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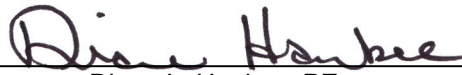
General Specifications and Standard Detail Plates for Street and Utility Construction

JANUARY 2024



CERTIFICATION

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

A handwritten signature in dark ink, reading "Diane Hankee", is written over a horizontal line.

Diane L. Hankee, PE

Date: January 2024

Lic. No. 43338

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
- 11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 - 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 - 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 - 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 - 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 - 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 - 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 - 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 - 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 - 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 - 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;
 3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition

and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the

required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

- C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.
- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed

by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);
 4. not seek contribution from insurance maintained by the additional insured; and
 5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will

provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

- E. *Insurance of Other Property; Additional Insurance:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.
 - 1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 - 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
 - 1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.
- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or

description contains or is followed by words reading that no like, equivalent, or “or equal” item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an “or equal” item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
 - b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor’s Expense*: Contractor shall provide all data in support of any proposed “or equal” item at Contractor’s expense.
- C. *Engineer’s Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each “or-equal” request. Engineer may require Contractor to furnish additional data about the proposed “or-equal” item. Engineer will be the sole judge of acceptability. No “or-equal” item will be ordered, furnished, installed, or utilized until Engineer’s review is complete and Engineer determines that the proposed item is an “or-equal,” which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer’s Determination*: Neither approval nor denial of an “or-equal” request will result in any change in Contract Price. The Engineer’s denial of an “or-equal” request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an “or-equal” item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor’s Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that

Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a

Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation.

Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as

being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such

changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when

Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

- 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.
 3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.
5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.
 - d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is

not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

1. Observations by Engineer;
 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. Use or occupancy of the Work or any part thereof by Owner;
 5. Any review and approval of a Shop Drawing or Sample submittal;
 6. The issuance of a notice of acceptability by Engineer;
 7. The end of the correction period established in Paragraph 15.08;
 8. Any inspection, test, or approval by others; or
 9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.
- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or

arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER’S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer’s status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner’s duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner’s duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner’s identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner’s responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner’s responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner’s responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner’s Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor’s failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the

responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.
- E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of

inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

- E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.
- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 - 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 - 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
 - 1. A mutually acceptable fixed fee; or
 - 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

- d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
- e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
- f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.
- B. *Change Proposal Procedures*
 - 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
 - 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 5. *Binding Decision:* Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion:* Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 Cost of the Work

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors

acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.
 - c. *Construction Equipment Rental*
 - 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 6. Expenses incurred in preparing and advancing Claims.
 - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *Allowances*

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.
- E. *Adjustments in Unit Price*
 - 1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
 - 2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
 - 3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.

- C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

- A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;

- b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
- 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
- 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
- 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
- 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining

after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work,

property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
 - 2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is

acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

- D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced.

Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.

- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in

connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 Contractor May Stop Work or Terminate

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 Methods and Procedures

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
 - 1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 - 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 - 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SUPPLEMENTARY CONDITIONS

INTRODUCTION

These Supplementary Conditions amend or supplement EJCDC® C 700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix “SC” added—for example, “Paragraph SC 4.05.”

ARTICLE 1 DEFINITIONS AND TERMINOLOGY

SC 1.01 Defined Terms

Modify the definition of *Technical Data*, Paragraph 1.01.A.46 by amending the first sentence of Paragraph 1.01.A.46.b to read as follows:

If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

Add to the list of definitions in Paragraph 1.01.A by inserting the following as numbered items in their proper alphabetical positions:

Contractor – The individual or entity by with whom the Owner has entered into the Agreement or a Development Agreement.

Department – The City of Lino Lakes Community Development Department.

Engineer – The City Engineer of the City of Lino Lakes or the Engineer representing the Owner on the project.

Observer – The individual or entity by with whom the Owner and Engineer is represented in the observation and construction of the Project.

Owner – The contract holder which is typically the City of Lino Lakes or a Developer approved by the City of Lino Lakes through a separate contract.

Project Manual – The written documents prepared for, or made available for, procuring and construction the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing condition information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

Work Order – A Work Order shall be as defined in MnDOT 1103.

ARTICLE 2 PRELIMINARY MATTERS

SC 2.02 Copies of Documents

Delete Paragraph 2.02.A in its entirety and replace with the following:

- A. Owner shall furnish to Contractor one printed copy of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

SC 2.03 Before Starting Construction

Modify the beginning of the first sentence of Paragraph 2.03.A to read as follows:

Preliminary Schedules: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents) and prior to the preconstruction conference, Contractor shall submit to Engineer for timely review:

Delete Paragraph 2.03.A.3 in its entirety.

SC 2.04 Preconstruction Conference; Designation of Authorized Representative

Delete Paragraph 2.04.A in its entirety and replace with the following:

- A. Before any work at the Site is started, Engineer will arrange a preconstruction conference attended by Owner, Contractor, Engineer, private utility owners, and others as appropriate to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

SC 2.05 Acceptance of Schedules

Delete the first sentence of Paragraph 2.05.A.

Delete Paragraph 2.05.A.3 in its entirety.

SC 2.06 Electronic Transmittals

Add the following new paragraphs to Paragraph 2.06:

- D. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.
- E. Electronic Documents that are exchanged may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitation, and restrictions, set forth in the Contract Documents.
- F. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for project purposes.

