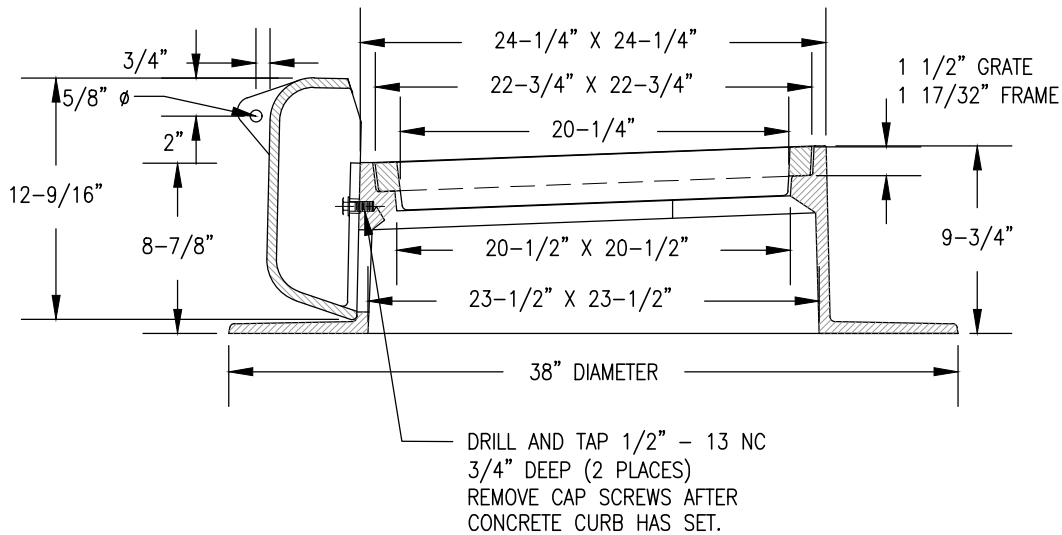
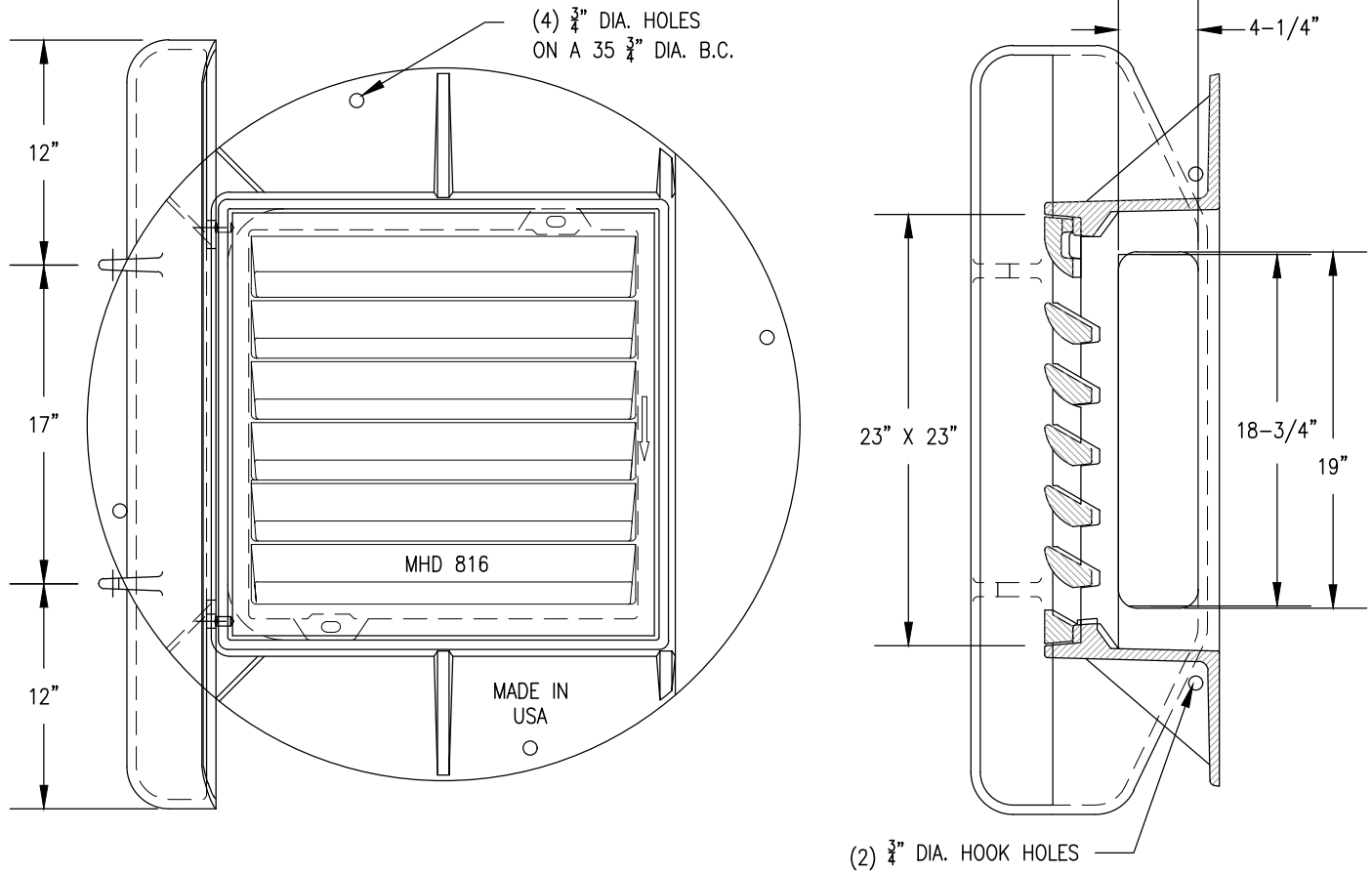
WEIGHT 298 LBS		MATL. GRAY IRON CLASS 35B
WEIGHT 122 LBS	TOTAL WEIGHT 420 LBS.	SPEC. ASTM A-48-74

NOTE: SUITABLE FOR HS25 WHEEL LOADS



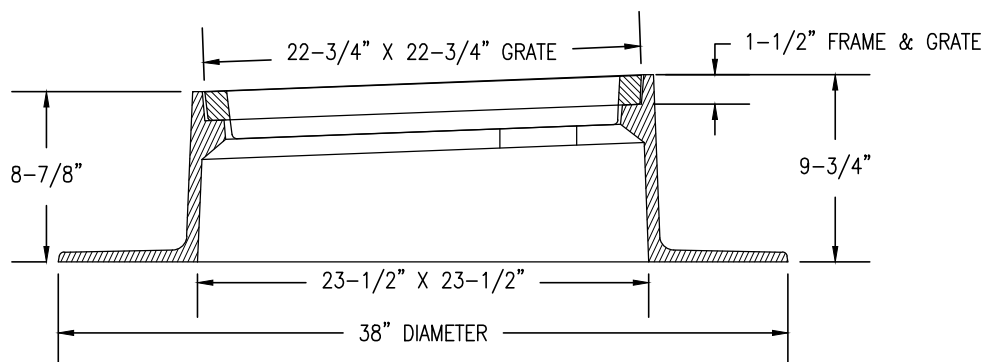
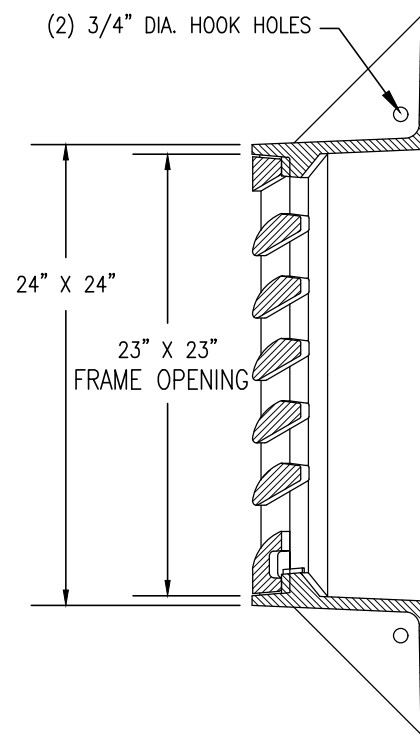
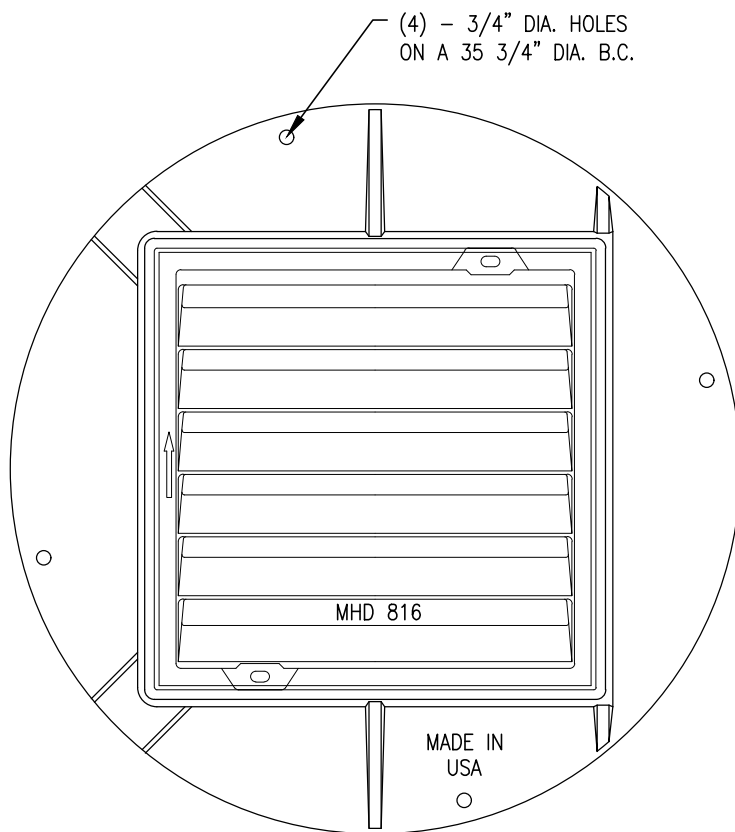
NOTE: T/CAST SHALL BE .03' BELOW  
FINISHED PAVEMENT SURFACE.





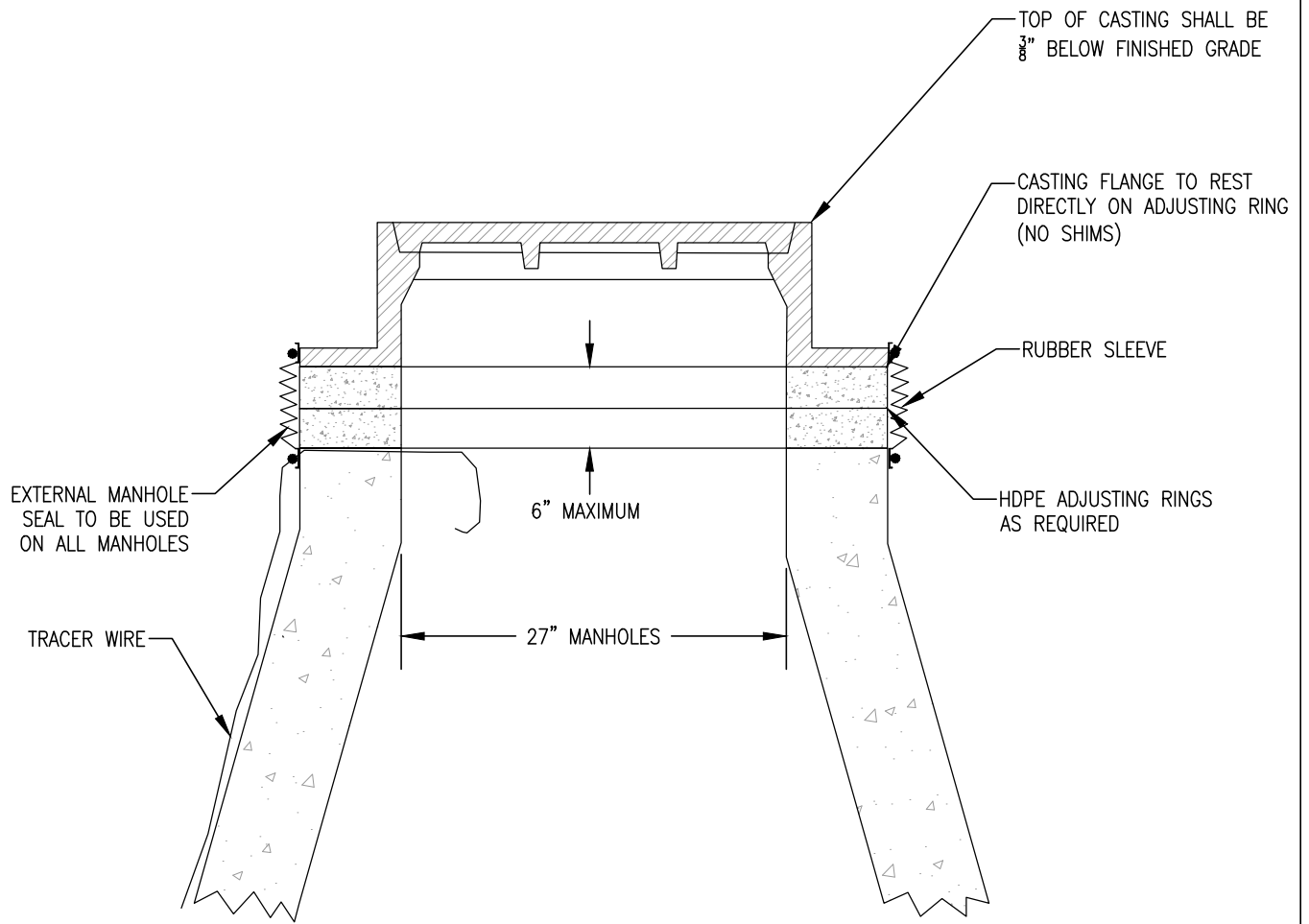
**NOTES:**

1. COMPONENT NO'S: FRAME 5002, GRATE MHD 816 (STD PLATE 4154), CURB BOX 823A (STD PLATE 4160).
2. MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
3. WEIGHT: FRAME APPROX. 257#, GRATE 131#, CURB BOX 105#.
4. ALL GUTTERS UPSTREAM OF CATCH BASINS SHALL BE STAMPED, "NO DUMPING, LEADS TO LAKE".



**NOTES:**

1. COMPONENT NO'S: FRAME 5005, GRATE 816 (STD PLATE 4154B).
2. MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
3. WEIGHT: FRAME 262#; GRATE 131#
4. ALL GUTTERS UPSTREAM OF CATCH BASINS SHALL BE STAMPED, "NO DUMPING, LEADS TO LAKE".

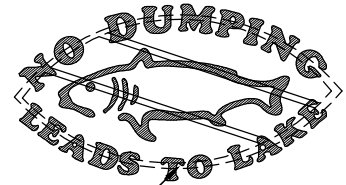
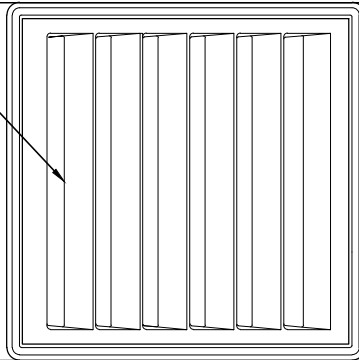


NOTE:  
TRACER WIRE REQUIRED ON ALL PLASTIC STORM SEWER PIPE

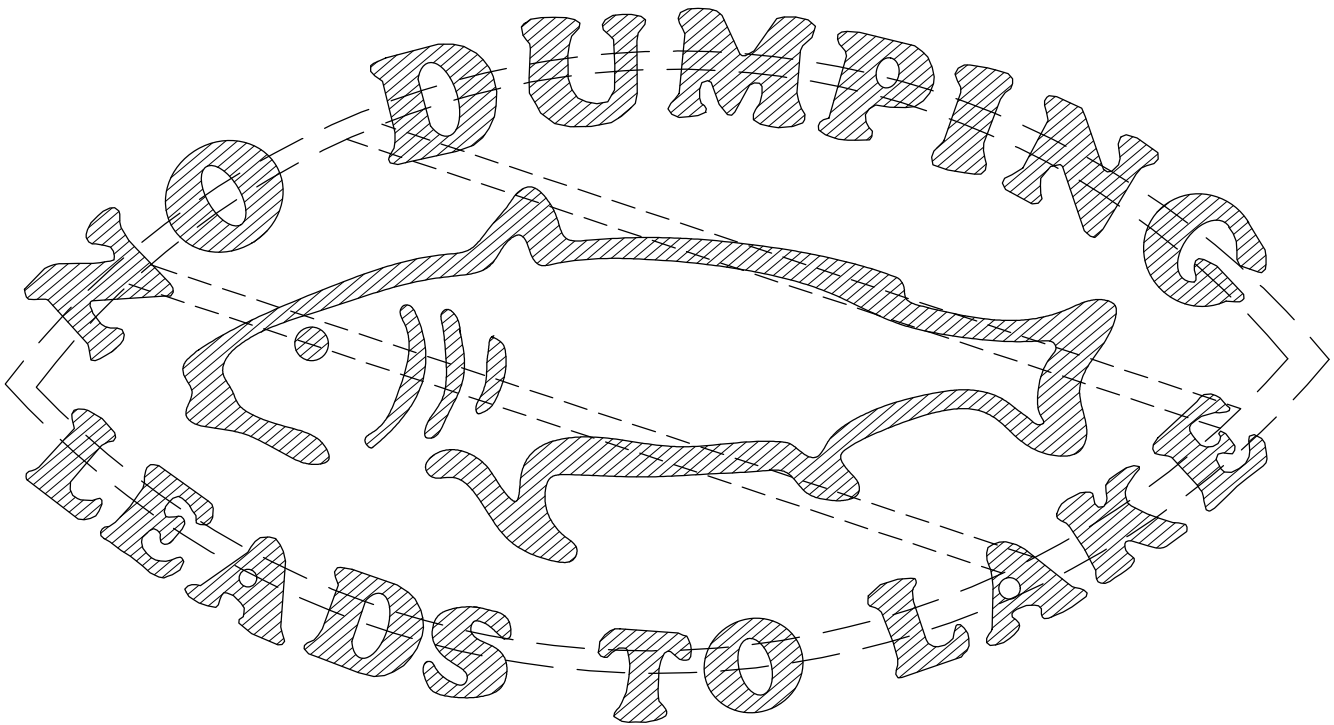


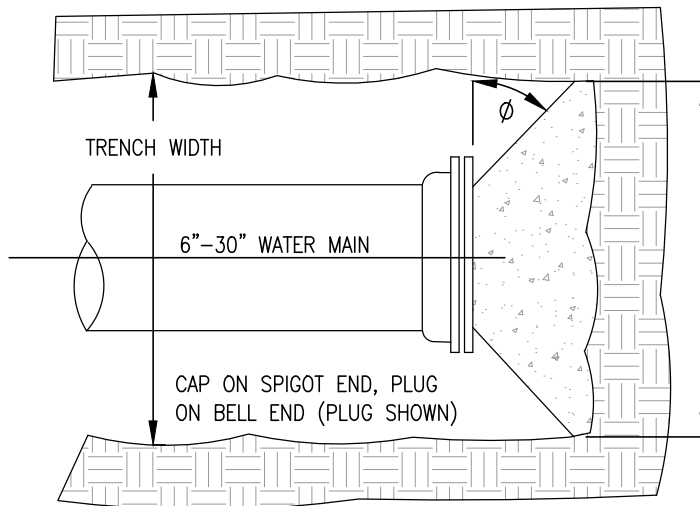
TOP OF CURB/GUTTER LINE

CATCH BASIN

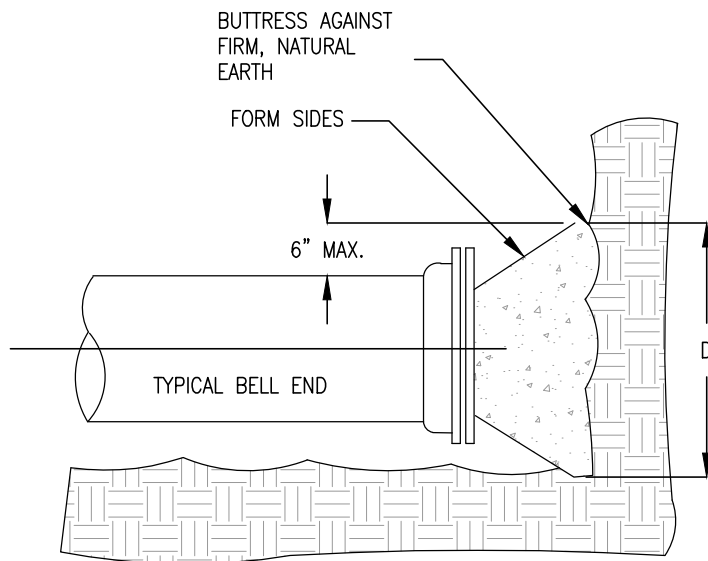


GUTTER STAMP TO BE PLACED A MAXIMUM OF 18"  
FROM CATCH BASIN GRATE ON UPHILL SIDE AND  
CENTERED IN GUTTER.





PLAN



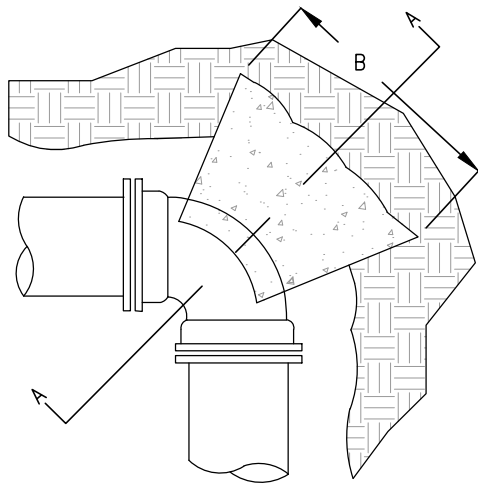
ELEVATION

BLOCKING DIMENSIONS

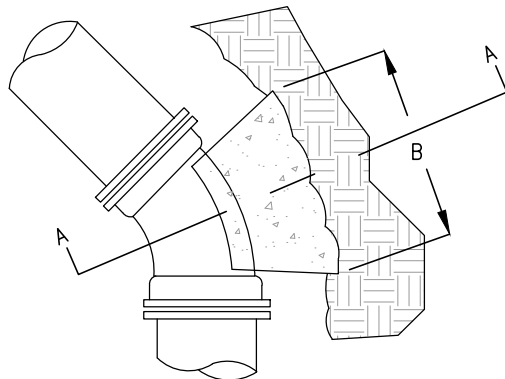
PLUG SIZE	B	D
6"	12"	15"
8"	24"	15"
10"	24"	20"
12"	30"	22"
16"	40"	28"
20"	50"	34"
24"	62"	40"
30"	80"	48"

NOTES:

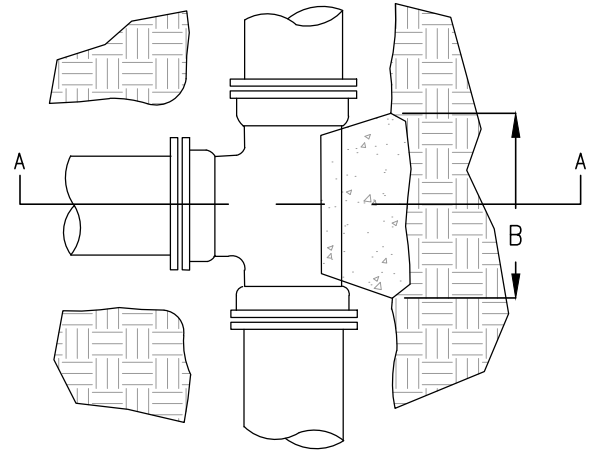
1. BLOCKING DIMENSIONS BASED ON EARTH RESISTANCE OF 2 TONS PER SQ. FT. WHERE, IN THE OPINION OF THE ENGINEER, EARTH IS POOR, BLOCKING SHALL BE INCREASED IN SIZE AS DIRECTED OR STRAPPING MAY BE NECESSARY.
2. ANGLE  $\phi$  SHALL BE EQUAL TO OR LARGER THAN 45°.
3. BLOCKING SHALL BE CENTERED ON MAIN.
4. CONCRETE SHALL BE MIX 3G52 – MNDOT 2461.
5. POLYETHYLENE SHALL BE USED TO SEPARATE CONCRETE FROM FITTING.
6. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



PLAN - 90° BEND

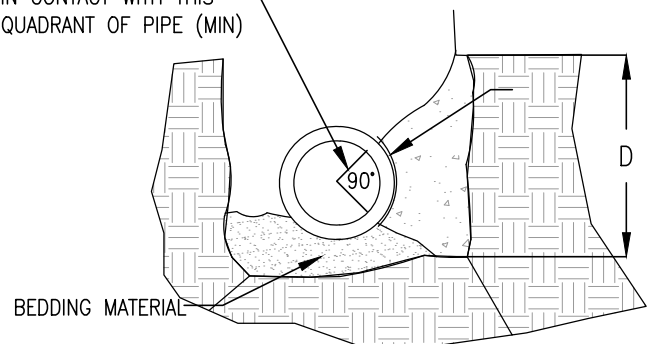


PLAN - 45° BEND



PLAN - TEE

CONCRETE SHALL BE  
IN CONTACT WITH THIS  
QUADRANT OF PIPE (MIN)

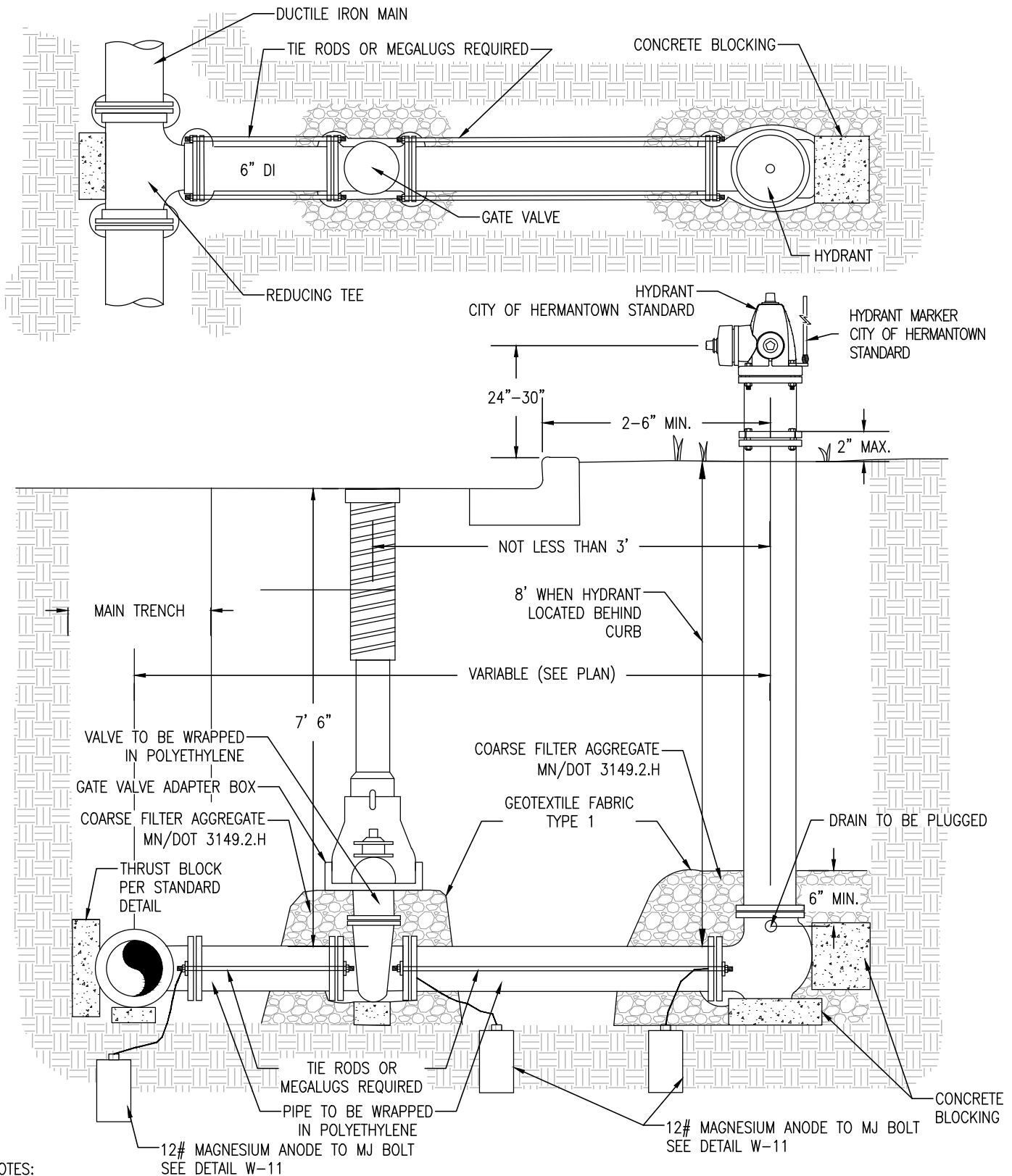


SECTION A-A

#### NOTES

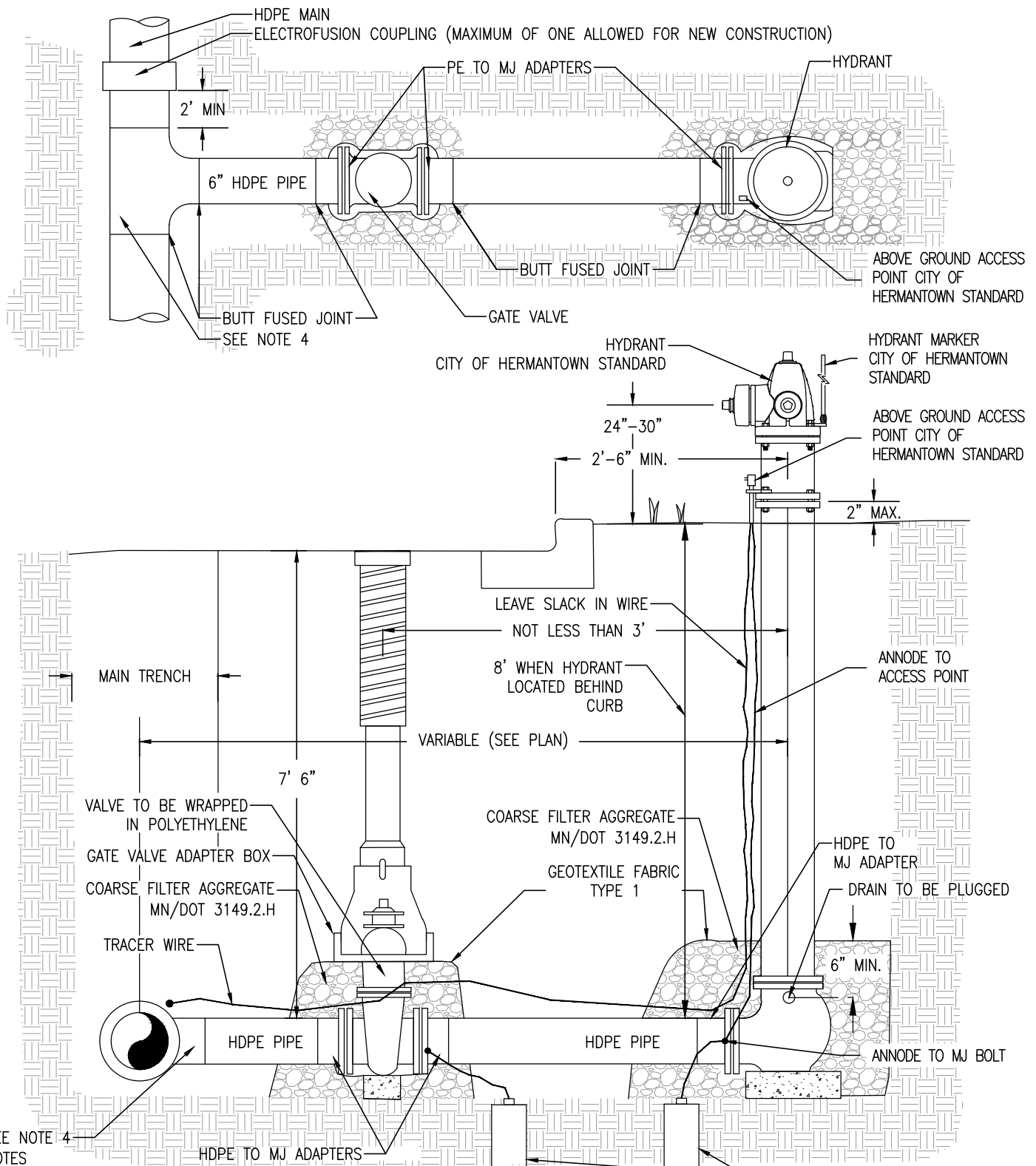
1. DIMENSIONS IN TABLE ARE BASED ON A WATER PRESSURE OF 150 P.S.I. & AN EARTH RESISTANCE OF 2 TONS/S.F.
2. BLOCKING TO BE SET AGAINST UNDISTURBED SOIL
3. CONCRETE SHALL BE MIX 3G52. (MNDOT SPEC. 2461) CONCRETE SHALL NOT INTERFERE WITH MECHANICAL JOINTS
4. POLYETHYLENE SHALL BE USED TO SEPARATE CONCRETE FROM FITTING.
5. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

BLOCKING DIMENSIONS								
BEND OR BRANCH SIZE	22-1/2" BENDS		45° BENDS		90° BENDS		TEES	
	B	D	B	D	B	D	B	D
0'-6"	1'-0"	1'-0"	1'-0"	1'-0"	1'-4"	1'-2"	1'-3"	1'-0"
0'-8"	1'-0"	1'-0"	1'-4"	1'-2"	1'-10"	1'-6"	1'-6"	1'-4"
1'-0"	1'-4"	1'-4"	1'-10"	1'-10"	2'-8"	2'-3"	2'-3"	2'-0"
1'-4"	1'-10"	1'-8"	2'-6"	2'-4"	3'-10"	2'-10"	3'-2"	2'-4"
1'-8"	2'-4"	2'-0"	3'-3"	2'-10"	5'-0"	3'-4"	4'-0"	3'-0"
2'-0"	2'-10"	2'-4"	4'-0"	3'-3"	6'-4"	3'-10"	5'-3"	3'-4"
2'-6"	3'-6"	3'-0"	5'-4"	3'-10"	8'-0"	4'-8"	6'-3"	4'-3"



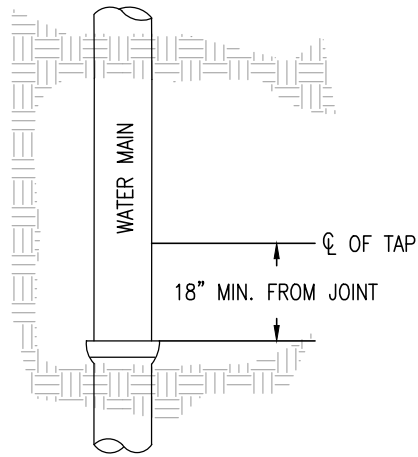
NOTES:

1. VALVES SHALL BE CONNECTED DIRECTLY TO AN ANCHORING TEE. WHENEVER DIRECT CONNECTION IS NOT POSSIBLE, TIE RODS OR MEGALUGS SHALL BE USED. TIE RODS SHALL BE GALVANIZED.
2. USE EPOXY COATING ON VALVE AND HYDRANT BASE.
3. ALL BOLTS SHALL BE COR-TEN WITH 6 OUNCE ZINC ANODE CAPS CONFORMING TO ASTM B-418 FOR ALL MECHANICAL JOINT FITTINGS.



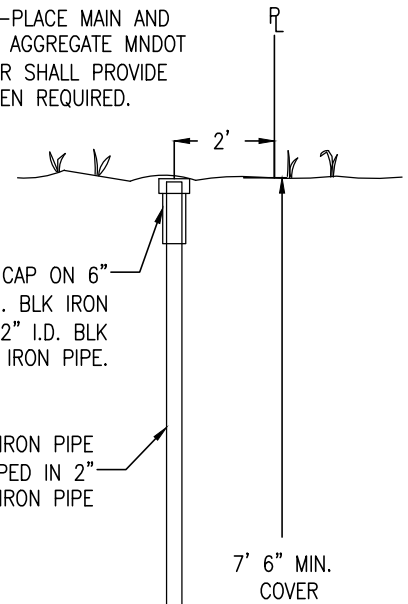
SEE NOTE 4  
NOTES

1. VALVES SHALL BE CONNECTED DIRECTLY TO MECHANICAL JOINT ADAPTER.
2. USE EPOXY COATING ON VALVE AND HYDRANT BASE
3. ALL BOLTS SHALL BE COR-TEN WITH 6 OUNCE ZINC ANODE CAPS CONFORMING TO ASTM B-418 FOR ALL MECHANICAL JOINT FITTINGS.
4. FOR 8" MAINS, CONTRACTOR SHALL USE AN 8 X 8 TEE WITH A MACHINED 8 X 6 REDUCER OR AN 8 X 6 ELECTROFUSION BRANCH SADDLE. FOR LARGER DIMENSION MAINS A FABRICATED TEE WITH A 6" BRANCH OUTLET MAY BE USED.
5. GATE VALVES WITH HDPE STUBS MAY BE USED IN LIEU OF MJ VALVES. ANODES SHALL BE CONNECTED DIRECTLY TO THE VALVE BONNET BOLTS.



TAPPING LOCATION

NOTE: EXCAVATE 6" UNDER IN-PLACE MAIN AND BACKFILL WITH COARSE FILTER AGGREGATE MNDOT SPEC. # 3149.2H. CONTRACTOR SHALL PROVIDE & PLACE A TRENCH BOX WHEN REQUIRED.



2" I.D. BLK. IRON CAP ON 6" LONG PIECE OF 2" I.D. BLK IRON SLIPPED OVER 1 1/2" I.D. BLK IRON PIPE.

1 1/2" I.D. BLK. IRON PIPE TOP SECTION SLIPPED IN 2" I.D. BLK. IRON PIPE

7' 6" MIN. COVER

2" I.D. BLK IRON PIPE BOTTOM SECTION SCREWED ONTO 2" X 1 1/2" I.D. REDUCING BUSHING

VARIABLE PAY MEASURE - ONE PIECE

MN/DOT 3149.2.H COARSE FILTER AGGREGATE REQUIRED AROUND CORPORATION STOP AND CURB STOP

CORPORATION STOP DIRECT CONNECTION

TYPE "K" COPPER (FLARED FITTING)