ARTICLE 3 CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC 3.02 Reference Standards

Add the following new paragraph immediately after Paragraph 3.02.A:

- B. The Work shall be performed in accordance with:
 - 1. the Project Manual;
 - 2. the Project Plans;
 - 3. the City of Lino Lakes General Specifications and Standard Detail Plates for Street and Utility Construction, dated January 2024;
 - 4. the 2020 Edition of the Minnesota Department of Transportation (MnDOT) Standard Specifications for Construction; and
 - 5. the 2023 Edition of the City Engineers Association of Minnesota (CEAM) Standard Specifications.

ARTICLE 4 COMMENCEMENT AND PROGRESS OF THE WORK

SC 4.04 Progress Schedule

Amend the first sentence of Paragraph 4.04.A to read as follows:

Contractor shall adhere to the Progress Schedule submitted in accordance with Paragraph 2.03 as it may be adjusted from time to time as provided below.

Amend the first sentence of Paragraph 4.04.A.1 to read as follows:

- 1. Contractor shall submit to Engineer for acceptance proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

ARTICLE 5 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC 5.01 Availability of Lands

Add the following language at the end of Paragraph 5.01.A:

If the Contractor believes that there has been delay by Owner in furnishing land, right-of-way, or easements, Contractor's sole remedy shall be an extension of Contract Time, for which the Contractor may make a claim therefore as provided in Article 12.

ARTICLE 6 BONDS AND INSURANCE

SC 6.01 Performance, Payment and Other Bonds

Add the following new paragraphs immediately after Paragraph 6.01.A:

- 1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C 610, Performance Bond, or as acceptable to the Owner.
- 2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C 615, Payment Bond, or as acceptable to the Owner.

Add the following paragraphs immediately after Paragraph 6.01.B:

1. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be two years after the date of Notice of Acceptability of Work.
2. After the Owner formally accepts the project and the Notice of Acceptability of Work is issued, Contractor shall furnish a maintenance bond in a bond amount of **100** percent of the final Contract Price. The maintenance bond period will extend to a date two years after the date of Notice of Acceptability of Work. Contractor shall deliver the fully executed maintenance bond no later than 10 days after the date of Notice of Acceptability of Work.
3. The maintenance bond must be issued by the same surety that issues the performance bond required under Paragraph 6.01.A of the General Conditions.

SC 6.03 Contractor's Insurance

Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- D. *Other Additional Insureds*: As a supplement to the provision of Paragraph 6.03.C of the General Conditions, the required policies, including but not limited to the commercial general liability, automobile liability, umbrella or excess policies, must include as additional insureds the following:
 1. City of Lino Lakes (Owner)
 2. WSB LLC (Engineer)
- E. *Workers' Compensation and Employer's Liability*: Contractor must purchase and maintain workers' compensation and employer's liability insurance in accordance with the Minnesota statutory requirements and must include the following:
 1. Part 2, Employer's Liability including Stop Gap Liability for monopolistic states;
 2. Coverage C: All States Coverage;
 3. Waiver of subrogation in favor of the Owner; and
 4. If applicable, USL&H, Maritime, Voluntary, and Foreign Coverage.

The Contractor must also require Subcontractors to provide workers' compensation insurance in accordance with the requirements above.

If the Contractor is self-insured for its obligation under the Worker's Compensation Statute in the jurisdiction where the Project is located, the Contractor must provide the Owner with a Certification of the Authority to Self-Insure.

Worker's Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Employer's Liability	
Each accident	\$500,000
Each employee	\$500,000
Policy limit	\$2,000,000

- F. *Commercial General Liability – Claims Covered*: Contractor must provide and maintain commercial general liability insurance to cover claims arising from operations under the Contract, whether such operations are by the Contractor, subcontractor, lower-tier subcontractor or by anyone directly or indirectly employed under the Contract.
- G. *Commercial General Liability – Form and Content*: Contractor's commercial liability policy must include the following types of coverage:
 1. Premises and Operations Bodily Injury and Property Damage

2. Personal and Advertising Injury
3. Products and Completed Operations Liability
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
4. Contractual Liability as provided in ISO form CG 00 01 12 04 13 or its equivalent
5. Pollution exclusion with standard exception as per ISO Commercial General Liability Coverage Form – CG 00 01 12 04 13 or equivalent
6. Independent Contractors – Let or Sublet Work
7. Waiver of subrogation in favor of the Owner
8. Owner names as an Additional Insured, to the extent permitted by law, for claims arising out of the Contractor's negligence or the negligence of those for whom the Contractor is responsible, for both ongoing and completed operations
9. Coverage under the General Liability Policy(ies) of the Contractor will be as broadly construed for the Owner as is available to the Contractor.

Contractor agrees its coverage will not contain any restrictive endorsement(s) excluding or limiting Broad Form Property Damage (BFPD) or Explosion, Collapse, Underground (XCU).

- H. *Commercial General Liability – Excluded Content:* The commercial general liability insurance policy, including its coverages, will not contain any restrictive endorsement(s) excluding or limiting Broad Form Property Damage (BFPD) or Explosion, Collapse, Underground (XCU).
- I. *Commercial General Liability – Minimum Policy Limits:* The liability limits specified below are the minimum limits required, and any and all additional limits provided to the Contractor will be available on an excess, umbrella, or other basis to the additional insured for any and all covered claims.

Commercial General Liability	Policy limits of not less than:
Per Occurrence	\$2,000,000
Annual aggregate applying per Project or location	\$1,000,000
Annual aggregate applying to Products and Completed Operations	\$1,000,000
Fire damage (any one fire)	\$50,000
Medical expense (any one person per occurrence)	\$5,000

- J. *Automobile Liability:* Contractor must provide and maintain insurance to cover liability arising out of the operations, use, or maintenance of all owned, non-owned, and hired motor vehicles. A waiver of subrogation in favor of the Owner must also be included.

Bodily Injury	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage	
Each Accident	\$1,000,000
Or	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage) per occurrence	\$2,000,000

- K. *Aircraft Liability Insurance:* If the Contractor uses aircraft (including "Unmanned Aerial Vehicles") to perform the Work, then the Contractor must provide Aviation (aircraft) insurance protecting it from claims for bodily injury and property damage whether the operations are by Contractor or by a subcontractor or by anyone directly or indirectly employed under the

Contract. The insurance must cover the Contractor and its employees as well as the Owner and the Owner's employees as additional insured.

Aircraft Liability	Policy limits of not less than:
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage) per occurrence	\$2,000,000

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, automobile liability, and aircraft liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein.
- M. *Contractor's Pollution Liability Insurance:* Contractor is not required to provide Pollution Liability Insurance under this Contract.
- N. *Contractor's Professional Liability Insurance:* If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability Insurance shall be as required by Laws or Regulations, whichever is greater and is to be approved by the Owner.

SC 6.04 Builder's Risk and Other Property Insurance

Supplement Paragraph 6.04 of the General Conditions with the following provision:

- E. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.

ARTICLE 7 CONTRACTOR'S RESPONSIBILITIES

SC 7.07 Labor; Working Hours

Add the following immediately after the end of 7.03.C:

Regular working hours shall be restricted to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday and 9:00 a.m. to 5:00 p.m. on Saturday. Expansion of regular working hours, including Sunday's and Federal Holidays, require City Council approval.

SC 7.08 Concerning Subcontractors and Suppliers

Add the following new paragraph to Paragraph 7.07:

- N. In accordance with MINN. STAT. 471.425, Contractor shall pay any subcontractor within 10 days of the Contractor's receipt of payment from the Owner.

SC 7.16 Submittals

Amend Paragraph 7.16.B.1.a to read as follows:

Contractor shall submit as a minimum, one electronic copy or as required in the Specifications.

Add the following new paragraph immediately after Paragraph 7.16.B.1.b:

- a. Detailed, dimensioned manufacturer's drawings shall be submitted for all materials, apparatus and machinery, and for such fittings and devices as the Engineer may direct, including but not limited to: manhole/catch basin structures, castings, sewer pipe, watermain, lift stations, and waterworks brass.

Amend Paragraph 7.16.B.3 by striking out the following words:

and approval

Amend the second sentence of Paragraph 7.16.C.1 by striking out the following words:

and approval

Amend Paragraph 7.16.C.2 by striking out the following words:

and approval

Amend Paragraph 7.16.C.3 to read as follows:

Engineer's review of a separate item as such will not indicate acceptance of the assembly in which the item functions.

Amend the first sentence of Paragraph 7.16.C.4 by striking out the following words:

and approval

Amend Paragraph 7.16.C.5 by striking out the following words:

and approval

Amend Paragraph 7.16.C.6 by striking out the following words:

and approval

Amend Paragraph 7.16.C.7 to read as follows:

Neither Engineer's receipt, review or acceptance of a Shop Drawing or Sample will result in such item becoming a Contract Document.

Amend Paragraph 7.16.C.8 to read as follows:

Contractor shall perform the Work in compliance with the requirements and commitments set forth in accepted Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

Amend the first sentence of Paragraph 7.16.D.1 by striking out the following words:

and approval

Amend the first sentence of Paragraph 7.16.D.2 to read as follows:

Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required acceptance of an item with no more than two resubmittals.

Amend Paragraph 7.16.D.3 to read as follows:

If Contractor requests a change of a previously accepted Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

SC 7.17 Contractor's General Warranty and Guarantee

Amend Paragraph 7.17.D.5 by striking out the following words:

and approval

ARTICLE 8 OTHER WORK AT THE SITE

SC 8.01 Other Work

Add the following language at the end of Paragraph 8.01.C:

Contractor shall cooperate with all parties to facilitate the prompt completion of all contracts for work at or adjacent to the Site.

SC 8.02 Coordination

Add the following new paragraphs immediately following paragraph 8.02.B:

- C. Contractor is hereby advised that the following work may be performed at or adjacent to the Site by others during the Contract Time:
 - 1. The individual lot owners or their agents may be site grading and/or constructing buildings on the lots adjacent to the proposed streets.
 - 2. Private utility companies may be installing and/or relocating underground facilities.

SC 8.03 Legal Relationships

Add the following sub-paragraph to Paragraph 8.03.B:

- 3. If Owner performs work for the Contractor, the Contractor must pay Owner for such work with no deduction in Contract amount.