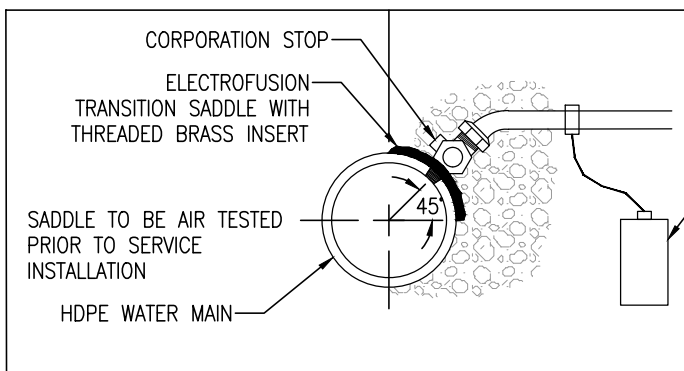
BRASS CLAMP

DI WATER MAIN

CONCRETE SUPPORT

INSERT LEAD OR PLASTIC SLUG & TIGHTEN COUPLING TO SEAL END

5# MAGNESIUM ANODE



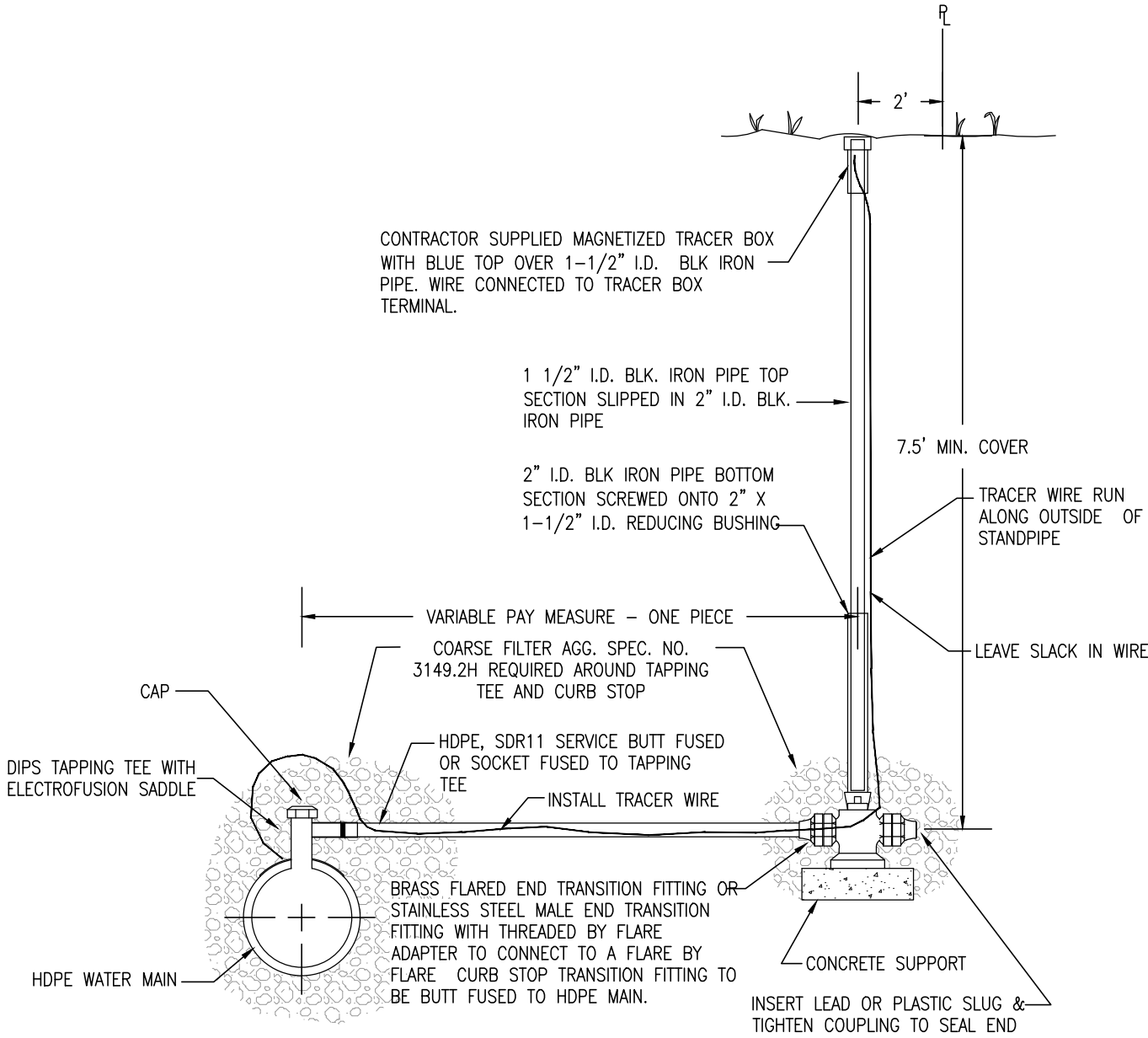
CORPORATION STOP

ELECTROFUSION TRANSITION SADDLE WITH THREADED BRASS INSERT

SADDLE TO BE AIR TESTED PRIOR TO SERVICE INSTALLATION

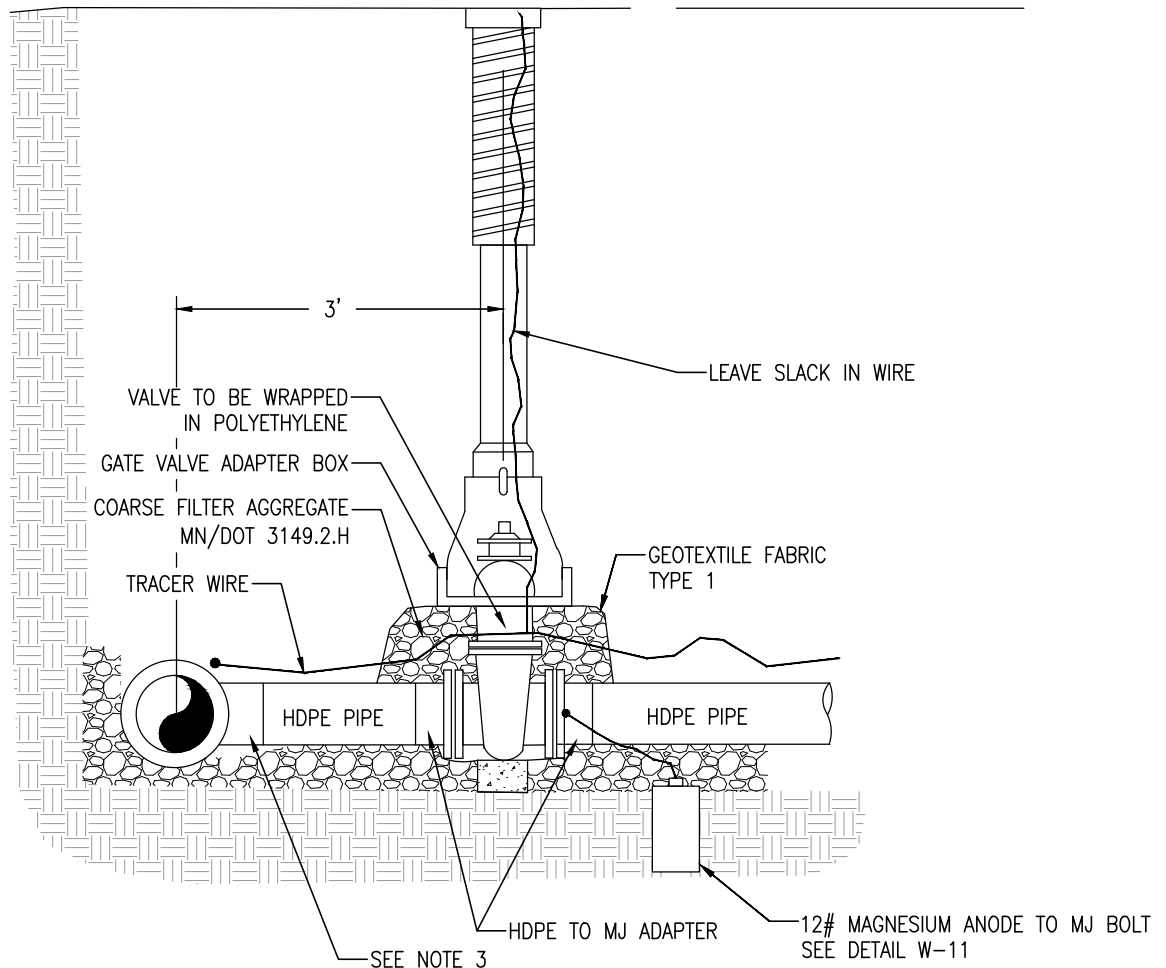
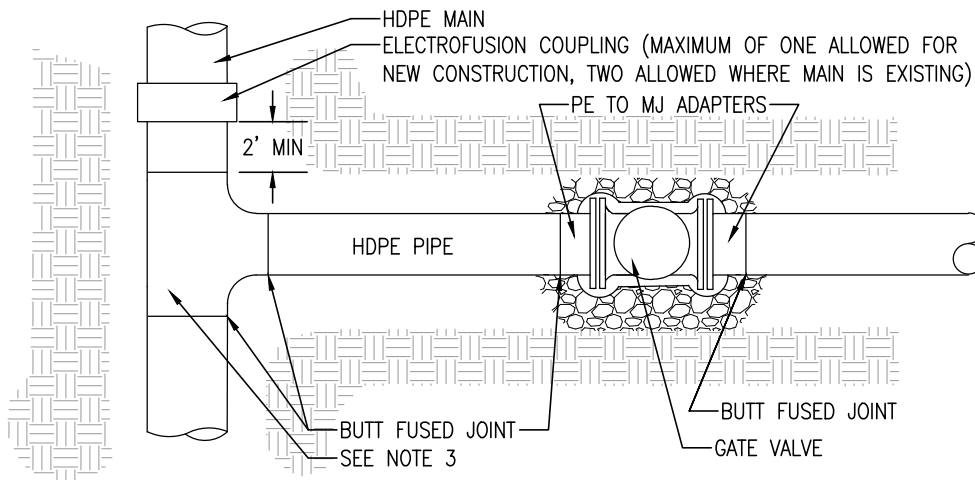
HDPE WATER MAIN

NOTE: EXCAVATE 6" UNDER IN-PLACE MAIN AND BACKFILL WITH COURSE FILTER AGGREGATE MNDOT SPEC. # 3149.2H. CONTRACTOR SHALL PROVIDE & PLACE A TRENCH BOX WHEN REQUIRED.



NOTE: SERVICE TO BE AIR TESTED PRIOR TO TAPPING MAIN

THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. SPLICES IN THE TRACER WIRE SHOULD BE MADE WITH SPLIT BOLT CONNECTORS. WIRE NUTS OR CLIP TYPE CONNECTOR SHALL NOT BE USED. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.

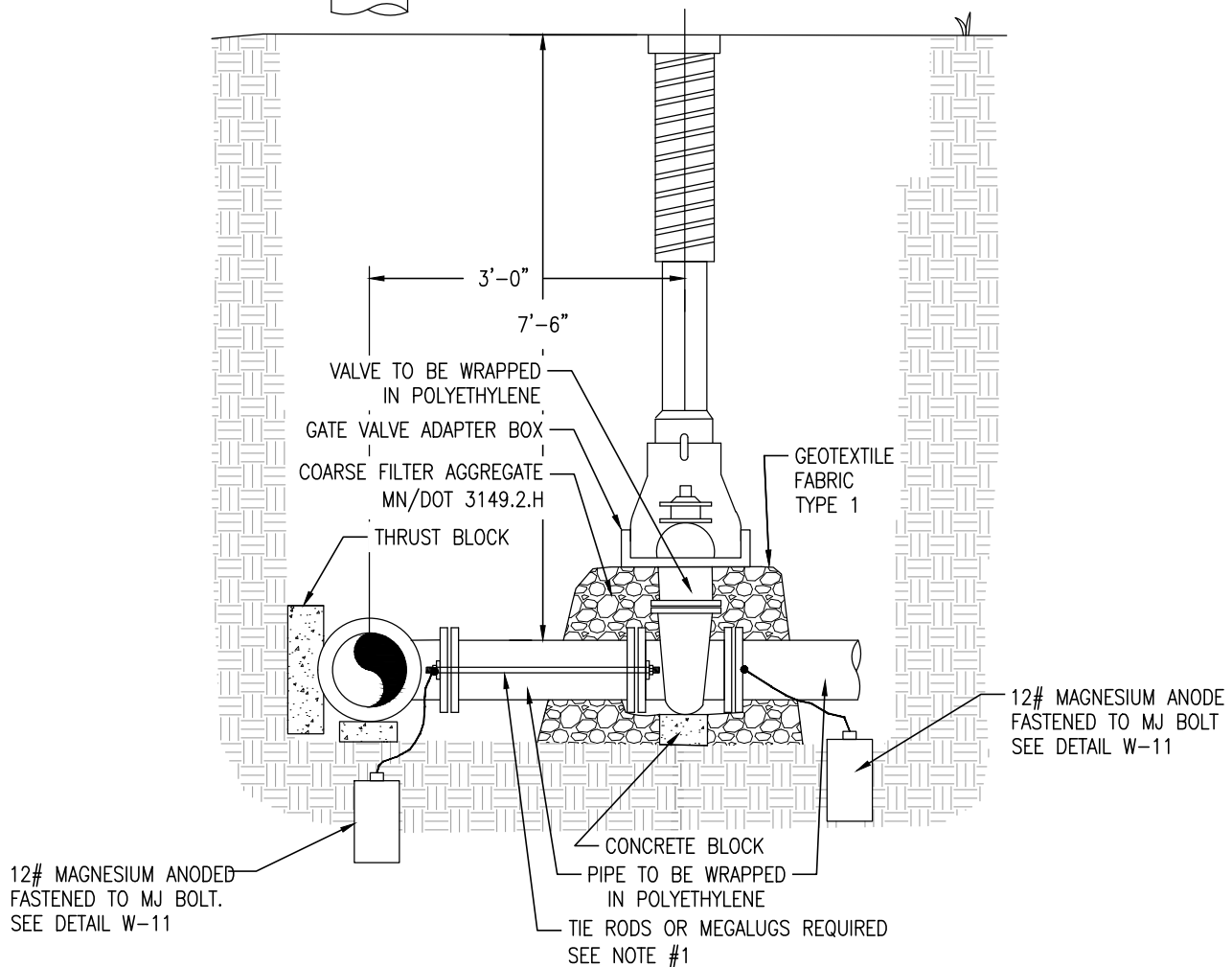
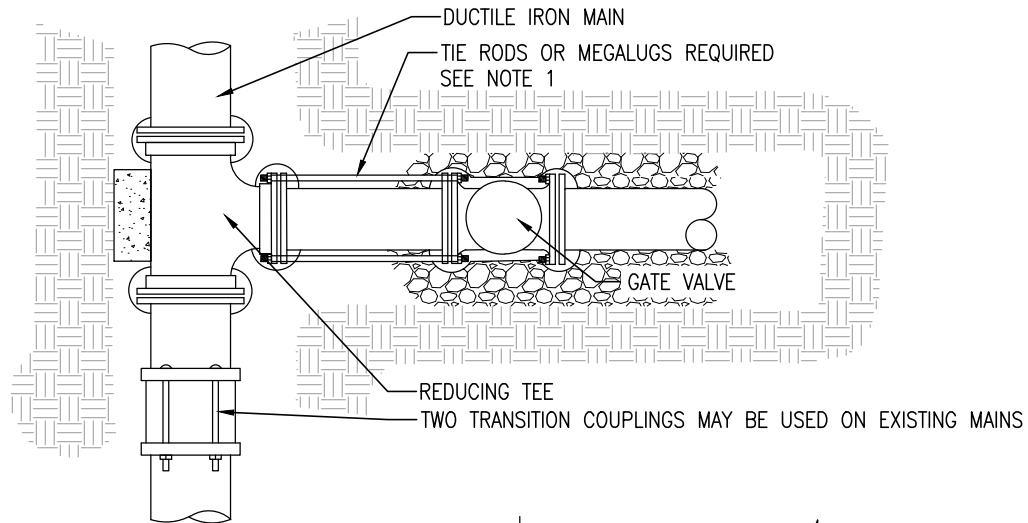


#### NOTES

1. VALVES SHALL BE CONNECTED DIRECTLY TO MECHANICAL JOINT ADAPTER.
2. ALL BOLTS SHALL BE COR-TEN WITH 6 OUNCE ZINC ANODE CAPS CONFORMING TO ASTM B-418 FOR ALL MECHANICAL JOINT FITTINGS.
3. FOR 8" MAINS, CONTRACTOR SHALL USE AN 8 X 8 TEE WITH A MACHINED 8 X 6 REDUCER OR AN 8 X 6 ELECTROFUSION BRANCH SADDLE. FOR LARGER DIMENSION MAINS A FABRICATED TEE WITH A 6" BRANCH OUTLET MAY BE USED.
4. GATE VALVES WITH HDPE STUBS MAY BE USED IN LIEU OF MJ VALVES. ANODES SHALL BE CONNECTED DIRECTLY TO THE VALVE BONNET BOLTS.

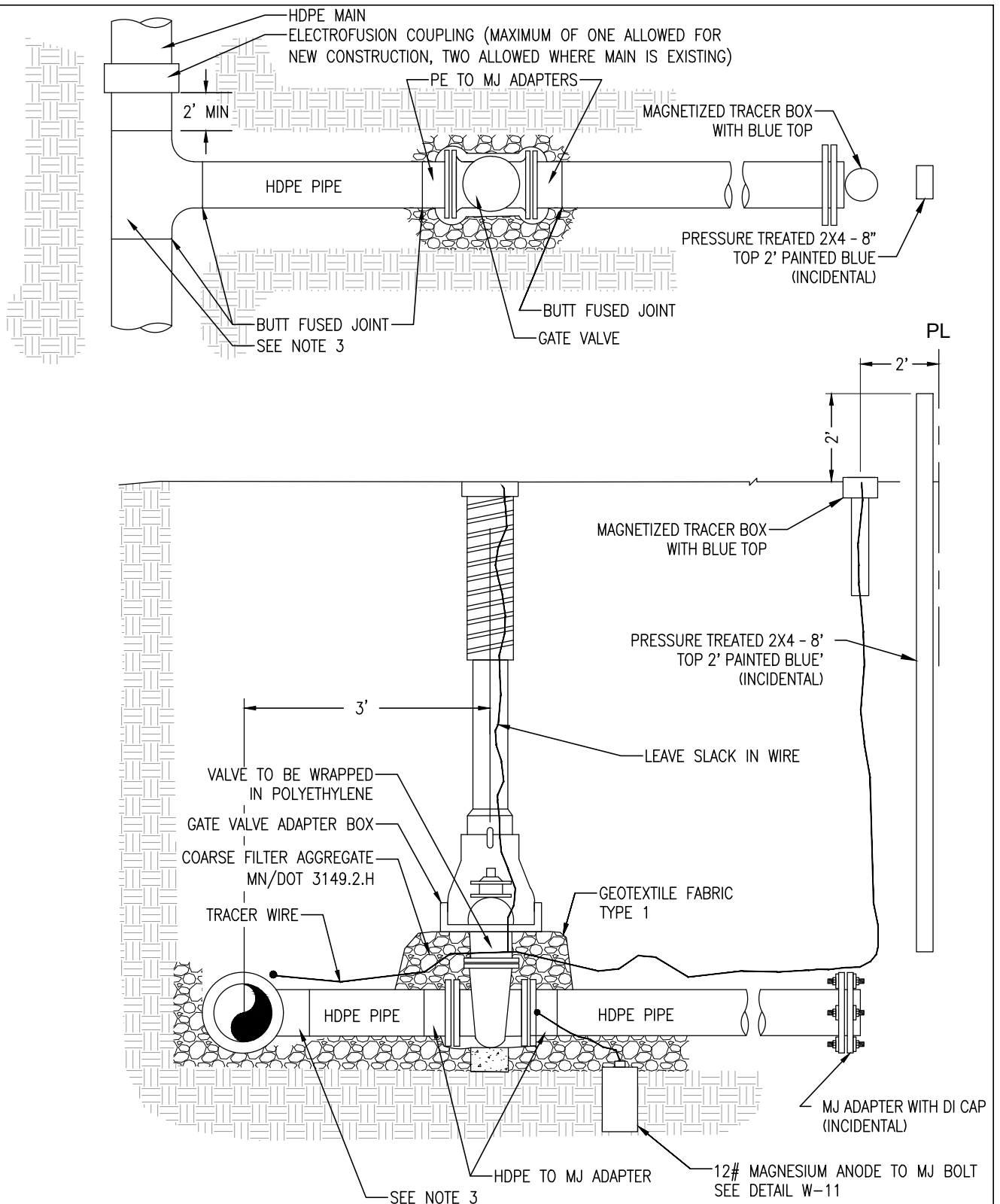


NOTE: ON EXISTING WATER MAINS, HOT TAPS SHALL BE PERFORMED FOR NEW SERVICES WHEN POSSIBLE.



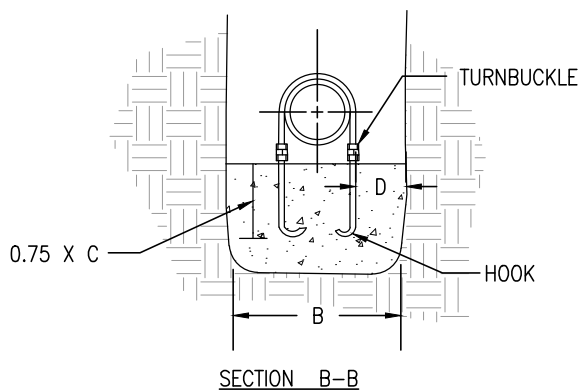
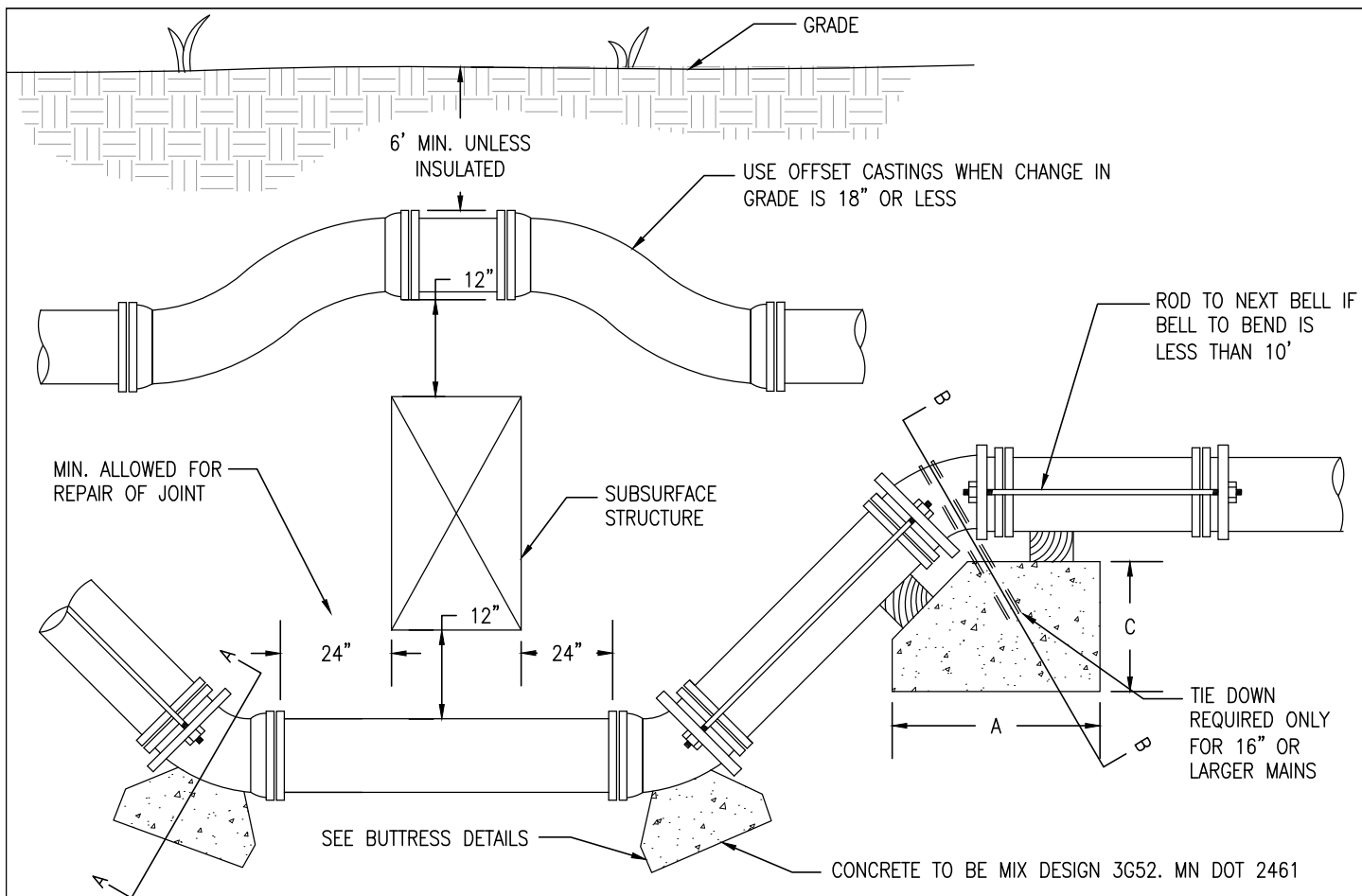
NOTES:

1. VALVES SHALL BE CONNECTED DIRECTLY TO AN ANCHORING TEE. WHENEVER DIRECT CONNECTION IS NOT POSSIBLE, TIE RODS OR MEGALUGS SHALL BE USED. TIE RODS SHALL BE GALVANIZED.
2. USE EPOXY COATING ON VALVE.
3. ALL BOLTS SHALL BE COR-TEN WITH 6 OUNCE ZINC ANODE CAPS CONFORMING TO ASTM B-418 FOR ALL MECHANICAL JOINT FITTINGS.



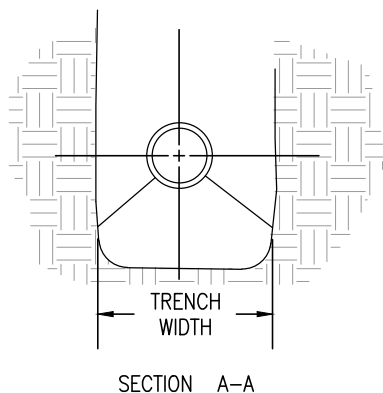
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4. GATE VALVES WITH HDPE STUBS MAY BE USED IN LIEU OF MJ VALVES. ANODES SHALL BE CONNECTED DIRECTLY TO THE VALVE BONNET BOLTS.