ARTICLE 10 ENGINEER'S STATUS DURING CONSTRUCTION

SC 10.02 Visits to Site

Add the following new paragraph immediately following paragraph 10.02.B:

- C. Throughout the construction phase, regular weekly meetings will be held by the Engineer on site to review progress and to discuss items necessary for an orderly completion of the project. This weekly construction meeting shall include the Owner, Engineer, and Contractor. Contractor's representative must be able to make decisions for the Contractor pertaining to the project. All project conflicts shall be brought to these meetings, including requests for additional payment. Meeting minutes will be provided to all participants as a record of the meeting.

SC 10.03 Resident Project Representative

Add the following new subparagraph immediately after Paragraph 10.03.A:

1. On this Project, by agreement with the Owner, the Engineer will not furnish a Resident Project Representative. Rather, the Engineer will furnish an Observer to represent both the Owner and the Engineer at the Site and to assist Engineer in observing the progress and quality of the Work.

Add the following new paragraphs immediately after Paragraph 10.03.B:

- C. The Observer's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. Observer's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The Observer will:
 1. *Conferences and Meetings*: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 2. *Safety Compliance*: Comply with Site safety programs, as they apply to Observer, and if required to do so by such safety programs, receive safety training specifically related to Observer's own personal safety while at the Site.
 3. *Liaison*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 4. *Review of Work; Defective Work*
 - a. Conduct on-site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
 5. *Inspections and Tests*
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
 - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
 6. *Payment Requests*: Review Applications for Payment with Contractor.
 7. *Completion*
 - a. Participate in Engineer's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.
 - c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
- D. The Observer will not:
 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Authorize Owner to occupy the Project in whole or in part.

SC 10.07 Limitations on Engineer's Authority and Responsibilities

Add the following new sub-paragraph to paragraph 10.07.A:

1. Insofar as the subject matter of any pertinent claim, dispute, or other matter falls within the realm of the technical expertise of Engineer, Engineer shall not render any decision on any claims, disputes, or other matters the subject matter of which, at Engineer's sole discretion, requires legal, rather than technical interpretation.

Add the following new paragraph immediately following paragraph 10.07.E:

- F. Paragraph 10.07 pertains to the Engineer's responsibilities to the Contractor and its subcontractors, suppliers, and other agents. Nothing in this paragraph shall be construed to limit the Engineer's responsibilities to the Owner, if any, under the Engineer's contract with the Owner.

ARTICLE 11 CHANGES TO THE CONTRACT

SC 11.06 Unauthorized Changes in the Work

Add the following new paragraphs immediately following paragraph 11.06.A:

- B. Except as specifically authorized in writing by the Engineer at the time additional work is done beyond the original scope of the Contract Documents, the Contractor shall make no claims for additional compensation. The Contractor's plea of ignorance of foreseeable conditions which will create difficulties or hindrances in the execution of the Work will not be acceptable to the Owner as an excuse for any failure of the Contractor to fulfill the requirements of the Contract Documents, and shall not be a basis for the Contractor's claim for additional compensation.
- C. Any discrepancies in or conflicts between the items described in these Contract Documents must be submitted in writing to the Engineer for adjustment prior to proceeding with the Work as any claims for additional compensation to achieve compliance with the requirements of those items will not be allowed or considered.

SC 11.09 Change Proposals

Delete paragraph 11.09.B in its entirety, and replace with the following:

- B. *Change Proposal Procedures:* All Change Proposal procedures shall follow the requirements of MnDOT 1403, Notification for Contract Revisions.

ARTICLE 12 CLAIMS

SC 12.01 Claims

Amend the first sentence of paragraph 12.01.B to read as follows:

The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 10 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 10 days of the decision under appeal.

ARTICLE 13 COST OF WORK; ALLOWANCES, UNIT PRICE WORK

SC 13.03 Unit Price Work

Delete Paragraph 13.03.E in its entirety.

ARTICLE 14 TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

SC 14.02 Tests, Inspections, and Approvals

Add the following sub-paragraphs to paragraph 14.02.A:

1. The Contractor shall provide a minimum 48-hour notice to the Observer for any testing that must be observed or accomplished by someone other than the Contractor's personnel. All final tests and inspections shall be performed in the presence of the Observer.
2. Signed copies of all reports on tests shall be sent at once to the Owner, Engineer, and Contractor.
3. Inspection and testing shall in no way relieve the Contractor or supplier from the responsibility of furnishing materials and workmanship in accordance with the Contract Documents.

ARTICLE 15 PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

SC 15.01 Progress Payments

Amend paragraph 15.01.A to read as follows:

Basis for Progress Payments: The Contractor's Bid Unit Prices will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03.

Delete paragraph 15.01.D and insert the following:

D. *Payment Becomes Due*

1. Thirty days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor, unless extenuating circumstances exist which would preclude such payment by Owner to Contractor. If such extenuating circumstances exist, then payment shall be made within 45 days after Owner received the Application for Payment.
2. Contractor's acceptance of partial payment constitutes a certification by the Contractor that the Work covered by the partial payment meets the Contract requirements.
3. Contractor must promptly notify the Owner if the Contractor receives an underpayment or overpayment for the Work. The Contractor must refund the Owner any overpayment in response to a request for refund of overpayment within 30 days of the Owner's request. If the Contractor fails to refund overpayment, the Owner may deduct the amount of overpayment from any moneys due or becoming due to the Contractor.

SC 15.03 Substantial Completion

Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

SC 15.05 Final Inspection

Add the following language at the end of the second sentence of Paragraph 15.05.A:

If, after such measures are taken, subsequent inspections by the Engineer reveal that any of the previously identified construction items remain incomplete or defective, the Engineer will again notify the Contractor in writing of the remaining construction items. All costs associated with any subsequent inspections in which said remaining particulars are revealed, will be documented by the Engineer and paid by the Contractor to the Owner.

SC 15.06 Final Payment

Add the following new sub-paragraphs to Paragraph 15.06.A:

4. Before final application for payment is made for the Work, the Contractor must make satisfactory showing of compliance with MINN. STAT. 290.92, which requires the withholding of state income taxes for wages paid to employees on this project. Receipt by the Engineer of a certificate of Compliance from the Commissioner of Taxation to the Owner will satisfy this requirement. The Contractor is advised that before such certificate can be issued, the Contractor must first place on file with the Commissioner of Taxation an affidavit that the Contractor has complied with the provisions of MINN. STAT. 290.92. The required affidavit form will be supplied by the Commissioner of Taxation, Centennial Building, St. Paul, Minnesota, on request.
5. Final payment will not be made until the Contractor has filed with the Engineer evidence in the form of an affidavit or such other evidence as may be required that all claims against the Contractor by reason of the Contract have been fully paid or satisfactorily secured. This shall be in the form of IC134 forms, paid-in-full final lien waivers from the Contractor, subcontractors, and major suppliers, and a Consent of Surety. Such evidence shall precede or accompany the final application for payment. If evidence is not furnished, the Owner may retain out of any monies due said Contractor sums sufficient to cover all lienable claims unpaid.

SC 15.08 Correction Period

Add the following new paragraphs to Paragraph 15.08:

- G. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be the number of years set forth in SC 6.01.B.1.
- H. With regard to any surface concrete work, including but not limited to sidewalks, curb, gutter, and driveway aprons within the project area, the Contractor shall assume full responsibility for any warranty work unless written approval is provided by the Owner releasing the Contractor for the responsibility for damages. The intent of this provision is to release the Contractor from accepting monetary losses for destruction of surface concrete work due to damages and circumstances beyond control of the Contractor. At no point during the two-year correction period shall this relieve the Contractor's responsibility for correction of the defective work as

states above, or as caused by poor construction and defective materials on surface concrete work within the project area. The Owner or engineer shall make the final determination of what work is defective within the project area at any point within the two-year correction period.

ARTICLE 17 FINAL RESOLUTION OF DISPUTES

SC 17.02 Mediation

Add the following new paragraph to Article 17:

17.02 *Mediation*

- A. To resolve any conflicts that arise during the design or construction of the project or following the completion of the project, the Contractor and the Engineer agree that all disputes between them arising out of or relating to this agreement shall be resolved, if possible, at the lowest possible staff level. If the individuals with full settlement authority for the Contractor and the Engineer are unable to achieve a resolution, the dispute shall be submitted to non-binding mediation.
- B. The rights and remedies available to the Contractor shall be limited to breach of Contract, and no other cause of action, including, without limitation, negligence, misrepresentation or other tort theory. The Owner or Contractor may assert any such breach of contract claim in any court of competent jurisdiction. Neither the Owner nor the Contractor shall be entitled to a jury trial in any such action.
- C. The rights and remedies to the Owner hereunder shall be in addition to and shall not be constructed in any way as a limitation of any rights and remedies available to the Owner, which is otherwise available by law or contract, by special warranty or guarantee, or by other provision of the Contract Documents.
- D. The provision of Paragraph 17.02 shall be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which it may apply. All representations, warranties and guarantees made in the Contract Documents shall survive final payment, termination, or completion of this agreement.
- E. No waiver or failure to enforce any part of provision of the Contract Documents, including but not limited to the change order process, shall be deemed to be waiver by the Owner of any subsequent default or breach of the same or any other part of provision contained herein, or right to enforce the same or any other part or provision contained herein.

DIVISION 1

GENERAL REQUIREMENTS

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DIVISION 1

GENERAL REQUIREMENTS

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DIVISION 1

GENERAL REQUIREMENTS

INTRODUCTION

These General Requirements amend or supplement Division I of the Minnesota Department of Transportation (MnDOT) Standard Specifications for Construction (2020 Edition). With the exclusion of *Definitions and Terms, Bidding Requirements and Conditions, and Bidding Requirements and Covenants*, unless specifically stated, provisions of MnDOT Division I which are not amended or supplemented **shall not apply** to this Contract.

GR - 1 WORK SEQUENCE

The Contractor shall:

1. Perform its work in such a manner as to cause the least interference with adjoining property owners and the general public.
2. For each phase of the project, construct work in a sequence that will allow the utility work to follow immediately upon the removal of the bituminous pavement and concrete curb and gutter. Subgrade excavation, subgrade preparation, and placement of aggregate base shall be completed within two weeks of the completion of any utility work. Curb and gutter placement, final aggregate base placement, and the first lift of bituminous pavement shall be placed within two weeks of initial aggregate base placement. All restoration work within the boulevard area shall be completed within two weeks of paving the bituminous base course.
3. Limit the area under construction at any given time to minimize the impacts to adjoining properties and limit the duration that activities will disturb residents on each street.
4. Limit the area under construction to the area(s) indicated on the staging plan, unless approved by the Engineer. Under construction is defined as the time period from bituminous removal to placement of aggregate base.
5. All proposed haul roads must be approved by the Engineer. The Contractor cannot utilize newly paved streets as haul roads. Any damage to existing streets due to unapproved construction use will be repaired at the Contractor's expense.
6. Concrete curb and gutter and bituminous paving crews shall be mobilized to the project whenever a minimum of one working day, but not more than two working days, are satisfactorily prepared for their respective work.