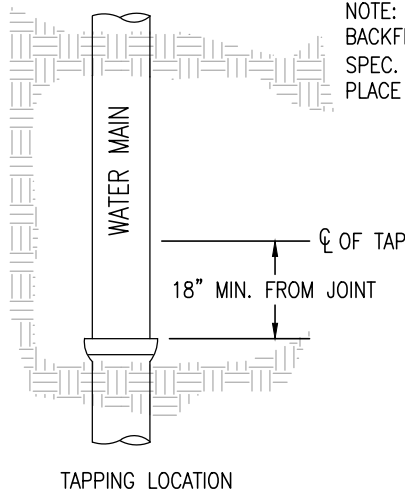


#### NOTES:

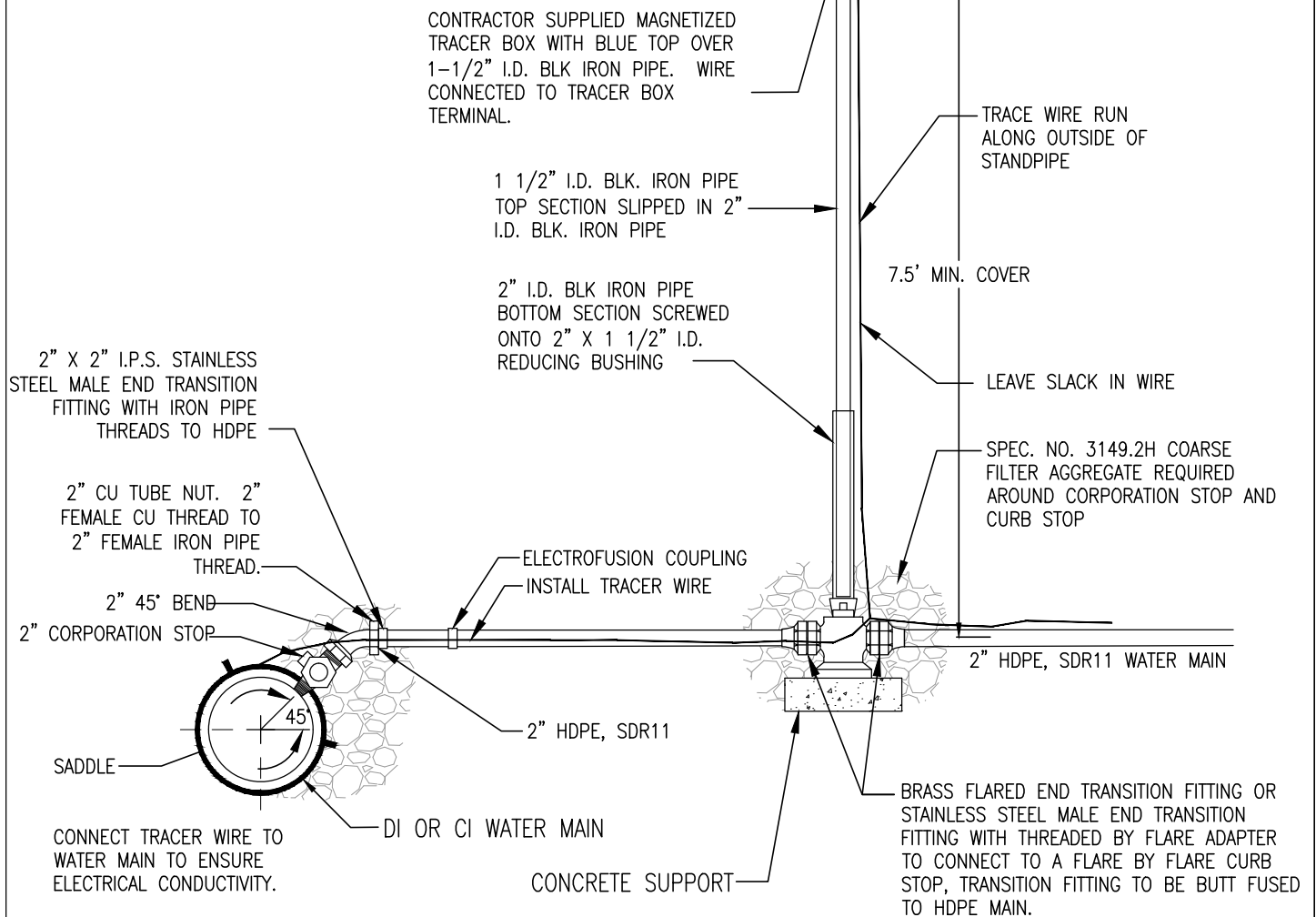
1. TIE RODS, BOLTS, NUTS, BANDS, AND WASHERS TO BE FURNISHED BY THE CONTRACTOR AND INSTALLED BY CONTRACTOR. ALL RODS AND CONNECTING HARDWARE SHALL BE GALVANIZED. ALL BOLTS SHALL BE COR-TEN WITH ZINC ANODE CAPS
2. STRAPPING MATERIAL:
  - 2.1. NO. RODS 2 PER TIE
  - 2.2. DIA. RODS 1 INCH
  - 2.3. STRAP SIZE 1/2" X 2"
  - 2.4. BOLT DIA. 3/4"
  - 2.5. WASHER SIZE 1/2" X 3" X 5"
3. OFFSETS FOR 16" WATER MAIN AND LARGER, TIE DOWNS SHALL BE INSTALLED AS SHOWN. TURNBUCKLE AND BLOCK SIZES:



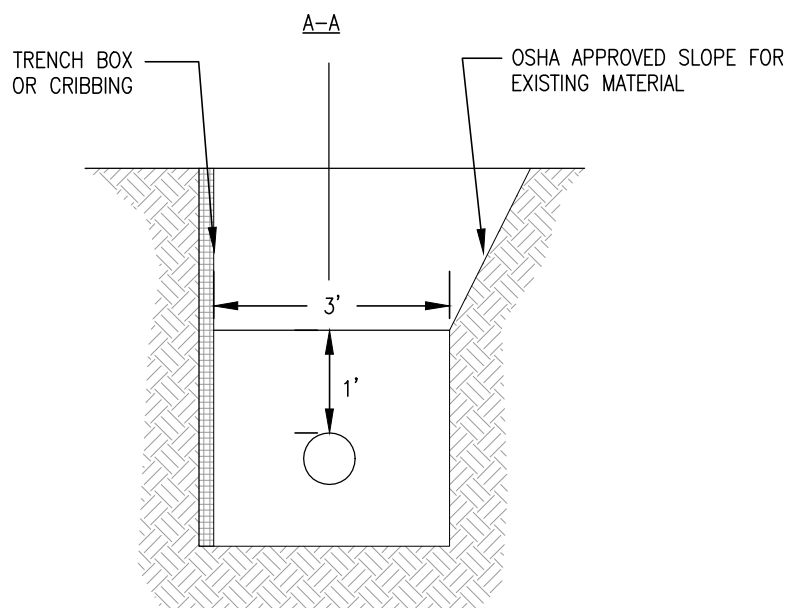
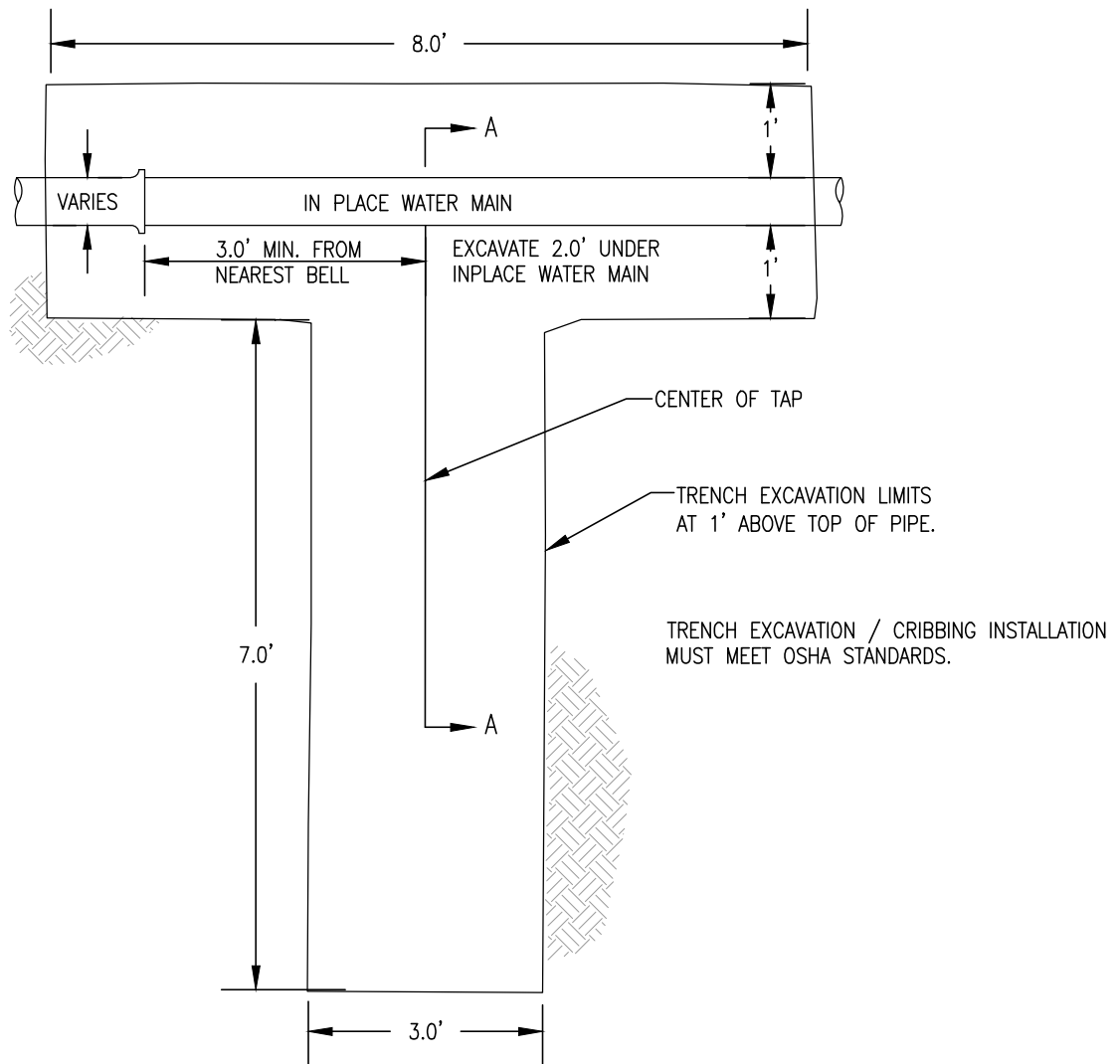
PIPE SIZE	A	B	C	D
16"	6'-0"	2'-6"	3'-0"	0'-1"
20"	8'-0"	3'-0"	3'-0"	0'-1 1/4"
24"	8'-0"	3'-0"	5'-0"	0'-1 1/2"
30"	8'-0"	5'-0"	5'-0"	0'-2"

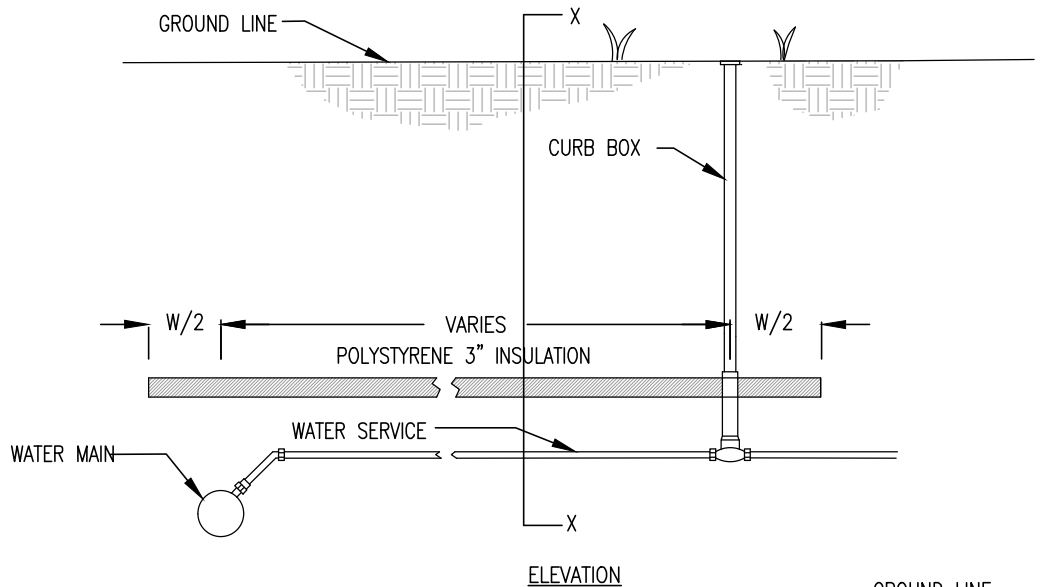


NOTE: EXCAVATE 6" UNDER IN-PLACE MAIN AND BACKFILL WITH COARSE FILTER AGGREGATE MNDOT SPEC. # 3149.2H. CONTRACTOR SHALL PROVIDE & PLACE A TRENCH BOX WHEN REQUIRED.

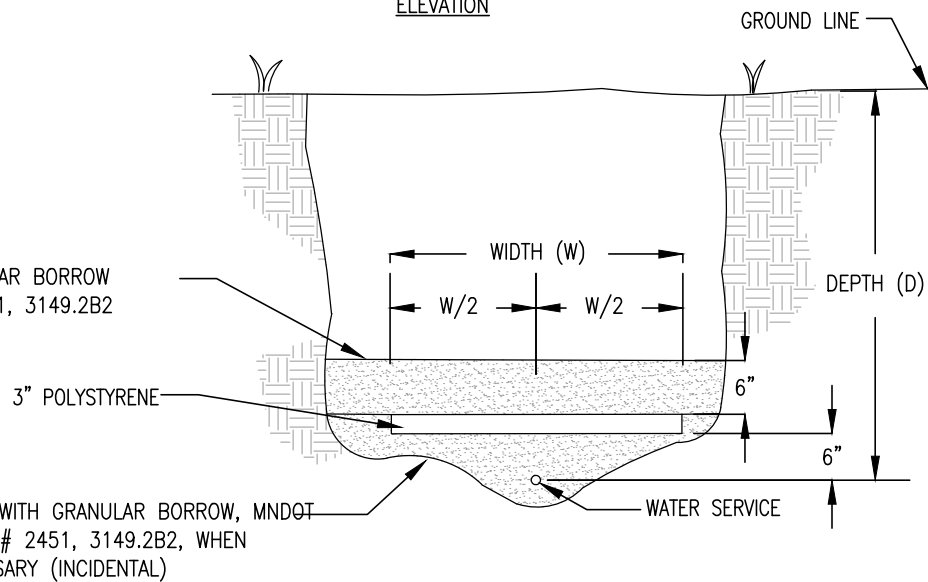


THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. THE NUMBER OF CONNECTIONS MUST BE KEPT TO A MINIMUM. ANY SPLICES IN THE TRACER WIRE SHOULD BE MADE WITH SPLIT BOLT CONNECTORS. WIRE NUTS OR CLIP TYPE CONNECTORS SHALL NOT BE USED. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.





COVER W/6" GRANULAR BORROW  
MNDOT SPEC. # 2451, 3149.2B2



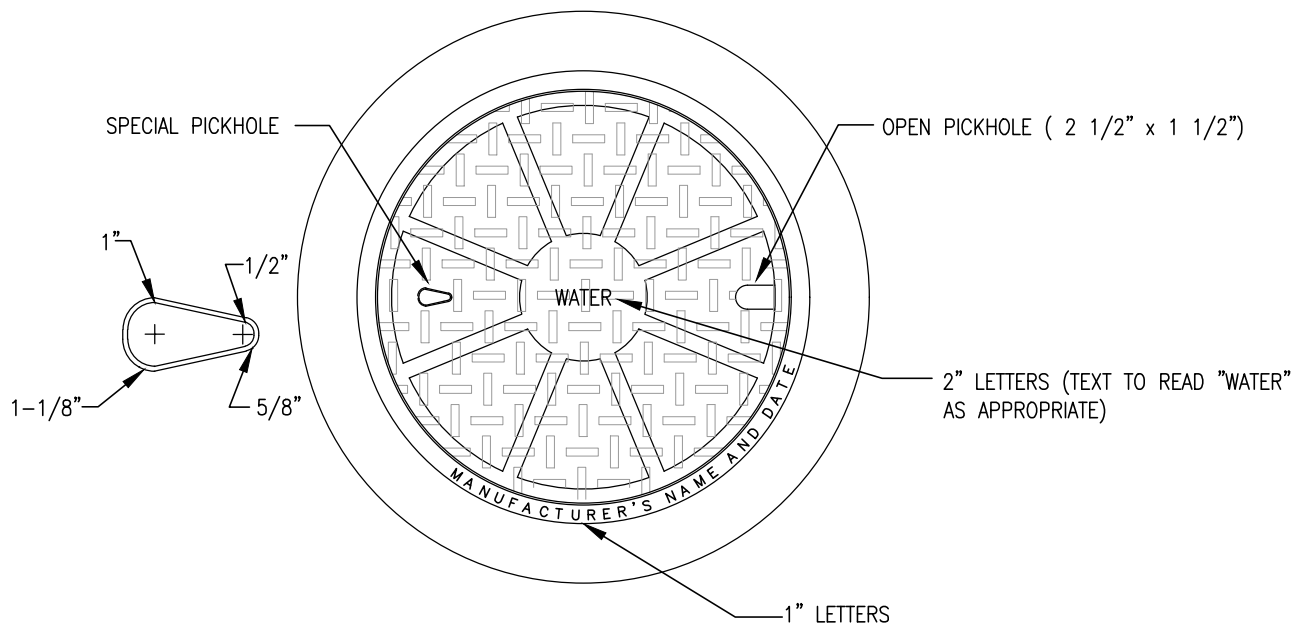
LEVEL WITH GRANULAR BORROW, MNDOT  
SPEC. # 2451, 3149.2B2, WHEN  
NECESSARY (INCIDENTAL)

SECTION X-X

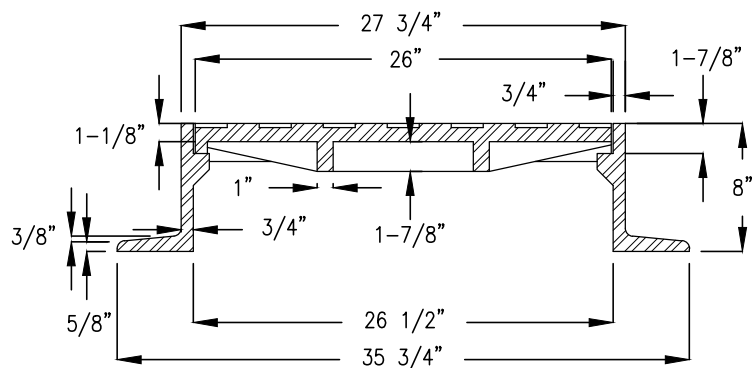
NOTES:

1. LAYERING OF 2 OR 3 SHEETS TO ARRIVE AT 3" IS PERMITTED WITH JOINTS OFFSET A MINIMUM OF 6".
2. POLYSTYRENE SHALL BE AS SPECIFIED IN THE CITY OF HERMANTOWN PUBLIC WORKS AND UTILITIES STANDARD CONSTRUCTION SPECIFICATIONS.
3. INSULATION SHALL ONLY BE USED WHERE APPROVED BY THE ENGINEER.

DEPTH (D)	WIDTH (W)
7' OR MORE	NONE
5.2' TO 6.9'	4'-0"
4.3' TO 5.1'	6'-0"
3.0' TO 4.2'	8'-0"

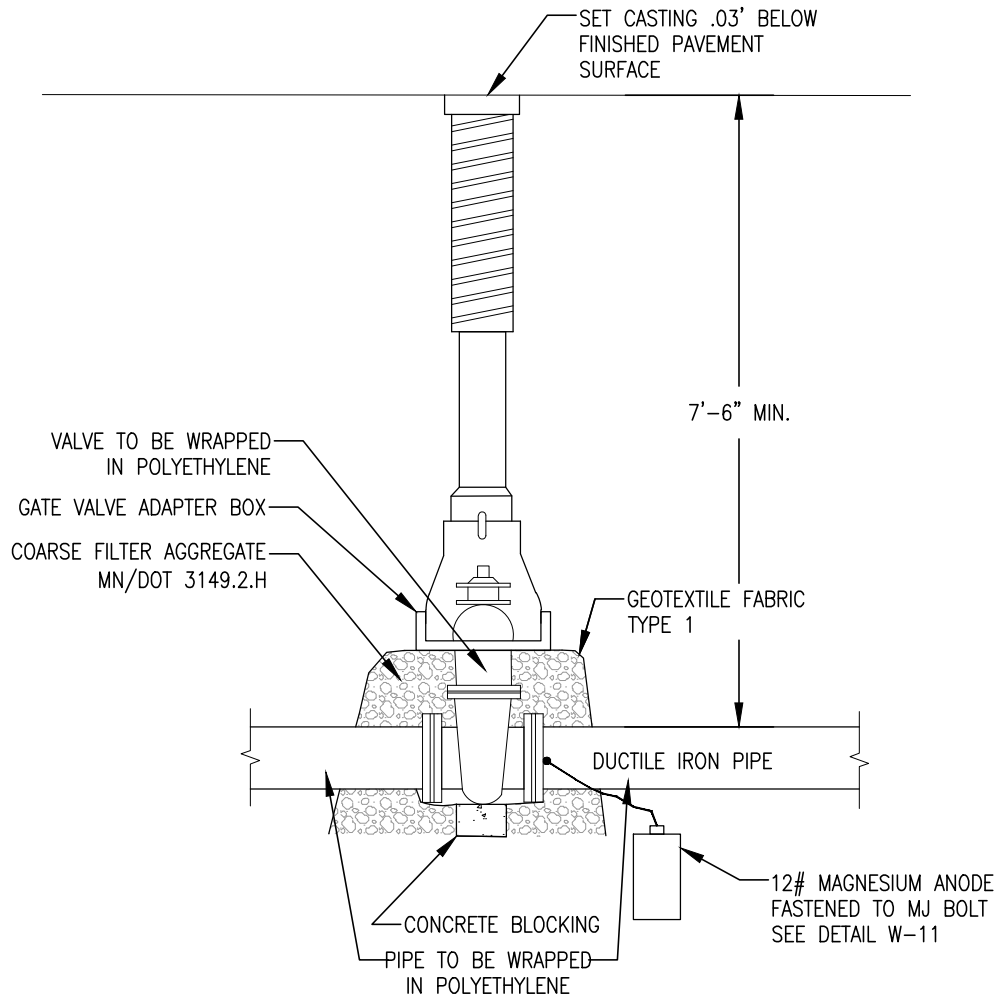


PLAN OF COVER



SECTION OF FRAME AND COVER

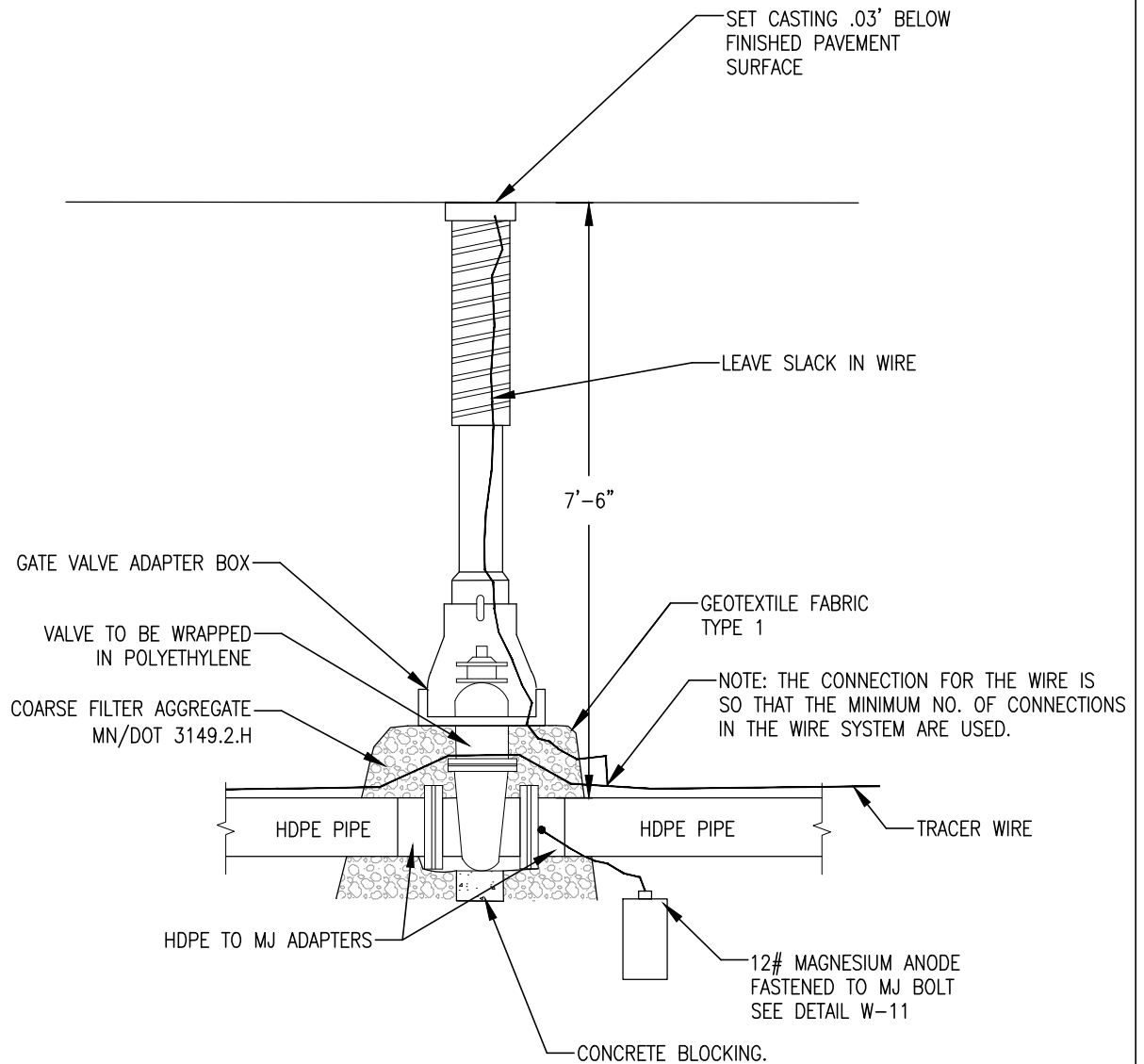
NOTE: ROUND OFF ALL EXPOSED EDGES FURNISHED WITH MACHINED HORIZONTAL BEARING SURFACES.  
 WEIGHT: RING-295 LBS. COVER - 162 LBS. SIMILAR OR EQUAL TO NEENAH FOUNDRY NQR-1723 (EXCEPT WITH LETTERING AS NOTED)



NOTES:

1. USE EPOXY COATING ON EXTERIOR OF VALVES
2. ALL BOLTS SHALL BE COR-TEN WITH 6 OUNCE ZINC ANODE CAPS  
CONFORMING TO ASTM B-418 FOR ALL MECHANICAL JOINT FITTINGS.

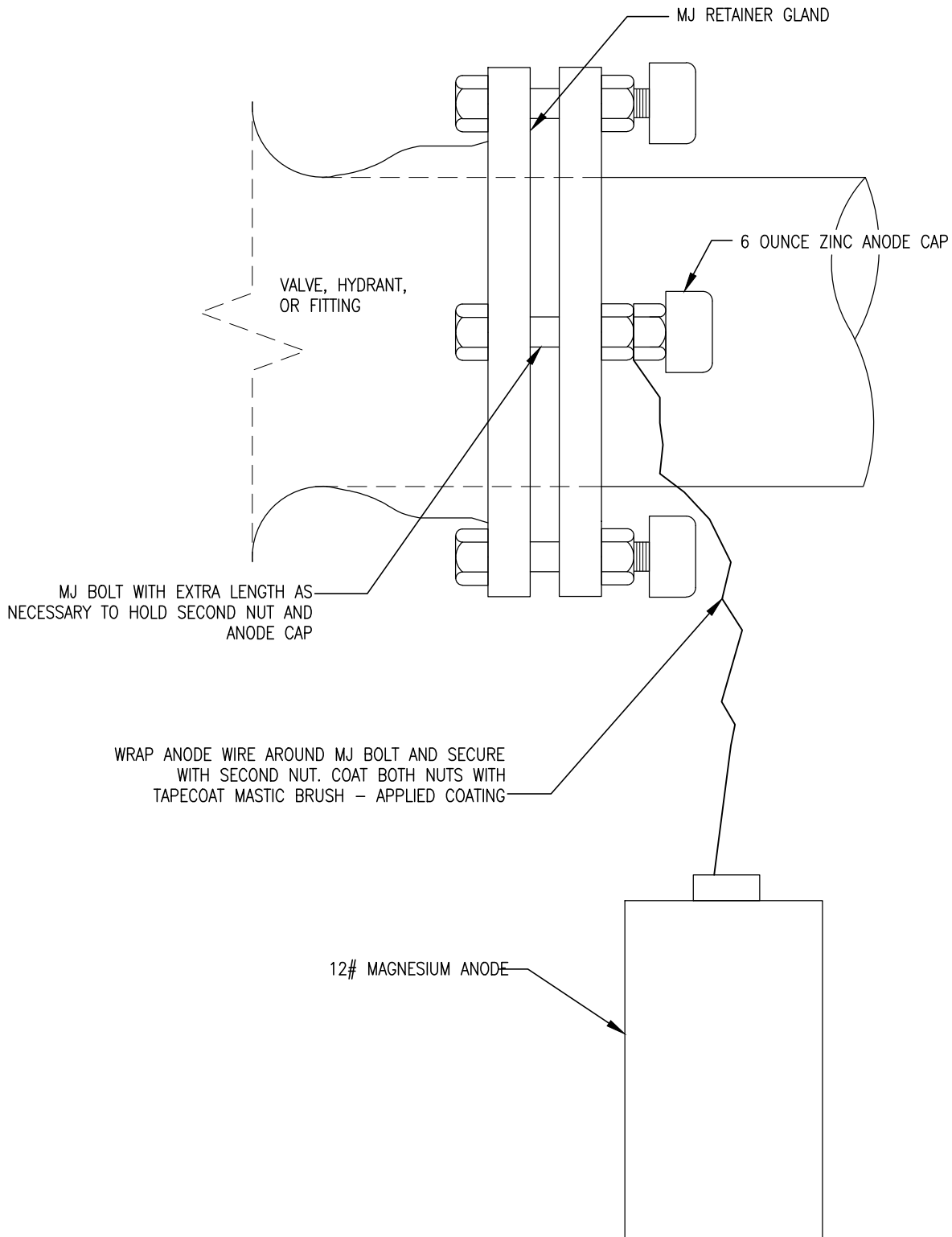


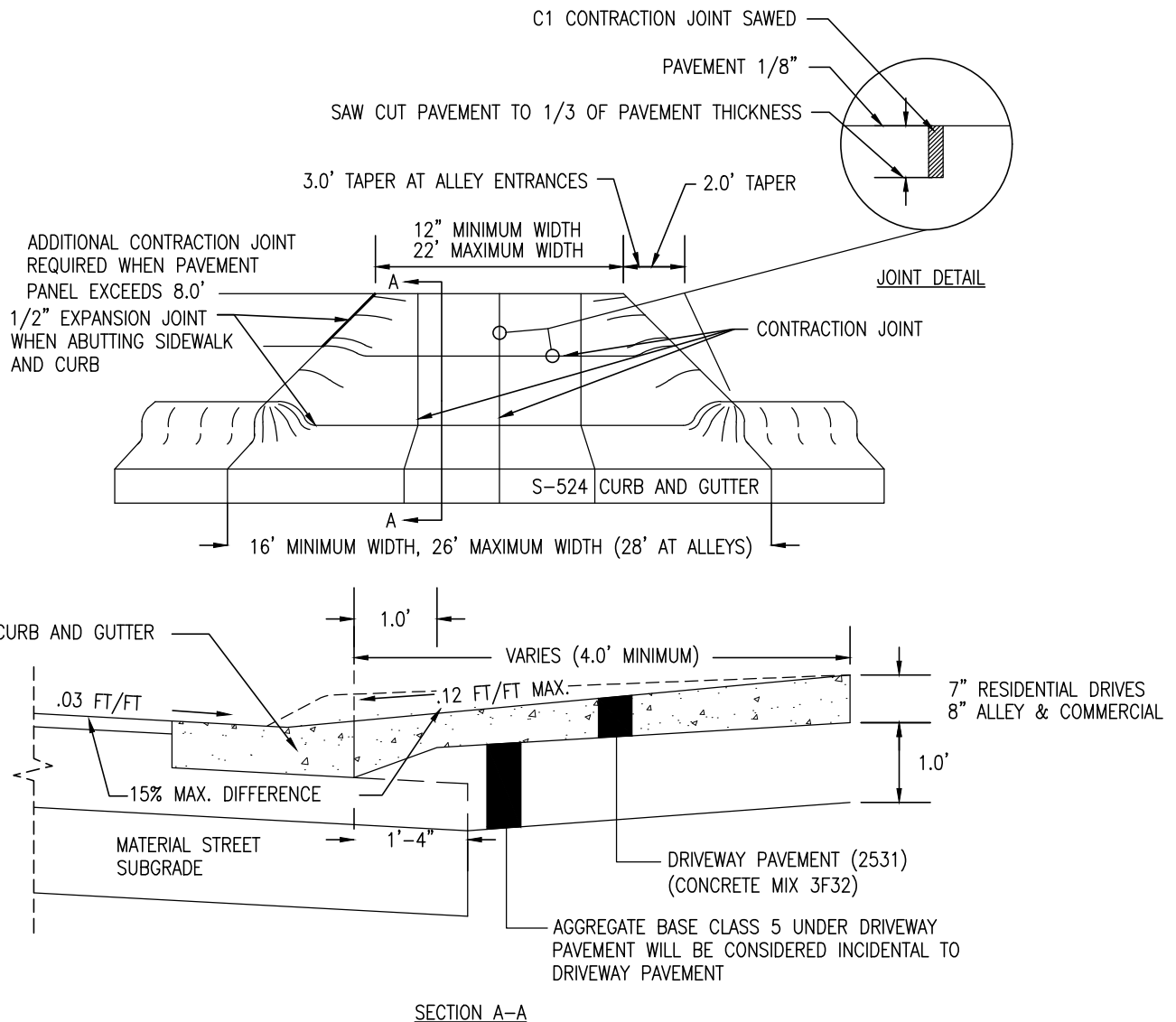


NOTES:

1. VALVES SHALL BE CONNECTED DIRECTLY TO HDPE WITH HDPE TO MECHANICAL JOINT ADAPTERS.
2. USE EPOXY COATING ON EXTERIOR OF VALVES.
3. ALL BOLTS SHALL BE COR-TEN WITH 6 OUNCE ZINC ANODE CAPS CONFORMING TO ASTM B-418 FOR ALL MECHANICAL JOINT FITTINGS.
4. FOR OPEN CUT PIPE INSTALLATIONS, ELECTROFUSION COUPLINGS ARE NOT ALLOWED FOR CONNECTION OF HDPE TO MJ ADAPTERS. FOR DIRECTIONAL DRILLED INSTALLATIONS, ONE ELECTROFUSION COUPLING MAY BE USED PER VALVE.
5. GATE VALVES WITH HDPE STUBS MAY BE USED IN LIEU OF MJ VALVES. ANODE SHALL BE CONNECTED DIRECTLY TO THE VALVE BONNET BOLTS.

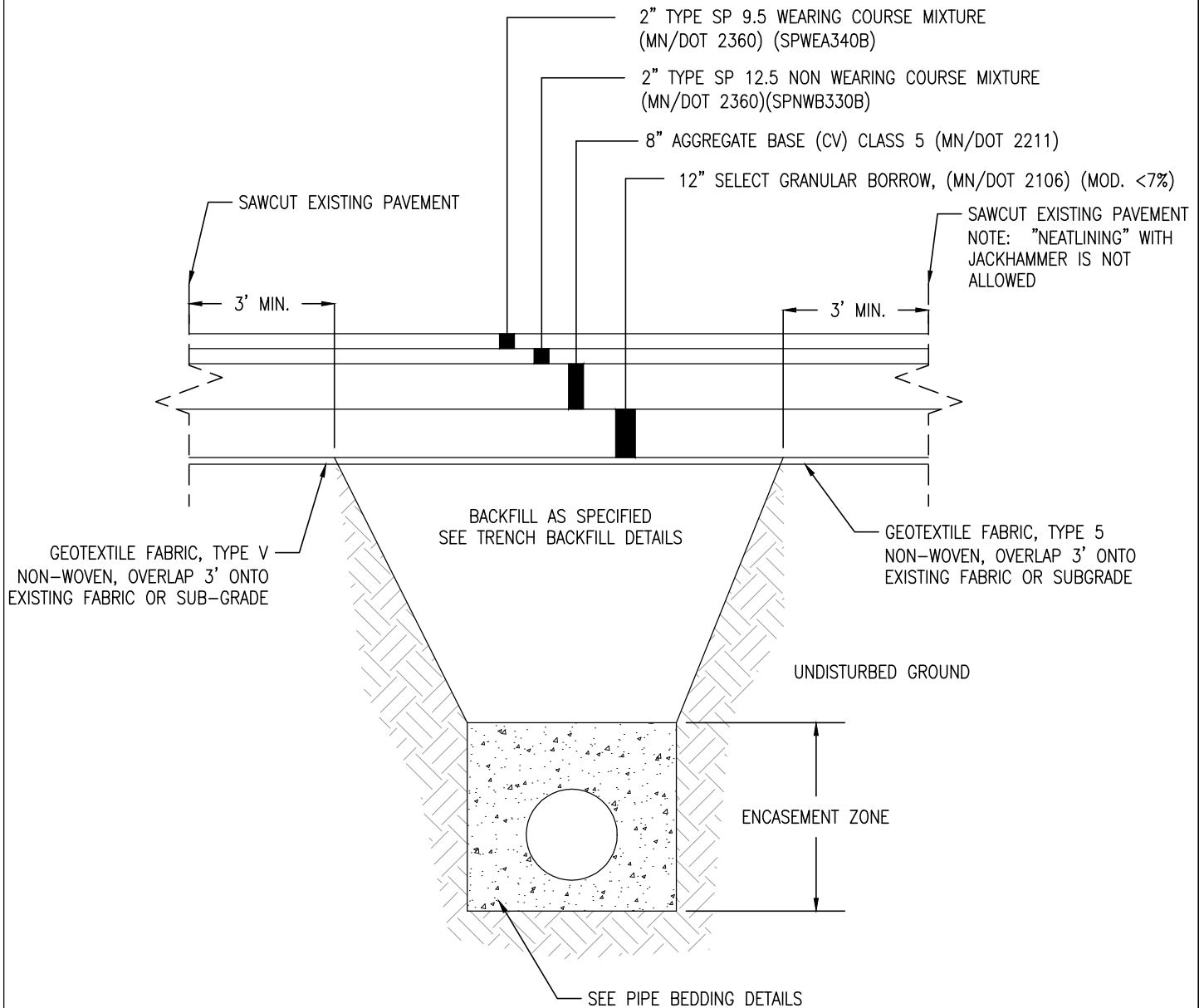
NOTE: ALL DUCTILE IRON VALVES, HYDRANTS, OR FITTINGS SHALL RECEIVE ANODES.






NOTES:

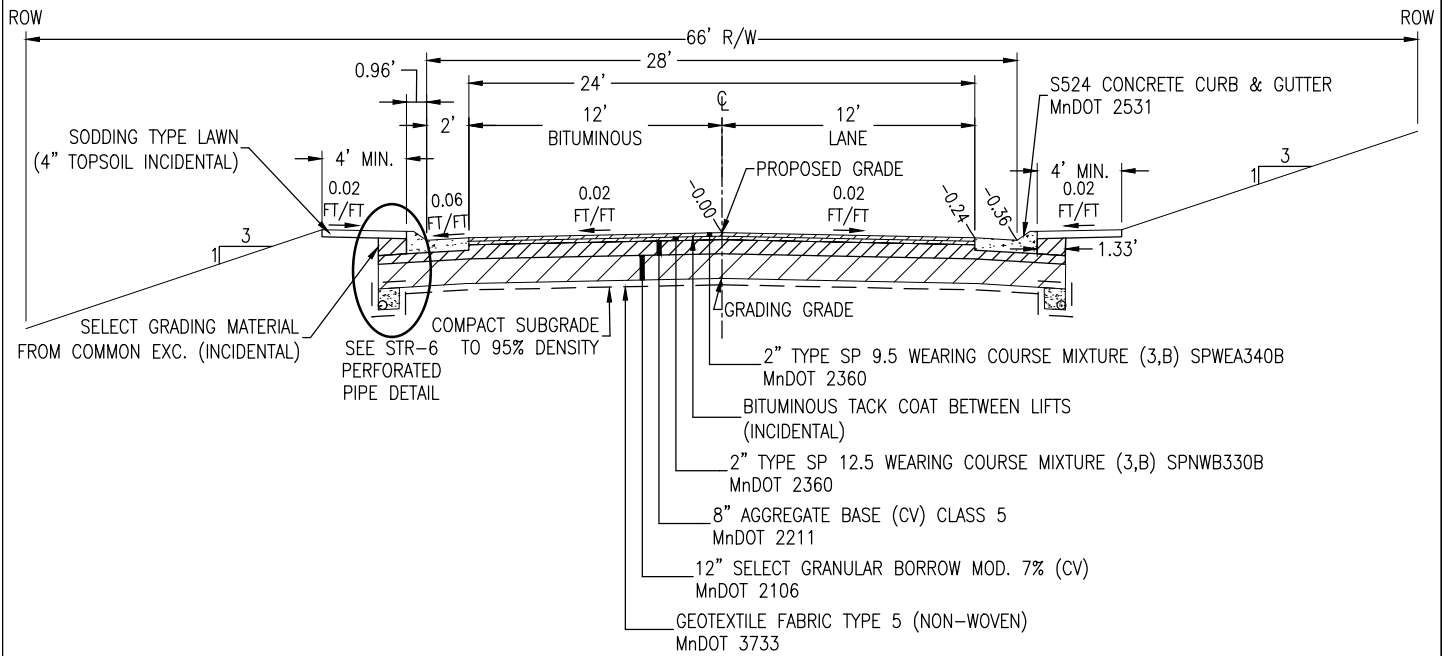
1. WHERE THERE IS NO SIDEWALK OR THERE IS A GRASS BOULEVARD BETWEEN THE SIDEWALK AND THE BACK OF CURB THE CREST OF THE DRIVEWAY MUST BE AT LEAST 6" ABOVE GUTTER TO CONTAIN RUNOFF.
2. WHERE THERE IS SIDEWALK DIRECTLY BEHIND THE CURB, DRIVEWAY PROFILE SLOPE SHALL BE FLATTENED TO MEET ADA ACCESSIBLE ROUTE STANDARDS
3. WHEN SIDEWALK INTERSECTS WITH DRIVEWAY OR ALLEY ENTRANCE, SIDEWALK RAMPS MUST BE CONSTRUCTED WITH GRADE CHANGES AND CONSTRUCTION JOINTS BEING PERPENDICULAR TO THE PEDESTRIAN ACCESS ROUTE.