GR - 2 (1401) INTENT OF CONTRACT

The provision of MnDOT 1401 shall apply.

GR - 3 (1402) CONTRACT REVISIONS

The provision of MnDOT 1402 are modified and/or supplemented with the following:

Delete Paragraph 1402.6 in its entirety.

GR - 4 (1403) NOTIFICATION FOR CONTRACT REVISIONS

The provision of MnDOT 1403 are modified and/or supplemented with the following:

Modify the first sentence of MnDOT 1403.6 to read as follows:

If the Contractor disagrees with the Engineer's final written response or the Engineer's response is untimely, the Contractor may pursue a claim in accordance with the General Conditions, Article 12.

GR - 5 (1404) MAINTENANCE OF TRAFFIC

The provisions of MnDOT 1404 are modified and/or supplemented with the following:

Add the following new paragraph to MnDOT 1404.1:

A. Access to Properties

The Contractor shall maintain driveway access to the residents at the end of each day. Each resident must be able to drive their vehicle into the driveway. The only exception is the time after the curb and gutter is poured, and after the driveway is restored. The Contractor shall salvage aggregate or recycled bituminous from the project, or haul approved granular material to the project site, at no additional cost to the Owner for use in ramping the driveways to maintain access. If driveway access must be closed, the Contractor shall notify the residents a minimum of twenty-four (24) hours in advance of the time the access will not be available. In the event that an access is temporarily closed, the Contractor shall install the proper traffic control to barricade the access at no additional cost to the Owner.

The Contractor shall accommodate special access needs of the residents (medical needs, working the night shift, etc.) and provide access to driveways and roadways as required.

If access is determined to be unsuitable for individual residences by the Engineer, the Contractor shall make the necessary improvements to reestablish an acceptable access to the property.

The Contractor shall notify the Owner at least one week in advance of any daytime road closures or access restrictions.

GR - 6 (1405) USE OF MATERIALS FOUND ON THE PROJECT

The provisions of MnDOT 1405 shall apply.

GR - 7 (1406) PRESERVATION OF HISTORICAL OBJECTS

The provisions of MnDOT 1406 shall apply.

GR - 8 (1407) FINAL CLEANUP

The provisions of MnDOT 1407 are modified and/or supplemented with the following:

During the progress of the work, the area affected shall be kept clean and free of all rubbish and surplus materials. All unnecessary construction equipment shall be removed from the site and all damage repaired so that the public and adjacent property owners are inconvenienced as little as possible.

Where materials or debris have washed, flowed into, or have been placed in water courses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations, such material or debris shall be removed and satisfactorily disposed of during progress of work. All ditches, channels, drains, etc. shall be kept in a clean and neat condition.

On or before the completion of work, the Contractor shall, unless otherwise directed in writing, remove all temporary works, tools and machinery, other construction equipment, or stockpiles placed by the Contractor. The Contractor shall remove all rubbish from any grounds which the Contractor occupied and shall leave all the premises and adjacent properties affected by the operation in a neat and restored condition satisfactory to the Engineer.

Street sweeping (with a pickup broom) will be required periodically. Any material deposited on streets adjacent to the project from construction or hauling operations shall be cleaned as directed by the Engineer. If the Contractor fails to clear adjacent roadways within 24 hours of notification, the Engineer

shall arrange to have the roadways cleaned by the Owner and bill the Contractor \$500 per occurrence. The \$500 fee for street sweeping will be deducted from project retainage for each occurrence.

GR - 9 (1408) VALUE ENGINEERING INCENTIVE

The provision of MnDOT 1408 are modified and/or supplemented with the following:

MnDOT 1408 is deleted in its entirety and replaced with the following:

1408 VALUE ENGINEERING INCENTIVE

Value engineering provisions allow the Contractor to initiate, develop, and present cost reduction Proposals involving changes in the Contract requirements to the Owner for consideration.

Value engineering provisions only apply if the Contractor specifically submits a Proposal for consideration as a value engineering Proposal.

The cost reduction Proposals shall produce a net savings to the Contract by providing less costly items or methods than those specified in the Contract without impairing essential functions and characteristics.

The Contractor shall submit value engineering Proposals to the Engineer with the following information:

- (1) A statement that the Contractor is submitting a value engineering Proposal
- (2) A description of the Proposal
- (3) An itemization of the proposed changes to the Contract requirements and a recommendation of how to make each change
- (4) An estimate of the reduction in performance costs that will result from adoption of the Proposal
- (5) A prediction of any effect the proposed changes would have on other costs incurred by the Owner
- (6) A statement of the time by which an agreement for adoption of the Proposal must be executed to obtain the maximum cost reduction during the remainder of the Contract, and the reasoning for this time schedule
- (7) The dates of any previous submissions of the Proposal, including project Owner's name, contact information, and actions taken
- (8) A statement as to the effect the Proposal would have on the time for completion of the Contract

The Owner will not assume any liability for not meeting the statement of the time described in the Contractor's value engineering Proposal. The Contractor may withdraw, in whole or in part, any value engineering Proposal not accepted by the Owner within the period identified in the proposal.

The Owner's acceptance or rejection decision on a value engineering Proposal shall be final and the provisions of the General Conditions, Article 12 will not apply.

The Owner will notify the Contractor in writing of its decision regarding each value engineering Proposal. Until the Owner accepts the Proposal, the Contractor shall continue to perform Work in accordance with the requirements of the Contract. If the Owner accepts the Proposal, the Owner will execute a Change Order setting forth the terms, conditions, and costs of the Proposal. If the Contractor performs any Work performed in accordance with the value engineering Proposal before the execution of the Change Order, the Department will consider that "unauthorized Work" as specified in MnDOT 1512 as modified herein.

The Owner reserves the right to reject any value engineering Proposal.

The Owner will not provide an incentive payment to the Contractor as a result of any net savings from the value engineering Proposal. The Owner may include conditions for consideration, approval, and implementation of the cost reduction Proposal in the Change Order.

The Contractor shall design and develop the Proposal at no additional cost to the Owner.

After the Owner accepts the cost reduction Proposal, any restrictions imposed by the Contractor on its use or disclosure of the information submitted shall be void, and the Owner will have the right to use, duplicate, and disclose any data necessary to use the Proposal.

GR - 10 (1502) PLANS AND WORKING DRAWINGS

The provisions of MnDOT 1502 are modified and/or supplemented with the following:

Drawings provided by the Owner will include the information, as applicable to the project, in accordance with MnDOT 1502. The Owner's Standard Plates, MnDOT's Standard Plates, and MnDOT's Standard Plans may provide supplemental information.

GR - 11 (1504) COORDINATION OF CONTRACT DOCUMENTS

The provisions of MnDOT 1504 are modified and/or supplemented with the following:

Delete the second sentence of the first paragraph of MnDOT 1504 and replace with the following:

If discrepancies exist between the Contract documents, the following order of precedence applies:

1. Addenda,
2. Project Manual,
3. Project Plans,
4. The City of Lino Lakes General Specifications and Standard Plates (if applicable),
5. MnDOT Standard Specifications for Construction, and
6. CEAM Standard Specifications.

GR - 12 (1506) SUPERVISION BY CONTRACTOR

The provisions of MnDOT 1506 shall apply.

GR - 13 (1507) UTILITY PROPERTY AND SERVICE

The provisions of MnDOT 1507 are modified and/or supplemented with the following:

The plans show only known underground utilities, public and private, and the locations are approximate. No assurance is given that additional underground facilities do not exist. The utilities are classified as "Level D" unless the plans specifically state otherwise. This utility quality level was determined according to the guidelines of CI/ASCE 38-02, entitled "Standard Guidelines for the Collection and Depiction of Existing Subsurface Data".

State law requires the Contractor to contact Gopher State One Call (811) for utility locations before doing any underground excavation. The Contractor is responsible for ascertaining the actual location of underground utilities.

The following utility owners are known to have existing facilities that may be affected by the Work:

Gas

Centennial Utilities (Circle Pines)
Rich Lavell

200 Civic Heights Circle
Circle Pines, MN 55014
763.231.2606

Xcel Energy
Sam Richert
404 Nicollet Mall
Minneapolis, MN 55401
612.499.1303

CenterPoint Energy
Nick Larson
501 W 61st St
Minneapolis, MN 55419
715.222.1649

Minnesota Pipeline Company
Flint Hills Resources (Koch Industries)
Ed Traut
320.232.8910

Sanitary Sewer
Watermain
Storm Sewer

City of Lino Lakes
600 Town Center Parkway
Lino Lakes, MN 55014
651.982.2428

Electric

Connexus Energy
Paul Orndorff
14601 Ramsey Boulevard
Ramsey, MN 55303
763.323.2761

Xcel Energy
Talene Eddleston
404 Nicollet Mall
Minneapolis, MN 55401
651.462.6201

Telephone

CenturyLink
Jason DeRosa
425 Monroe Street
Anoka, MN 55303
612.272.6783

Cable

Comcast Cable Communications, Inc.
Luke Bastil
2611 Fairview Avenue North
Roseville, MN 55113
651.262.6600

Prior to commencing construction, the Contractor shall check all existing manholes, catch basins, gate valve boxes, stop boxes, culverts, and storm sewer lines in the construction zones to determine their condition. Failure to report deficiencies in writing, and have such deficiencies acknowledged in writing by the Engineer, will be cause for any required repairs and/or cleaning to be charged to this Contractor.

The Contractor shall coordinate schedules with the work schedules of the utility owners present within the project limits to avoid delays.

The Contractor must provide a safe Work place for personnel and the utilities, including the payment of any fee charged by the utility for preparing a safe Work area for the Contractor.

Where construction operations require the interruption of service of a utility, the Contractor shall notify the utility at least 48 hours before the interruption and shall advise the utility of the probable time when the service will be restored.