	TYPICAL STREET RESTORATION OVER TRENCH	STR-2	NO SCALE
	CITY OF HERMANTOWN STANDARD DETAIL PUBLIC WORKS DEPARTMENT	APPROVED 4/19/2022	

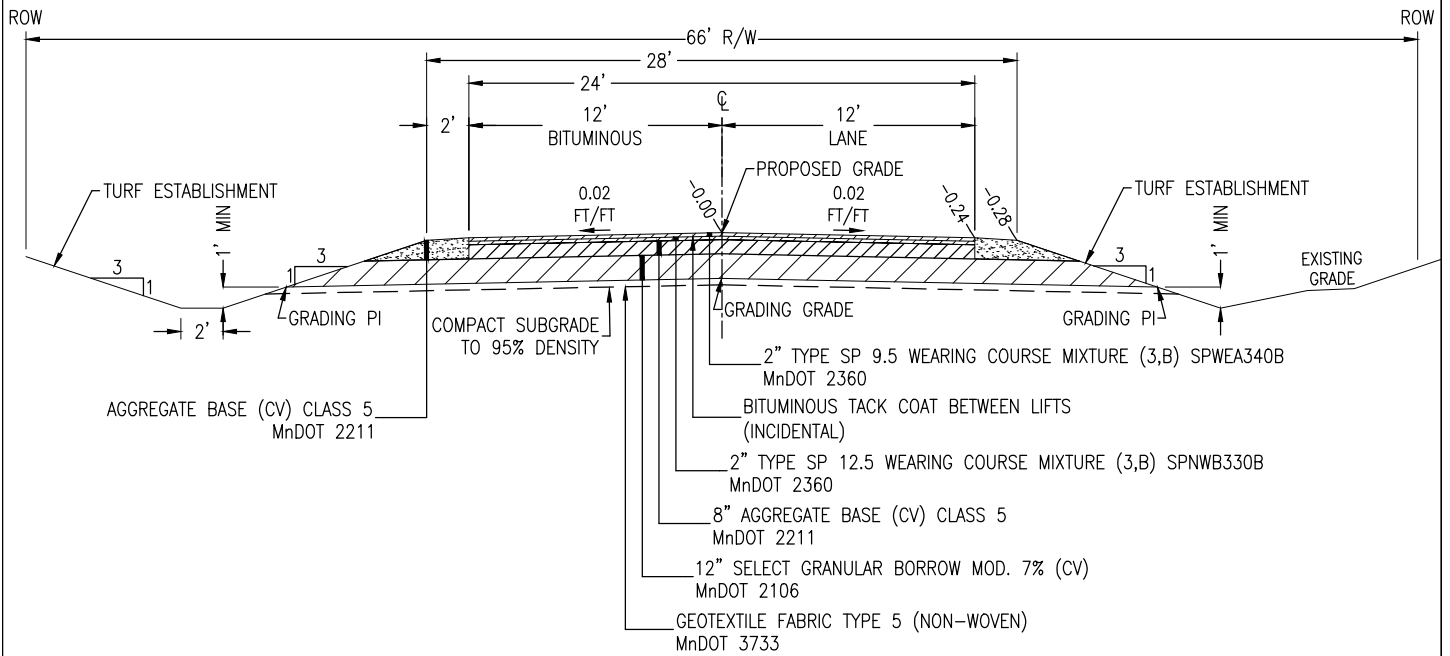
THIS SIDE SHOWN  
IN FILL

THIS SIDE SHOWN  
IN CUT



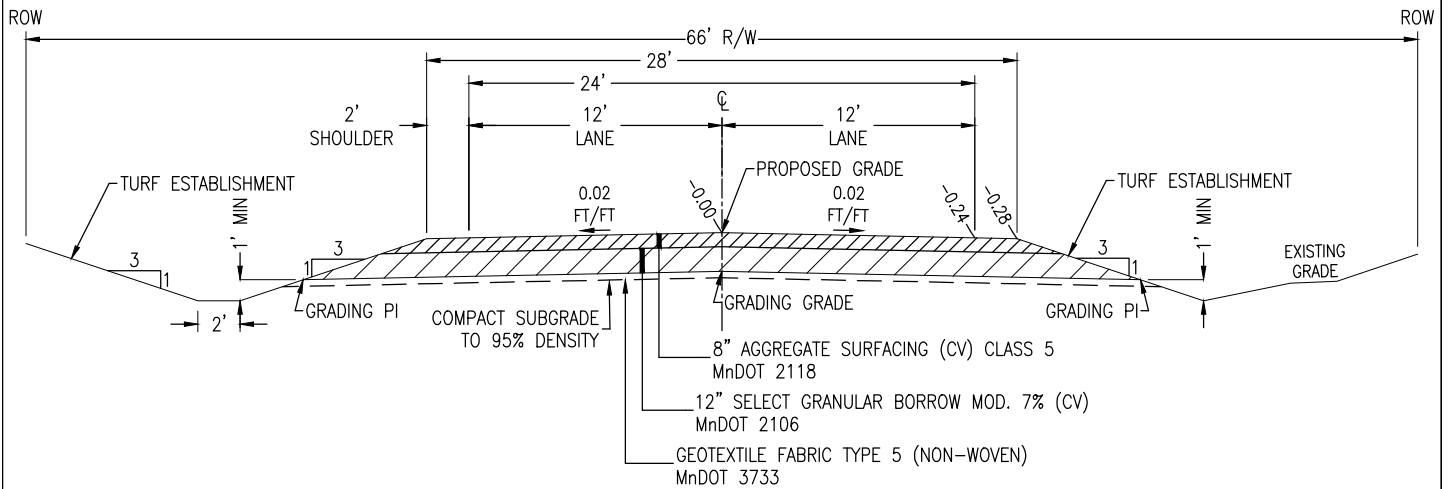
THIS SIDE SHOWN  
IN CUT

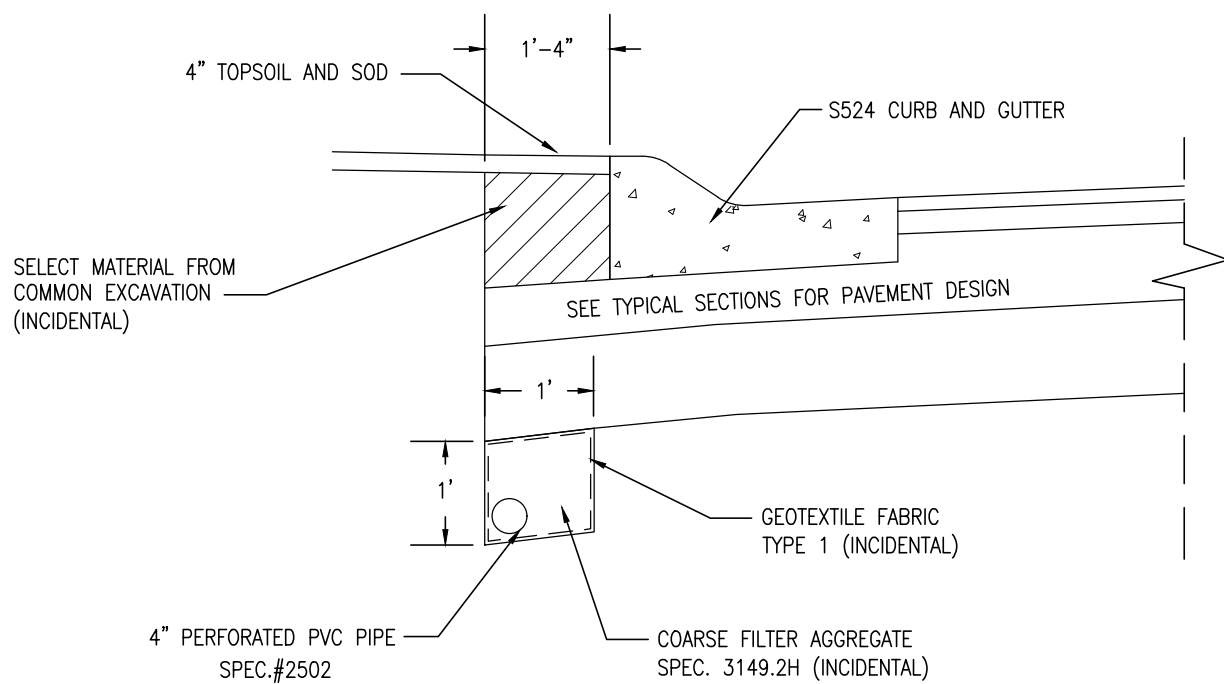
THIS SIDE SHOWN  
IN FILL



THIS SIDE SHOWN  
IN CUT

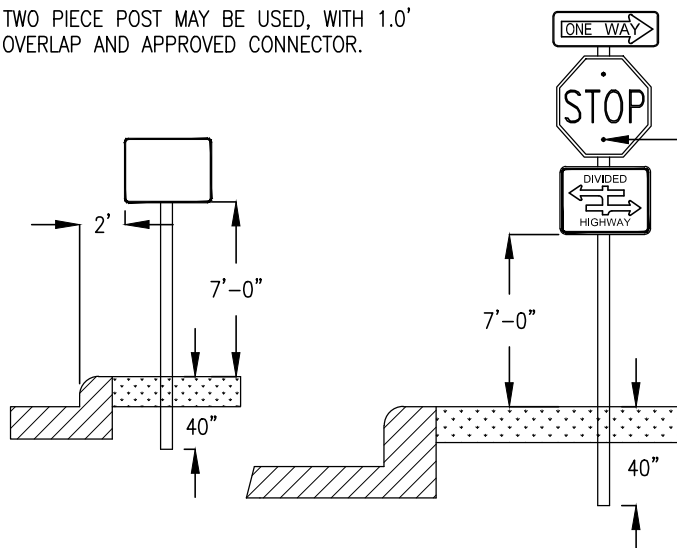
THIS SIDE SHOWN  
IN FILL



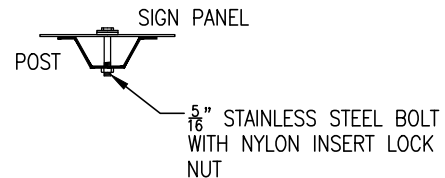




NOTE: ALL DIMENSIONS ARE MINIMUMS. A TWO PIECE POST MAY BE USED, WITH 1.0' OVERLAP AND APPROVED CONNECTOR.



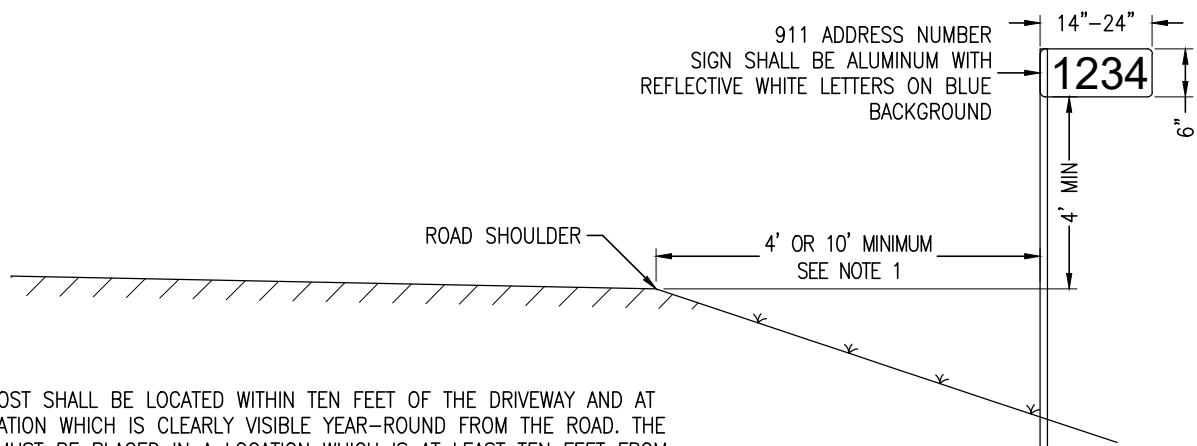
STAINLESS STEEL WASHER & NYLON WASHER  
(T=1/16" MIN., I.D.=3/8" MAX., O.D.=7/8" MAX.)



NOTE: SEE SPECIAL PROVISIONS FOR SIGN AND AND POST SPECIFICATIONS.

SIGN PANEL TO POST CONNECTION

ALL MATERIALS AND LABOR USED TO RELOCATE EXISTING SIGN AS SHOWN, SHALL BE INCLUDED IN THIS PAY ITEM:



NOTES:

1. THE POST SHALL BE LOCATED WITHIN TEN FEET OF THE DRIVEWAY AND AT A LOCATION WHICH IS CLEARLY VISIBLE YEAR-ROUND FROM THE ROAD. THE POST MUST BE PLACED IN A LOCATION WHICH IS AT LEAST TEN FEET FROM THE EDGE OF THE ROAD SURFACE FOR ROADS WITH A DEFINED SHOULDER OR AT LEAST FOUR FEET FROM THE EDGE OF THE ROAD SURFACE FOR ROADS WITHOUT A DEFINED SHOULDER AND, IN ANY CASE, NOT FARTHER FROM THE ROAD THAN THE END OF THE RIGHT-OF-WAY.
2. POST SHALL BE 1.2#/FT GALVANIZED U-CHANNEL
3. ASSIGNED ADDRESS NUMBER MUST BE ON BOTH SIDES OF THE SIGN.
4. THE SIGN SHALL BE INSTALLED ON THE POST FROM ONE EDGE AND EXTEND PERPENDICULARLY AWAY FROM THE ROAD.

**City of Hermantown, Minnesota  
Public Works Department**

**Standard Specifications  
for Construction  
2022 Edition**

**APPENDIX B**

**Schedule for Materials Testing**

**SCHEDULE FOR MATERIALS TESTING  
CITY OF HERMANTOWN STREET AND UTILITY  
PROJECTS**

The Engineer will perform materials testing for acceptance and quality assurance at these minimum rates. When deemed appropriate, the Engineer will perform additional testing to determine acceptance. Additional testing and retesting shall be at the Contractor's expense.

Specified Method	Sampling & Testing	Sampling Notes	Compaction Testing	Compaction Notes
<b>UTILITY COMPACTION</b>				
Specified Density	<ul style="list-style-type: none"> <li>One sieve and proctor for each backfill borrow material at source and one for each different classification of onsite native material.</li> </ul>	<u>Materials to be tested:</u> <ul style="list-style-type: none"> <li>Course filter aggregate</li> <li>Granular backfill</li> <li>Native material from site</li> </ul> <u>Note:</u> If material looks like it changed, test again.	<ul style="list-style-type: none"> <li>Take moisture of native material on first day of utility work.</li> <li>Take densities at rate of; One per each 200' of mainline pipe, One per each 4 service laterals, and One per each 4 manholes at every 3 feet in depth.</li> <li>Required compaction is 100% around manholes full depth; 100% in the top 3 feet of utility trench below top of subgrade; 95% in utility trench below the top 3 feet.</li> </ul>	<ul style="list-style-type: none"> <li>Compact backfill in 8" lifts.</li> <li>Additional tests where inspector notes rutting or pumping; additional moistures after wet weather.</li> <li>Most common problem is too much moisture in native backfill; may require granular borrow backfill to be used.</li> <li>Retest at contractor's cost.</li> </ul>
<b>SELECT GRANULAR BORROW</b>				
Specified Density	<ul style="list-style-type: none"> <li>One sieve and proctor from source.</li> </ul>	<ul style="list-style-type: none"> <li>Take additional samples if material changes or source changes, at contractor's cost</li> </ul>	<ul style="list-style-type: none"> <li>Take densities at rate of: Four per Block prior to Class 5.</li> <li>Compact in 8" layers or less.</li> <li>Required density is 100%.</li> </ul>	<ul style="list-style-type: none"> <li>Take additional densities where rutting is noted.</li> <li>The most common problem with select granular is not enough moisture or more than 7%.</li> <li>Retest at contractor's cost.</li> </ul>
<b>CLASS 5</b>				
Specified Density	<ul style="list-style-type: none"> <li>One sieve and proctor at source.</li> </ul>	<ul style="list-style-type: none"> <li>Take additional samples if material changes or source changes, at contractor's cost.</li> </ul>	<ul style="list-style-type: none"> <li>Take densities at rate of: Two per Block prior to curb and gutter and/or paving.</li> <li>Required density is 100%.</li> </ul>	<ul style="list-style-type: none"> <li>Excavate and re-compact areas where visible rutting.</li> <li>Most common problem is segregation of aggregates; replacement/blending as directed by the Engineer.</li> <li>Retest at contractor's cost.</li> </ul>

**SCHEDULE FOR MATERIALS TESTING  
CITY OF HERMANTOWN STREET AND UTILITY  
PROJECTS**

<b>CONCRETE CURB &amp; GUTTER, SIDEWALK AND APRONS</b>			
<b>Field Testing</b>	<b>Cylinders</b>	<b>Plant Inspection</b>	<b>Concrete Aggregate Graduations</b>
<ul style="list-style-type: none"> <li>• Test two trucks early in the day (first 2 trucks if possible) for air and slump.</li> <li>• Test air &amp; slump 2 times per Block, one on each side.</li> <li>• Note: If less than 200 ft., no test required.</li> </ul>	<ul style="list-style-type: none"> <li>• Two sets per Block, one on each side.</li> </ul>	<ul style="list-style-type: none"> <li>• One inspection per project on either curb &amp; gutter or sidewalk.</li> </ul>	<ul style="list-style-type: none"> <li>• One test/aggregate pile for the mix placed during the plant inspection.</li> </ul>
<ul style="list-style-type: none"> <li>• Test two trucks early in the day (first two trucks if possible) for air and slump.</li> <li>• Two tests per Block, one on each side.</li> </ul>	<ul style="list-style-type: none"> <li>• Two tests per Block, one on each side.</li> </ul>	<ul style="list-style-type: none"> <li>• One inspection per project on either curb &amp; gutter or sidewalk.</li> </ul>	<ul style="list-style-type: none"> <li>• One test/aggregate pile for the mix placed during the plant inspection.</li> </ul>

<b>BITUMINOUS</b>	
<b>Quality Assurance Testing (Owner's Testing Agency)</b>	<b>Quality Control Testing (Suppliers Testing)</b>
<ul style="list-style-type: none"> <li>• For S.I.P. projects, one companion sample (split with contractor) per mix placed per project. Test for asphalt content, gradation, and air voids.</li> <li>• No plant inspection required by owners testing agency on S.I.P projects.</li> <li>• One companion core for density from contractor per lot per lift. One lot for 300–600 tons, two lots for 601-1000 tons, three lots for 1001–1600 tons, four lots for 1601 – 3600 tons.</li> </ul>	<ul style="list-style-type: none"> <li>• Percent crushing - two per/mix/day at start-up, then sample daily, test minimum of one weekly.</li> <li>• Plant aggregate gradation – one/1000 tons at start-up, then one/2000 tons.</li> <li>• Asphalt content and air voids– one/500 tons/mix for first 2000 tons, then one/1000 tons.</li> <li>• Core density – three cores per lot per lift (see QA for lot determination). Two tested by supplier and one forwarded to owner's testing agency.</li> </ul>

\*Cores for Bituminous Quality Assurance Testing shall be provided by the Contractor.

**City of Hermantown, Minnesota**  
**Public Works Department**

**Standard Specifications  
for Construction  
2022 Edition**

**APPENDIX C**

**General Conditions**

# SECTION GC

Revised 03/2022

## 1. CONTRACT AND CONTRACT DOCUMENTS

The plans, specifications and addenda shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect limit or cast light on the interpretation of the provisions to which they refer.

## 2. DEFINITIONS

The following terms as used in this Contract are respectively defined as follows:

- a) "Owner": The village, city, company, corporation or individual as designated in the ADVERTISEMENT FOR BIDS and in the PROPOSAL is herein referred to as the "OWNER".
- b) "ENGINEER": Northland Consulting Engineers L.L.P., 102 S 21<sup>st</sup> Avenue West, Suite One, Duluth, MN, 55806, has been appointed by the owner to make these plans and specifications and is herein referred to as the "ENGINEER".
- c) "SUPERVISOR": The supervisor or resident project engineer is an authorized representative of the engineer assigned to make inspection of the work performed and materials furnished by the contractor, to establish grades with help as needed to be furnished by the contractor and generally assist in supervising the execution of the work in accordance with the plans and specifications. The supervisor has no authority to order or permit deviations from the plans and specifications, or to accept on behalf of the owner, any materials or workmanship which does not conform fully to the requirements of the contract.
- d) "CONTRACTOR": A person, firm or corporation with whom the contract is made by the owner.
- e) "SUBCONTRACTOR": A person, firm or corporation supplying labor and materials or only labor for work at the site of the project for and under separate contract or agreement with the contractor.
- f) "WORK ON (AT) THE PROJECT": Work to be performed at the location of the project, including the transportation of materials and supplies to or from the location of the project by employees of the contractor and any subcontractor.

## 3. DRAWINGS

- a) The drawings, with such corrections, interlineation and details as may be found upon them shall be considered as a part of and illustrative of this specification and cooperative with it. Any work or material herein specified and not shown on the drawings, or any work shown on the drawings and not mentioned in the specifications must be considered as included as though both shown and specified. Where parts of the work are given, the balance shall be a repetition and where any detail is started upon a drawing, it shall be in the construction carried the full length of the part it details. Parts not specially detailed shall be constructed in the customary manner of the class or work so as to maintain the strength and complete the parts they compose.
- b) Where figures or notes are given, same shall be preferred to scale dimensions, but where none are given, scale drawings shall be accurately followed. Large scale drawings shall take precedence over those small scale. All dimensions and details shall be checked against those on job. Job dimensions to hold in preference to plan scale and dimensions.
- c) The contractor shall not take advantage of any clerical error or manifest omissions or discrepancies in the drawings or specifications but shall immediately refer same to the engineer for solution and correction, whose decision shall be final; and in no case shall the contractor proceed in doubt.

- d) The owner reserves the right to make any changes or alterations in the drawings and specifications in accordance with Paragraph 18 hereof which he may deem advisable, but the contractor shall make no changes in the drawings or specifications except upon written orders of the engineer.
- e) All drawings and specifications are the property of the engineer and must be returned to him upon completion of the work and shall not be used for the construction of any other work without the knowledge and consent of the engineer.

#### **4. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS**

The contractor will be furnished additional instructions and detail drawings as necessary to carry out the work included in the contract. The additional drawings and instructions thus supplied to the contractor will coordinate with the contract documents and will be so prepared that they can be reasonably interpreted as part thereof. The contractor shall carry out the work in accordance with the additional detail drawings and instructions. The contractor and the engineer will prepare jointly (a) a schedule, fixing the dates at which special detail drawings will be required; such drawings, if any, to be furnished by the engineer in accordance with said schedule, and (b) a schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment, and the completion of the various parts of the work; each such schedule to be subject to change from time to time in accordance with the progress of the work.

#### **5. SHOP OR SETTING DRAWINGS**

The contractor shall submit promptly to the engineer two copies of each shop or setting drawing prepared in accordance with the schedule predetermined as aforesaid. After examination of such drawings by the engineer and the return thereof, the contractor shall make such corrections to the drawings as have been indicated and shall furnish the engineer with two corrected copies. If requested by the engineer, the contractor must furnish additional copies. Regardless of corrections made in or approval given to such drawings by the engineer the contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the plans and specifications, unless he notified the engineer in writing of any deviations at the time he furnishes such drawings.

#### **6. SETS OF PLANS AND SPECIFICATIONS**

The engineer will furnish the contractor with two (2) sets of plans and specifications, on paper, as needed for his use during the prosecution of the work. Any additional sets of plans and specifications required shall be paid for by the contractor at cost.

#### **7. MATERIALS, SERVICES AND FACILITIES**

- a) It is understood that except as otherwise specifically stated in the contract documents, the contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.
- b) Any work necessary to be performed after regular working hours, on Sundays or legal holidays shall be performed without additional expense to the owner. When the contractor elects to work at such times, notice of his intention to do so shall be given to the engineer within a reasonable time in advance.

#### **8. CONTRACTOR'S TITLE TO MATERIALS**

No materials or supplies for the work shall be purchased by the contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The contractor warrants that he has good title to all materials and supplies used by him in the work, free from all liens, claims or encumbrances.



## **9. INSPECTION AND TESTING OF MATERIALS**

- a) All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the owner. The owner will pay for all laboratory inspection service direct, and not as a part of the contract.
- b) Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.
- c) Contractor shall provide adequate notice and coordination of planned work activities so that construction inspection can be provided by the ENGINEER.

## **10. SUBSTITUTE AND 'OR EQUAL' ITEMS**

The Contract, if awarded, will be on the basis of materials and equipment described in the drawings or specified in the specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the drawings or specified in the specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by CONTRACTOR if accepted in writing by ENGINEER. Application for such acceptance will not be considered by ENGINEER until after the effective date of the AGREEMENT. The procedure for submission of any such application by CONTRACTOR and consideration by ENGINEER is set forth in the GENERAL CONDITIONS and may be supplemented in the GENERAL AND SPECIFIC REQUIREMENTS.

## **11. PERMITS AND REGULATIONS**

The contractor shall procure and pay for all permits, licenses and approvals necessary for the execution of his contract.

Vendors shall secure all patent rights free of charge to the owner and free of infringement suits.

The contractor shall comply with all laws, ordinances, rules, orders, and regulations relating to the performance of the work, the protection of adjacent property, and the maintenance of passageways, guard fences or other protective facilities.

## **12. EXAMINATION OF CONTRACT DOCUMENTS AND SITE**

It is the responsibility of each Bidder before submitting a Bid:

- a) To examine thoroughly the CONTRACT DOCUMENTS and all information contained in the Bidding Documents.
- b) To visit the site to become familiar with and satisfy the Bidder as to the general, local and site conditions, including subsurface conditions, if applicable, that may affect cost, progress, performance or furnishing of the WORK.
- c) To consider federal, state, and local laws and regulations that may affect cost, progress, performance or furnishing of the WORK.
- d) To study and carefully correlate the Bidder's knowledge and observations with the CONTRACT DOCUMENTS and other related data.
- e) To promptly notify the ENGINEER of all conflicts, errors, ambiguities or discrepancies which the Bidder has discovered in or between the CONTRACT DOCUMENTS and other related documents.

Information and data shown or indicated in the Bidding Documents with respect to existing underground facilities at or contiguous to the site is based upon information and data furnished to OWNER and ENGINEER by owners of such underground facilities or others, and the OWNER and ENGINEER do not assume responsibility for the accuracy or completeness thereof.

The OWNER will provide each Bidder access to the site to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid. Bidders must fill all holes and clean up and restore the site to its former condition upon completion of such explorations, investigations, tests and studies. Bidders shall provide a copy of the result of invasive explorations, tests and studies to Owner and the Engineer.

The submission of a Bid will constitute an inconvertible representation by the Bidder, that without exception the Bid is premised upon performing and furnishing the Work required by the CONTRACT DOCUMENTS and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the CONTRACT DOCUMENTS, that the Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities and discrepancies that the Bidder has discovered in the CONTRACT DOCUMENTS and the written resolution thereof by ENGINEER is acceptable to Bidder, and that the CONTRACT DOCUMENTS are sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the WORK.

### **13. CONTRACTOR'S OBLIGATIONS**

The contractor shall and will, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with the provisions of this contract and said specifications and in accordance with the plans and drawings covered by this contract and any and all supplemental plans and drawings, and in accordance with the directions of the engineer as given from time to time during the progress of the work. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the contract and specifications, and shall do, carry on, and complete the entire work to the satisfaction of the engineer and the owner.

### **14. WEATHER CONDITIONS**

In the event of temporary suspension or work, or during inclement weather, or whenever the engineer shall direct, the contractor will, and will cause his subcontractors to protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the engineer, any work or materials shall have been damaged or injured by reason of failure on the part of the contractor or any of his subcontractors to so protect his work, such materials shall be removed and replaced at the expense of the contractor.

### **15. PROTECTION OF WORK AND PROPERTY - EMERGENCY**

The contractor shall at all times safely guard the owner's property from injury or loss in connection with this contract. He shall, at all times, safely guard and protect his own work and that of adjacent property, from damage. The contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the contract or by the owner, or his duly authorized representative.

In case of an emergency which threatens loss or injury of property, and/or safety of life, the contractor will be allowed to act, without previous instructions from the engineer, in a diligent manner. He shall notify the engineer immediately thereafter.

Any claim for compensation by the contractor due to such extra work shall be promptly submitted to the engineer for approval.

Where the contractor has not taken action but has notified the engineer of an emergency threatening injury to persons or damage to the work or any adjoining property, he shall act as instructed or authorized by the engineer.

The amount of reimbursement claimed by the contractor on account of any emergency action shall be determined in the manner provided in Paragraph 18 of the General Conditions.

## **16. REPORTS, RECORDS AND DATA**

The contractor shall submit to the owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the owner may request concerning work performed or to be performed under this contract.

## **17. SUPERINTENDENCE BY CONTRACTOR**

At the site of the work the contractor shall employ a construction superintendent or foreman who shall have full authority to act for the contractor. It is understood that such representative shall be acceptable to the engineer.

## **18. CHANGES IN WORK**

No changes in the work covered by the approved contract documents shall be made without having prior written approval of the owner. Charges or credits for the work covered by the approved change shall be determined by one or more, or a combination of the following methods:

- a) Unit bid prices previously approved
- b) An agreed lump sum
- c) The actual cost of:
  - 1) Labor, including foremen
  - 2) Materials entering permanently into the work
  - 3) The ownership or rental cost of construction plant and equipment during the time of use on the extra work
  - 4) Power and consumable supplies for the operation of power equipment
  - 5) Insurance
  - 6) Social Security and old age and unemployment contributions

To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) of the estimated cost of the work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses.

## **19. EXTRAS**

Without invalidating the contract, the owner may order extra work of the kind bid upon or make changes by altering, adding to or deducting from the work, the contract sum being adjusted accordingly, and the consent of the surety being first obtained where necessary or desirable. All the work of the kind bid upon shall be paid for at the price stipulated in the proposal, and no claims for any extra work or materials shall be allowed unless the work is ordered in writing by the owner or its engineer acting officially for the owner, and the price is stated in the order.

## **20. TIME FOR COMPLETION AND LIQUIDATED DAMAGES**

It is hereby understood and mutually agreed, by and between the contractor and the owner, that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the Notice to Proceed.

The contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the contractor and the owner, that the time for the completion of the work described herein is a

reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevail in this locality.

If the said contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the owner, then the contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the owner the amount specified in the contract, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the contractor shall be in default after the time stipulated in the contract for completing the work.

The said amount is fixed and agreed upon by and between the contractor and the owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the owner would in such event sustain, and said amount is agreed to be the amount of damages which the owner would sustain and said amount shall be retained from time to time by the owner from current periodical estimates.

It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that the contractor shall not be charged with liquidated damages or any excess cost when the owner determines that the contractor is without fault and the contractor's reasons for the time extension are acceptable to the owner; Provided further, that the contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

- a) To any preference, priority or allocation order duly issued by the owner;
- b) To unforeseeable cause beyond the control and without the fault or negligence of the contractor, including but not restricted to, acts of God, or of the public enemy, acts of the owner, acts of another contractor in the performance of a contract with the owner, fires floods, epidemics, quarantine restrictions, strikes, freight embargoes and sever weather; and
- c) To any delays of sub-contractors or suppliers occasioned by any of the causes specified in sub-sections (a) and (b) of this article; Provided further, that the contractor shall, within ten (10) days from the beginning of such delay, unless the owner shall grant a further period of time prior to the date of final settlement of the contract, notify the owner, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify the contractor within a reasonable time of its decision in the matter.

## **21. CORRECTION OF WORK**

All work, all materials, whether incorporated in the work or not, all processes of manufacture and all methods of construction shall be at all times and places subject to the inspection of the engineer who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture and methods of construction for the purposes for which they are used. Should they fail to meet his approval they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the contractor at his own expense. Rejected material shall immediately be removed from the site. If, in the opinion of the engineer, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the contract documents, the compensation to be paid to the contractor hereunder shall be reduced by such amount as in the judgment of the engineer shall be equitable.

## **22. CLAIMS FOR EXTRA COSTS**

No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order of the engineer approved by the owner, as aforesaid, and the claim presented with the first estimate after the changed or extra work is done. When work is performed under the terms of subparagraph 18 (c) of the General Conditions, the contractor shall furnish satisfactory bills, payrolls, and vouchers covering all items of cost and when requested by the owner, give the owner access to accounts relating thereto.

### **23. RIGHT OF THE OWNER TO TERMINATE CONTRACT**

In the event that any of the provisions of this contract are violated by the contractor, or by any of his subcontractors, the owner may serve written notice upon the contractor and the surety of its intention to terminate the contract, and unless within ten (10) days after the serving of such notice upon the contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, the contract shall, upon the expiration of said ten (10) days, cease and terminate. In the event of any such termination, the owner shall immediately serve notice thereof upon the surety and the contractor, and the surety shall have the right to take over and perform the contract; Provided, however, that if the surety does not commence performance thereof within ten (10) days from the date of the mailing to such surety of notice of termination, the owner may take over the work and prosecute the same to completion by contract or by the force account for the account and at the expense of the contractor, and the contractor and his surety shall be liable to the owner for any excess cost occasioned the owner thereby, and in such event the owner may take possession of and utilize in completing the work, such materials, appliances and plant as may be on the site of the work and necessary therefore.

### **24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES**

Immediately after execution and delivery of the contract, and before the first partial payment is made, the contractor shall deliver to the owner an estimated construction progress schedule in form satisfactory to the owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the contract documents and the anticipated amount of each monthly payment that will become due the contractor in accordance with the progress schedule. The contractor shall also furnish (a) a detailed estimate giving a complete breakdown of the contract price and (b) periodic itemized estimates of work done for the purpose of making partial payments thereon. The costs employed in making up any of these schedules will be used only for determining the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the contract price.

### **25. PAYMENT TO CONTRACTOR**

- a) Not later than the 15th day of each calendar month the owner shall make a progress payment to the contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this contract, but to insure the proper performance of this contract, the owner shall retain five percent (5%) of the amount of each estimate until final completion and acceptance of all work covered by this contract.
- b) In preparing estimates, the material delivered on the site and preparatory work done may be taken into consideration.
- c) All material and work covered by partial payments made shall thereupon become the sole property of the owner, but this provision shall not be construed as relieving the contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the owner to require the fulfillment of all of the terms of the contract.
- d) Owner's right to withhold certain amounts and make application thereof: The contractor agrees that he will indemnify and save the owner harmless from all claims growing out of the lawful demands of sub-contractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. The contractor shall, at the owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have to be paid, discharged or waived. If the contractor fails to do so, then the owner may, after having served written notice on the said contractor, either pay unpaid bills of which the owner has written notice, direct, or withhold from the contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the contractor shall be resumed, in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon the owner to either the contractor or his surety.
- e) Final Payment. The balance due the Contractor hereunder, including any retainage, shall be payable after the Owner, by resolution of its City Council, determines the Contractor shall have obtained or caused to occur the

following:

- (i) Completion of the Work; and
- (ii) Inspection and approval of the Work hereunder, by the engineer; and
- (iii) Final resolution of all claims for damages made with respect to work performed by Contractor under this Agreement; and
- (iv) Approval by the Owner of the Contractor's final application for payment.

In paying any unpaid bills of the contractor, the owner shall be deemed the agent of the contractor, and any payment so made by the owner, shall be considered as a payment made under the contract by the owner to the contractor, and the owner shall not be liable to the contractor for any such payment made in good faith.

## **26. ACCEPTANCE OF FINAL PAYMENT AS RELEASE**

The acceptance by the contractor of final payment shall be and shall operate as a release to the owner of all claims and all liability to the contractor for all things done or furnished in connection with this work and for every act and neglect of the owner and others relating to or arising out of this work. No payment, however, final or otherwise, shall operate to release the contractor or his sureties from any obligations under this contract or the performance bond.

## **27. PAYMENTS BY CONTRACTOR**

The contractor shall pay (a) for all transportation and utility services not later than the calendar month following that in which services are rendered, (b) for all materials, tools, and other expendable equipment to the extent of 90% of the cost thereof, not later than the calendar month following that in which such materials, tools and equipment are delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools and equipment are incorporated or used and (c) to each of his subcontractors, not later than the 7th day following each payment to the contractor, the respective amounts allowed the contractor on account of the work performed by his subcontractors to the extent of each subcontractor's interest therein.

## **28. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE**

The Contractor agrees to indemnify and save harmless the Owner, its officers, employees, agents and assigns against loss or expense, including attorneys' fees, by reason of the liability imposed by law upon the Owner for damages because of bodily injuries, including death at any time resulting therefrom, accidentally sustained by any person or persons, or on account of damage to property arising out of or in consequence of the performance or non-performance of this Construction Contract, whether such injuries to persons or damage to property are due or claimed to be due as a result of negligence or willful misconduct of the Contractor, its subcontractors, employees, agents or any other person.

The Contractor shall not commence work under this contract until the Contractor has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on any subcontract until the insurance required of the subcontractor has been obtained and approved.

- a) Compensation Insurance: The Contractor and each subcontractor shall procure and shall maintain during the term of the contract Worker's Compensation Insurance as required by applicable Minnesota law for all employees to be engaged in work at the site of the Project. In case any class of employees engaged in hazardous work on the Project is not protected under the Worker's Compensation Statute, the Contractor shall provide and shall cause each subcontractor to provide adequate employer's liability insurance for the protection of such employees as are not otherwise protected. Contractor shall maintain "stop gap" coverage if Contractor obtains Workers' Compensation coverage from any state fund if Employer's liability coverage is not available.
- b) Contractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance: The Contractor shall procure and shall maintain during the term of the Contract Contractor's Property Damage Insurance and Vehicle Liability Insurance and Contractor's Public Liability Insurance in the amounts specified in Paragraphs (g), (h) and (i) below.

- c) Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance: The Contractor shall either (1) require each subcontractor to procure and to maintain during the life of any subcontract, subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance of the type and in the amounts specified in Paragraphs (g), (h) and (i) below, or (2) insure the activities of the subcontractors in Contractor's policy, specified in Paragraph (b) above.
- d) Scope of Insurance and Special Hazards: The insurance required under Paragraphs (b) and (c) hereof shall provide adequate protection for the Contractor and the subcontractors, respectively against damage claims which may arise from operations under this contract, whether such operations be by the insured or by any one directly or indirectly employed by the insured and, also against any of the special hazards which may be encountered in the performance of this Contract as enumerated in Paragraph (g) below.
- e) Indemnification. The Contractor shall indemnify and save harmless the Owner from all claims and actions of any kind arising from, or incidental to the performance of the Contract and expenses incidental to such claims and actions, including attorneys' fees, and shall assume without expense to the Owner, the defense of any such claims or actions. Except to the extent prohibited by law, this indemnity applies regardless of any strict liability or negligence attributable to the Owner (including sole negligence) and regardless of the extent to which the underlying occurrence (i.e., the event giving rise to a claim which would have been covered by the specified insurance) is attributable to the negligent or otherwise wrongful act or omission (including breach of contract) of Owner, its agents, employees or delegates. Contractor agrees that this indemnity shall be construed and applied in favor of indemnification. Contractor also agrees that if applicable law limits or precludes any aspect of this indemnity, then the indemnity will be considered limited only to the extent necessary to comply with that applicable law. The stated indemnity continues until all applicable statutes of limitation have run.

If a claim arises within the scope of the stated indemnity, the Owner may require Contractor to:

- i. Furnish and pay for a surety bond, satisfactory to the Owner, guaranteeing performance of the indemnity obligation; or
- ii. Furnish a written acceptance of tender of defense and indemnity from Contractor's insurance company.

Contractor will take the action required by the Owner within fifteen (15) days of receiving notice from the Owner.

- f) Proof of Insurance: The Contractor shall furnish the Owner with a certificate showing the type, amount, class of operations covered, effective dates and dates of expiration of policies. Such certificates shall contain substantially the following statement: "The insurance covered by this certificate will not be canceled, materially altered, or not renewed, except after thirty (30) days written notice or ten (10) days for non-payment of premium, has been received by the Owner." Owner is to be named as an additional insured on such Certificate and not merely as a Certificate holder. Contractor must provide Owner with appropriate endorsements to its policy(ies) of insurance reflecting the status of Owner as an additional insured and requiring that the foregoing notice of cancellation, material alteration or non-renewal be provided to owner by the insurance company providing such insurance policy(ies) to Contractor. In addition, all policies shall contain a waiver of subrogation in favor of Owner. All policies shall apply on a "per project" basis. Contractor agrees to maintain all coverage required herein throughout the term of the Contract and for a minimum of two (2) years following Owner's written acceptance of the Contract.

- g) Limits of Insurance:

Employer's Liability	Each Accident	\$500,000.00
	Disease Policy Limit	\$500,000.00
	Disease Each Employee	\$500,000.00

Worker's Compensation: As required by Minnesota law with an  
"all states" endorsement

Independent Contractor's protective  
coverage liability:

Bodily Injury:	Per Occurrence	\$2,000,000.00
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Property Damage	Per Occurrence	\$2,000,000.00
Products and completed operations coverage to be kept in place for the duration of any contract guarantee period:		
Bodily Injury	Per Occurrence	\$2,000,000.00
Property Damage	Per Occurrence	\$2,000,000.00
Comprehensive General Liability, Premises and Operations:		
Bodily Injury	Per Occurrence	\$2,000,000.00
Comprehensive General Liability, Property Damage and Bodily Injury:		
	Per Occurrence	\$2,000,000.00
Products – Completed Operations	Per Occurrence	\$2,000,000.00
Fire Legal Liability	Each Occurrence	\$100,000.00
Medical Expense:		\$5,000.00
Contractual Liability covering customary Construction Contract and subcontract indemnity provisions:		
Bodily Injury	Per Occurrence	\$2,000,000.00
Contractual Liability covering customary Construction Contract and subcontract indemnity provisions:		
Property Damage	Per Occurrence	\$2,000,000.00
Comprehensive Automobile Liability		
		\$2,000,000.00
Combined single limit each accident (shall include coverage for all owned, hired and non-owned vehicles).		
Property Damage	Per Occurrence	\$2,000,000.00
"All Risk" Builder's Risk Insurance		Completed Value Form

- h) Property Insurance: Contractor shall provide "All Risk" builder's risk insurance under a completed value form on all work on the Project, including foundations, permanent fixtures and attachments, machinery and equipment included in or installed under the Contract, debris removal, architects' and engineer's fees, temporary structures, materials, equipment and supplies of all kinds located on the Project, to the full replacement value thereof, except that such policy may provide for a deductible amount not to exceed \$25,000.00 per occurrence. Said insurance shall be endorsed to provide consent for occupancy of the Project and shall be maintained in effect until permanent property coverage is in force. Such insurance shall be written in the names of Contractor, any subcontractor and Owner, as their interests may appear. Contractor, all subcontractors, and suppliers waive all rights against Owner for damages caused by fire or insured perils, except such rights as are set forth hereunder to the proceeds of such insurance payable in the event of such loss.
- i) Public Liability Insurance: Public Liability Insurance written on an "occurrence" basis under Comprehensive General Liability Form with "Broad Form" property damage liability coverage, with the XCU exclusion removed, in limits specified in paragraph (g) above. Contractor shall require such liability coverage from all subcontractors unless they are insured under the Contractor's policies. Certificates evidencing such coverage obtained by any subcontractor shall be provided to Owner and Engineer/Architect.



- j) General Liability: Prior to starting the Work, Contractor shall procure, maintain and pay for such insurance as will protect against claims or loss which may arise out of operations by Contractor or by any subcontractor or by anyone employed by any of them or by anyone for whose acts any of them may be liable. Such insurance shall include, but not be limited to, minimum coverages and limits of liability specified in this section or required by law.
- k) Commercial General Liability: The Commercial General Liability Policy shall be on ISO form CG 00 01 12 07 or CG 00 01 04 13, or the equivalent. Such insurance shall cover liability arising from premises, operations, independent contractors, products- completed operations, personal and advertising injury, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract). There shall be no endorsement or modification of the Commercial General Liability form arising from pollution, explosion, collapse, underground property damage or work performed by subcontractors.
- l) Claim Form: Contractor shall obtain and provide to Owner, with the Certificate of Insurance, a Claim Form for use by parties with claims against Contractor arising out of the performance of work by Contractor under the Contract with Owner.
- m) Primary Policies. All policies shall be primary and non-contributory.
- n) Deductible Responsibilities. It shall be Contractor's responsibility to pay any retention or deductible for the coverages required herein.
- o) Insurance Company Rating. Contractor shall maintain in effective all insurance coverages required under this section at Contractor's sole expense and with insurance companies licensed to do business in the state of Minnesota and having a current A.M. best rating of no less than A, unless specifically accepted by Owner in writing.

## 29. PERFORMANCE BOND

The contractor shall furnish a performance bond in an amount at least equal to one hundred percent (100%) of the contract prices as security for the faithful performance of this contract. Only a bond without limitations or restrictions will be accepted. The bond will be for the use and benefit of the owner, as well as all persons who may become entitled to liens under said contract, according to the provisions of the laws of the applicable State or territory in such case made and provided. Bond shall be in force until one year after the completion of the contract to allow the owner to be free to adjust and satisfy any claims or liability arising from the construction of this work, and this bond shall be liable for any expense caused by such adjustment. Before final acceptance the performance bond must be approved by the owner.

## 30. PAYMENT BOND

The contractor shall furnish a payment bond in an amount at least equal to one hundred percent (100%) of the contract price as security for the payment of all persons supplying labor and material in connection with the performance of this contract. Only a bond without limitation or restrictions will be accepted. The bond shall be for the use and benefit of the owner, as well as all persons who may become entitled to liens under this contract according to the provisions of the laws of the applicable State or territory in such case made and provided. The bond shall be in force for one year after the completion of the contract to allow the owner to be free to adjust and satisfy any claims or liability arising from the construction of this contract, and this payment bond shall be liable for any expense caused by such adjustment. Before final acceptance of this contract, the payment bond must be approved by the owner.

## 31. ADDITIONAL OR SUBSTITUTE BOND

If at any time the owner for justifiable cause shall be or become dissatisfied with the surety or sureties for the performance bond, the contractor shall within five (5) days after notice from the owner to do so substitute an acceptable bond in such form and sum and signed by such other surety or sureties as may be satisfactory to the owner. The premiums on such bond shall be paid by the contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished such an acceptable bond to the owner.

### **32. ASSIGNMENTS**

The contractor shall not assign the whole or any part of this contract or any monies due or to become due hereunder without written consent of the owner. In case the contractor assigns all or any part of any monies due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this contract.

### **33. MUTUAL RESPONSIBILITY OF CONTRACTORS**

If, through acts of neglect on the part of the contractor any other contractor or any subcontractor shall suffer loss of damage on work, the contractor agrees to settle with such other contractor or subcontractor by agreement or arbitration if such other contractor or subcontractors will so settle. If such other contractor or subcontractor shall assert any claim against the owner on account of any damage alleged to have been sustained, the owner shall notify the contractor, who shall indemnify and save harmless the owner against any such claim.

### **34. SEPARATE CONTRACTS**

The contractor shall coordinate his operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work. The contractor, including his subcontractors, shall keep informed of the progress and the detail work of other contractors and shall notify the engineer immediately of lack of progress or defective workmanship on the part of other contractors. Failure of a contractor to keep informed of the work progressing on the site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by him of the status of the work as being satisfactory for proper coordination with his own work.

### **35. SUBCONTRACTING**

- a) The contractor may utilize the services of specialty subcontractors on those parts of the work which, under normal contracting practices, are performed by specialty subcontractors.
- b) The contractor shall not award any work to any subcontractor without prior written approval of the owner, which approval will not be given until the contractor submits to the owner a written statement concerning the proposed award to the subcontractor, which statement will contain such information as the owner may require.
- c) The contractor shall be as fully responsible to the owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- d) The contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the contractor by the terms of the General Conditions and other contract documents insofar as applicable to the work of subcontractors and to give the contractor the same power as regards to terminating any subcontract that the owner may exercise over the contractor under any provision of the contract documents.
- e) Nothing contained in this contract shall create any contractual relation between any subcontractor and the owner.
- f) Contractor shall comply with the provisions of Minnesota Statutes Section 471.425 Subd. 4a, Contractor shall pay Subcontractor within ten days of Contractor's receipt of payment from Owner for undisputed services provided by such Subcontractor. Contractor shall 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. Contractor shall pay the actual interest or \$10, whichever is greater, for an unpaid balance of \$100 or more. Contractor shall pay the Subcontractor the actual interest for an unpaid balance of less than \$100.

### **36. ENGINEER'S AUTHORITY**

The engineer shall give all orders and directions contemplated under this contract and specifications relative to the execution of the work. The engineer shall determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and the construction thereof.

The engineer's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determination or decision of the engineer shall be a condition precedent to the right of the contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.

The engineer shall decide the meaning and intent of any portion of the specifications and of any plan or drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work which may arise between the contractor under this contract and other contractors performing work for the owner shall be adjusted and determined by the engineer.

The contractor is to furnish the engineer or supervisor with all required assistance to facilitate thorough inspection or culling over removal of doubtful or defective material, or for the thorough examination into any of the work performed or for any other purpose required in the discharge of their duties, for which service no additional allowance will be made. The engineer or supervisor may stop the work entirely if there is not sufficient quantity of suitable and approved materials on the site to carry it on properly, or for any good and sufficient cause; also to see that all of the provisions of this contract and specifications are faithfully adhered to, and he shall have the power to dismiss any employee of the contractor for incompetence, intoxication, willful negligence or disregard of orders.

The engineer will not be responsible for the acts of omissions of the contractor, or any subcontractors, or any of his superintendents, agents or employees.

### **37. USE OF PREMISES AND REMOVAL OF DEBRIS**

The contractor expressly undertakes at his own expense:

- a) to take every precaution against injuries to persons or damage to property;
- b) to store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or the work of any other contractors; to place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work;
- c) to clean up frequently all refuse, rubbish, scrap materials, and debris caused by his operations, to the end that all times the site of the work shall present a neat, orderly and workmanlike appearance;
- d) before final payment to remove all surplus material, false-work, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations and to put the site in a neat, orderly condition;
- e) to effect all cutting, fitting or patching of his work required to make the same to conform to the plans and specifications and, except with consent of the engineer, not to cut or otherwise alter work of any other contractor.

### **38. QUANTITIES OF ESTIMATE**

Wherever the estimated quantities of work to be done and materials to be furnished on a unit price basis under this contract are shown in any of the documents including the proposal, they are given for use in comparing bids, and the right is expressly reserved, except as herein otherwise specifically limited, to increase or decrease them as may be deemed reasonably necessary or desirable by the owner to complete the work contemplated by this contract, and such increase or decrease shall in no way invalidate this contract, nor shall any such increase or decrease give cause for claims or liability for damages.

### **39. LAND AND RIGHTS-OF-WAY**

Prior to the start of construction, the owner shall obtain all land rights-of-way necessary for the carrying out and completion of work to be performed under this contract.

It is the obligation of the Contractor to identify the right-of-way boundaries available for the construction of the Work before bidding on the Work. The submission of a bid on the Work constitutes a representation and agreement by Contractor that the right-of-way made available for the Work is sufficient to construct the Work in accordance with the Plans and Specifications. Contractor shall confine its Work and operations to the right-of-way made available by Owner unless Contractor obtains written approval by an affected property owner(s) to utilize additional area beyond the available right-of-way.

#### **40. GENERAL GUARANTEE**

Neither the final certificate of payment nor any provision in the contract documents nor partial or entire occupancy of the premises by the owner shall constitute an acceptance of work not done in accordance with the contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the date of final acceptance of work unless a longer period is specified. The owner will give notice of observed defects with reasonable promptness.

#### **41. CONFLICTING CONDITIONS**

Any provision in any of the contract documents which may be in conflict or inconsistent with any of the paragraphs in these General Conditions shall be void to the extent of such conflict or inconsistency.

#### **42. NOTICE AND SERVICE THEREOF**

Any notice to any contractor from the owner relative to any part of this contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted, by certified or registered mail, to the said contractor at this last given address, or delivered in person to said contractor or his authorized representative on the work.

#### **43. REQUIRED PROVISIONS DEEMED INSERTED**

Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract shall forthwith be physically amended to make such insertion or correction.

#### **44. PROTECTION OF LIVES AND HEALTH**

In order to protect the lives and health of his employees under the contract, the contractor shall comply with all pertinent provisions of the "Manual of Accident Prevention In Construction" issued by the Associated General Contractors of America, Inc., and shall maintain an accurate record of all cases death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the contract.

The contractor alone shall be responsible for the safety, efficiency, and adequacy of his plant, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance, or operation.

#### **45. OTHER PROHIBITED INTERESTS**

No official of the owner who is authorized in such capacity and on behalf of the owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any engineering, inspection, construction or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part hereof. No officer, employee, attorney, engineer or inspector of or for the owner who is authorized in such capacity and on behalf of the owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

#### **46. USE AND OCCUPANCY PRIOR TO ACCEPTANCE BY OWNER**

The contractor agrees to the use and occupancy of a portion or unit of the project before formal acceptance by the owner, provided the owner:

- a) secures written consent of the contractor except in the event, in the opinion of the engineer, the contractor is chargeable with unwarranted delay in completing the contract requirements;
- b) secures consent of the surety;
- c) secures endorsement from the insurance carrier(s) permitting occupancy of the building or use of the project during the remaining period of construction; or
- d) when the project consists of more than one building, and one of the buildings is occupied, secures permanent fire and extended coverage insurance, including a permit from the insurance carrier to complete construction.

#### **47. SUSPENSION OF WORK**

Should the owner be prevented or enjoined from proceeding with work or from authorizing its prosecution either before or after its protection, by reason of any litigation, the contractor shall not be entitled to make or assert claim for damage by reason of said delay, but time for completion of the work will be extended to such reasonable time as the owner may determine will compensate for time lost by such delay with determination to be set forth in writing.

#### **48. SURVEYS, STAKES AND BENCH MARKS**

The contractor shall give the owner at least 72 hours' notice in writing before requiring any surveys or construction stakes to be set or before commencing work on any portion of the contract, or at any new place, as well as at any place where work has been relinquished or stopped for any cause.

The contractor is responsible for the preservation of all such stakes and bench marks in their proper positions, and in case of any of them being lost, destroyed or obliterated after once having been given, he shall at once notify the owner in writing, and all expense incurred by the owner in replacing the same may be charged against the contractor and deducted from the estimates.

#### **49. ENGINEERING SERVICES BEYOND COMPLETION DATE**

In the event the contractor exceeds the specified completion date, all engineering costs incurred after this date shall be paid by the contractor, such as inspection, supervision and any other relative engineering service.

#### **50. DATA PRACTICES CLAUSE**

All parties to this contract are subject to the Minnesota Government Data Practices Act, Chapter 13 of the Minnesota Statutes, including Section 13.05, Subd. 11.

## **51. NON-MINNESOTA CONTRACTORS AND SUBCONTRACTORS**

If a non-Minnesota CONTRACTOR or subcontractor enters into a CONTRACT for this Project, and the total amount of the CONTRACT for this Project is greater than \$100,000.00, the non-Minnesota CONTRACTOR or subcontractor will be required to file Form SD-E Minnesota Department of Revenue/Exemption from Surety Deposits for Non-Minnesota Contractors prior to executing the CONTRACT for this Project.

**City of Hermantown, Minnesota**  
**Public Works Department**

**Standard Specifications  
for Construction  
2022 Edition**

**APPENDIX D**

**Roadway Development Requirements**

# **HERMANTOWN ROADWAY DEVELOPMENT REQUIREMENTS**

## **GENERAL REQUIREMENTS**

The 2020 edition of the Minnesota Department of Transportation "Standard Specifications for Construction" and all its supplements shall apply for the road construction and the 2022 Standard Specifications for Construction for the City of Hermantown.

The requirements noted herein are minimum requirements. Specific projects may require more stringent standards be applied because of the specific situation. A checklist is provided to assist the developer or their engineer.

These standards are created as guidelines by which all development within the city that will eventually be owned by the city must be designed and constructed. In situations where other standards apply such as Mn/DOT state aid roadways, those standards supersede these. On any item where these standards are more stringent than those, these city standards will apply for that item unless otherwise approved by the City Engineer.

All costs incurred by the city regarding the project shall be reimbursed by the developer.

## **DEFINITIONS**

Local (minor) street: generally a residential street servicing the neighborhood. Consult

City staff for all other roads.

## **DESIGN CRITERIA**

Refer to the Standard Detail Drawings in Appendix A. The "Typical Urban Street Section STR-3" is to be used unless specifically approved in writing by the City Engineer and approved by the Hermantown City Council that the "Typical Rural Street Bituminous Section STR-4 or Typical Rural Street Gravel Section STR-5" is appropriate.

## **SUBSURFACE EVALUATION**

Soil borings shall be completed as part of the design of the project. These are to be evaluated by a qualified professional engineer with their recommendations in writing. Borings shall be located at intervals along the length of the project to best identify characteristics of the in-place material including any changes anticipated in the conditions along the project length. A sub-soil report and geotechnical recommendation shall be submitted to the Hermantown City Engineer. In the plan review, the City Engineer will check for compliance of the geotechnical recommendation.



## **PLANS**

A checklist is enclosed herein for general assistance.

A set of Record Drawings are to be submitted to the city at the end of the project including installed utilities, prior to city acceptance of the project. These plans shall include any modifications implemented during construction.

Both a hard copy of the Record Drawings and an electronic AutoCAD format shall become the ownership of the city prior to acceptance of the roadway.

## **TYPICAL SECTIONS AND DETAILS**

Typical sections that indicate minimum acceptable materials and thicknesses are included herein. The engineer's calculations should verify that the design criteria have been met with the typical section or that typical section had to be increased.

All roadways shall be surfaced with either bituminous or concrete surfacing as noted in the typical sections, except a rural design approved by the Planning & Zoning Commission, City Engineer, and City Council.

## **SIDEWALKS**

The plans shall provide grading for a future four-foot sidewalk on both sides for urban section design. The concrete sidewalk need not be installed during initial construction, but this allows the city and residents the ability to construct concrete sidewalk in the future in an economical manner.

## **RIGHT OF WAY**

The plans are to show the construction limits of the project. If additional right of way beyond that shown on the original plat is required, it is the developer's responsibility to provide permanent right of way ownership to the city.

## **SPECIAL CONSTRUCTION ISSUES**

All culverts across the public roadway shall be 15 inches or larger. Entrance culverts shall be 12 inches or larger. The City Engineer will review drainage report and culvert sizing to determine if the size is sufficient.

Cul-de-sacs shall be designed with an island. The minimum radius shall be 50 feet with right-of-way of 65 feet. Refer to "typical Cul-de-Sac Section S-4" for dimensions.

A street light shall be installed at any intersection where a collector street intersects another collector or an arterial street. The light type shall meet Minnesota Power specifications and shall be approved by the city.

#### **GEOMETRIC DESIGN STANDARDS - URBAN**

	Width	Design Speed	Structural Design Strength
Local Street	28' (2—12—12—2)	30-40	9 ton

#### **PLAN REVIEW CHECKLIST**

A complete set of street plans must follow a specified order; but may vary in number of sheets depending on the length and complexity of the individual project. Each plan should contain:

1. Title Sheet-
2. General Layout Sheet
3. Estimated Quantities
4. Tabulation of Individual Quantities
5. Typical Sections
6. Construction Details (Special Details)
7. Plan Sheet of Existing Topography
8. Plan and Profile Sheets
9. Erosion Control Plan
10. Traffic Control Plan
11. Cross—Section Sheets

Notes:

1. Standard size sheets 11" x 17".
2. All original sheets (or mylar) must be made so that copies are legible.
3. Uniform inked lettering no smaller than Leroy 120 (1/8 inch) on full size plans.

PRELIMINARY DESIGN

	<u>CHECKLIST</u>	<u>COMMENTS/DESCRIPTION</u>
A. <u>Soils/Sub Surface Exploration</u>		
Field Work — Borings		
Report with Recommendations		
B. <u>Drainage</u>		
1)    Hydrologic Analysis:		
•    Type of Method or Model		
•    Recommendations		
2)    Hydraulic Design:		
•    Data Analysis		
•    Study		
•    Recommendations		
3)    Stormwater Controls:		
•    Storm Sewer		
•    Ditch		
•    Storm Water Ponds		
4)    SWPPP		
C.    Sanitary Sewers		
•    Submit Permit Application to City Administrator or City Engineer for Review and Approval		

D. Bid Documents		
• Plans (see Checklist)		
• Specifications		
• Engineer's Cost Estimate		
• Construction Observation and Testing Program		

### TITLE SHEET

	<u>CHECKLIST</u>	<u>COMMENTS/DESCRIPTION</u>
Design designation, information ADT, Spec., Etc.		
Location of project information		
Length of project exception noted		
Index map information (Des., scale, north arrow begin and end proj. sta.)		
Index of sheets		
Type of work to be done (curb & gutter)		
All necessary signature blocks		
Project numbers where needed		
"This plan contains __ sheets"		
<u>HEADING</u> City of Hermantown Public Works Department Construction Plan For:		
Show section, township and range information		
Governing specifications		

**ESTIMATED QUANTITY AND  
STANDARD PLATES**

	<u>CHECKLIST</u>	<u>COMMENTS/DESCRIPTION</u>
Item and description from latest spec book or supplement		
Specify basis of measure for borrow and granular items		
Use of construction notes		
Index to tabulation charts		
Correct nomenclature and applicability of standard plates		
Quantities - Tabulations equal to pay items		

Note: "These Standard Plates as Approved by the FHWA Shall Apply"

**TYPICAL SECTION (S) SHEET**

	<u>CHECKLIST</u>	<u>COMMENTS/DESCRIPTION</u>
Show profile grade location		
Show additional sections for shoulders, swamp, turn lanes, rock, etc.		
Scale shown		

**TABULATION SHEETS**

	<u>CHECKLIST</u>	<u>COMMENTS/DESCRIPTION</u>
Index to tabulation charts		
Tabulations = pay item		
Spec. No. & description match SEQ		

### TRAFFIC CONTROL SHEET

The traffic control plan shall be in accordance to the current Minnesota Manual on Uniform Traffic Control Devices and the Field Manual. The traffic control plan shall be submitted to the Hermantown City Engineer for review and approval.

### PLAN AND PROFILE SHEETS

	<u>CHECKLIST</u>	<u>COMMENTS/DESCRIPTION</u>
Municipal R.O.W. Easements, etc.		
Temporary easements		
Section corner, 1/4 corners, etc.		
City monuments		
North arrows		
Equations, street alignment		
Construction centerline or reference line		
Misc. or private utilities Overhead/Underground <ul style="list-style-type: none"><li>• Minnesota Power</li><li>• Qwest</li><li>• MediaCom</li><li>• Aquila</li><li>• Hermantown Public Utilities</li><li>• City of Duluth Comfort Systems</li><li>• WLSSD</li></ul>		
Alignment plan or tabulation		
Azimuths or bearings		
Existing topography		
Hydraulic data		
Creeks and pipe over 48"		
Begin and end construction		
Culverts – Size and direction of flow		

Road and entrance radii		
Curve data		
Wetlands: description including type, size, etc.		
Sanitary sewers, existing and proposed		
Storm sewers, existing and proposed		
Road intersection data		
Ditches, location, direction of flow		
Ditch blocks (Overflow structures)		
Scale		
Erosion Control Plan		
Bench Marks		
Property owners		
House address		
Show profile grades		
Show culverts at centerline		
Show subcuts, swamp and rock depths		
Show culvert treatment		
Vertical curve information		

**CROSS SECTION SHEETS**

	<u>CHECKLIST</u>	<u>COMMENTS/DESCRIPTION</u>
Show scale		
Label equations, survey and construction centerline, etc.	_____	_____
Show beginning and end construction	_____	_____
Show inplace utilities	_____	_____
Show new utility construction CB's M.H., pipe	_____	_____
Show shoulder slope	_____	_____
Show R.O.W. and construction Easements	_____	_____
Sections on all drives & label slope	_____	_____
Sections minimum of 50 feet	_____	_____
Earthwork balance	_____	_____



**City of Hermantown, Minnesota**  
**Public Works Department**

**Standard Specifications  
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**APPENDIX E**

**Responsible Contractor Verification**

## RESPONSIBLE CONTRACTOR CERTIFICATE

Applies to all prime contracts in excess of \$50,000.00

A responsible contractor is defined in Minnesota Statutes §16C.285, subdivision 3.

Any prime contractor or subcontractor who does not meet the minimum criteria under Minnesota Statute §16C.285, subdivision 3, or who fails to verify that it meets those criteria, is not a responsible contractor and is not eligible to be awarded a construction contract for the project or to perform work on the project.

A false statement under oath verifying compliance with any of the minimum criteria shall render the prime contractor or subcontractor that makes the false statement ineligible to be awarded a construction contract for the project and may result in termination of a contract awarded to a prime contractor or subcontractor that makes a false statement.

A prime contractor shall submit to the contracting authority upon request copies of the signed verifications of compliance from all subcontractors of any tier pursuant to subdivision 3, clause 7.

By signing this statement, I, \_\_\_\_\_,  
(type or print name)

\_\_\_\_\_ certify that I am an owner or officer of the company  
(title)

and do verify under oath that my company is in compliance with each of the minimum criteria listed in the law.

\_\_\_\_\_  
(name of the person, partnership, or corporation submitting this proposal)

\_\_\_\_\_  
(business address)

Signed: \_\_\_\_\_  
(bidder or authorized representative)

Date: \_\_\_\_\_

## ATTACHMENT A

### RESPONSIBLE CONTRACTOR AND CERTIFICATION OF COMPLIANCE

Minn. Stat. §16.285, Subd., 7, **IMPLEMENTATION.** any prime contractor or subcontractor that does not meet the minimum criteria in subdivision 3 or fails to verify it meets those criteria is not a responsible contractor and is not eligible to be awarded a construction contract for the project or to perform work on the project.

Minn. Stat. §16.285, Subd. 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 following minimum criteria:

1. The Contractor:
  - a. is in compliance with workers' compensation and unemployment insurance requirements;
  - b. is currently registered with the Department of Revenue and the Department of Employment and Economic Development if it has employees;
  - c. has a valid federal tax identification number or a valid Social Security number if an individual; and
  - d. has filed a certificate of authority to transact business in Minnesota with the secretary of state if a foreign corporation or cooperative.
  - e.
2. The contractor or related entity is in compliance with and, during the three-year period before submitting the 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, sections 3141 to 3148. For purposes of this clause, a violation occurs when a contractor or related entity:
  - a. 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;
  - b. has been issued an order to comply by the commissioner of labor and industry that has become final;
  - c. 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;
  - d. 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;
  - e. 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
  - f. 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.
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; and
7. All subcontractors that the contractor intends to use to perform project work have verified to the contractor through a signed statement under oath by an owner or officer that they meet the minimum criteria listed in clauses (1) to (6).

Minn. Stat. 1§16.285, Subd. 5. **SUBCONTRACTOR VERIFICATION.** A prime contractor or subcontractor shall include in its verification of compliance under subdivision 4 a list of all of its first-tier subcontractors that it intends to retain for work on the project.

If a prime contractor or any subcontractor retains additional subcontractors on the project after submitting its verification of compliance, the prime contractor or subcontractor shall obtain verifications of compliance from each additional subcontractor with which it has a direct contractual relationship and shall submit a supplemental verification confirming compliance with subdivision 3, clause (7), within 14 days of retaining the additional subcontractors.

A prime contractor shall submit to the contracting authority upon request copies of the signed verifications of compliance from all subcontractors of any tier pursuant to subdivision 3, clause (7). A prime contractor and subcontractors shall not be responsible for the false statements of any subcontractor with which they do not have a direct contractual relationship. A prime contractor and subcontractors shall be responsible for false statements by their first-tier subcontractors with which they have a direct contractual relationship only if they accept the verification of compliance with actual knowledge that it contains a false statement.

Minn.Stat. §16.285, Subd. 4. **VERIFICATION OF COMPLIANCE.** A contractor responding to a solicitation document of a contracting authority shall submit to the contracting authority a signed statement under oath by an owner or officer verifying compliance with each of the minimum criteria in subdivision 3 at the time that it responds to the solicitation document.

A contracting authority may accept a sworn statement as sufficient to demonstrate that a contractor is a responsible contractor and shall not be held liable for awarding a contract in reasonable reliance on that statement. Failure to verify compliance with any one of the minimum criteria or a false statement under oath in a verification of compliance shall render the prime contractor or subcontractor that makes the false statement ineligible to be awarded a construction contract on the project for which the verification was submitted.

A false statement under oath verifying compliance with any of the minimum criteria may result in termination of a construction contract that has already been awarded to a prime contractor or subcontractor that submits a false statement. A contracting authority shall not be liable for declining to award a contract or terminating a contract based on a reasonable determination that the contractor failed to verify compliance with the minimum criteria or falsely stated that it meets the minimum criteria.

## **CERTIFICATION**

**By signing this document, I certify that I am an owner or officer of the company, and I swear under oath that:**

- 1) My company meets each of the Minimum Criteria to be a responsible contractor as defined herein and is in compliance with Minn. Stat. §16.285,**
- 2) I have included Attachment A-1 with my company's solicitation response, and**
- 3) if my company is awarded a contract, I will also submit Attachment A-2 as required.**

<b>Authorized Signature of Owner or Officer:</b>	<b>Printed Name:</b>
<b>Title:</b>	<b>Date:</b>
<b>Company Name:</b>	

## ATTACHMENT A-1

**FIRST-TIER SUBCONTRACTOR LIST**  
*(Submit with Prime Contractor Response)*

**Minn. Stat. §16.285, Subd. 5:** A prime contractor or subcontractor shall include in its verification of compliance under subdivision 4 a list of all of its first-tier subcontractors that it intends to retain for work on the project.

[illegible]