GR - 14 (1508) CONSTRUCTION STAKES, LINE, AND GRADES

MnDOT 1508 is deleted in its entirety and replaced with the following:

1508 CONSTRUCTION STAKES, LINE AND GRADES

The Engineer will provide horizontal and vertical control construction staking as follows:

1. Offset stakes placed at 25-foot intervals for the first 100 feet out of each manhole, then 100-foot intervals thereafter for sanitary or storm sewer, with a cut sheet indicating horizontal and vertical distances from the stake to the pipe invert.
2. Offset stakes placed at 50-foot intervals, including changes in direction and appurtenances for watermain construction.
3. Curb and Gutter: 3-foot offset stakes placed at 25-foot intervals with a cut sheet indicating a cut/fill to the proposed top of curb.
4. Reference hubs (blue tops) at approximately 100-foot intervals at a measured distance either side of centerline, including cut or fill instructions for subgrade and/or gravel base.

Construction stakes will not be placed by the Owner until a written request is received from the Contractor giving the Engineer 48 hours' notice, describing where and when the Contractor wants the construction stakes placed for the next week's construction.

The Contractor shall preserve all stakes and marks. If the Contractor carelessly or willfully destroys or disturbs any of the field control states or marks, the Engineer will deduct the Owner's cost for replacing the damaged stakes or marks from the payment for the Work.

The Engineer shall have the right to order the Contractor to have construction stakes replaced if the Engineer determines that a significant number of stakes have been destroyed.

The Contractor shall not rely solely upon the construction stakes, and shall fully review the Contract Documents along with the construction stakes. The Contractor shall notify the Engineer of any discrepancies between the Contract Documents and the construction stakes. The Contractor shall not knowingly take advantage of any such discrepancies.

The Contractor is fully responsible for all measurements made from any offset construction stake or measurements made from any stakes and marks established by the Engineer.

No additional compensation shall be allowed the Contractor for any claims of crews being held up because of lack of line and grade stakes.

GR - 15 (1511) INSPECTION OF WORK

The provisions of MnDOT 1511 are modified and/or supplemented with the following:

Any person representing Federal or State agencies, the Engineer, or Owner shall have the right of entry to inspect the Work being performed by the Contractor. If the case warrants, the Contractor shall provide proper facilities for such access and inspection.

The Contractor shall notify the Engineer anytime they anticipate working on this project. No work will be allowed without notifying the Engineer a minimum of 24 hours beforehand.

GR - 16 (1512) UNACCEPTABLE AND UNAUTHORIZED WORK

The provisions of MnDOT 1512 are modified and/or supplemented with the following:

MnDOT 1512.1 is deleted in its entirety and replaced with the following:

1512.1 UNACCEPTABLE WORK

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

Unacceptable Work resulting from poor workmanship, use of nonconforming Materials, damage through carelessness, or any other cause existing before final acceptance of the Work shall be handled in the same manner as Defective Work, in accordance with Article 14 of the General Conditions.

GR - 17 (1513) RESTRICTIONS ON MOVEMENT AND STORAGE OF HEAVY LOADS AND EQUIPMENT

The provisions of MnDOT 1513 are modified and/or supplemented with the following:

The Contractor shall limit the roadways utilized for delivery of equipment and for hauling operations.

The Contractor shall provide and use only rubber tire dozers, front end loaders, and other necessary equipment on all work where street pavements or portions of pavements are undisturbed for the protection of the pavements or in such locations as the Engineer may direct.

No compensation will be allowed to the Contractor for replacement of damaged utilities and resurfacing or replacing damaged pavements.

GR - 18 (1514) MAINTENANCE DURING CONSTRUCTION

The provisions of MnDOT 1514 shall apply.

GR - 19 (1515) CONTROL OF HAUL ROADS

The provisions of MnDOT 1515 shall apply.

GR - 20 (1601) SOURCE OF SUPPLY AND QUALITY

The provisions of MnDOT 1601 shall apply.

GR - 21 (1603) MATERIALS: SPECIFICATIONS, SAMPLES, TESTS, AND ACCEPTANCE

The provisions of MnDOT 1603 are modified and/or supplemented with the following:

Delete the first paragraph of MnDOT 1603.2 and replace with the following:

Testing of materials and/or densities shall be completed to assure quality of materials and/or workmanship. The Observer will coordinate and order the tests to be performed. Initial testing of materials

and/or densities, in accordance with the requirements below, will be paid for by the Owner. Any retesting due to failures shall be at the expense of the Contractor.

Schedule of Materials Control

TRENCH BACKFILL AND SUBGRADE DENSITY TESTING			
Location	Depth Below Aggregate Base	Minimum Required Compaction	Density Requirements
Green Areas	All Depths	95%	1/1,000 LF at various depths
Longitudinal Trench	0-3 FT	100%	1/500 LF at various depths
	3+ FT	95%	
Transverse Trench	0-3 FT	100%	1/250 LF every 2 ft vertical
	3+ FT	95%	
Subgrade	0-3 FT	100%	1/500 LF
	3+ FT	95%	

AGGREGATE BASE AND SELECT GRANULAR TESTING		
Test Type	Frequency	Test Requirements
Gradation: Aggregate Base	1/4,000 tons	2 tests minimum per source
Gradation: Select Granular	1/10,000 tons	1 test minimum per source
Density Testing	1/500 LF	100% Density of Standard Proctor or Penetration Index Method
Proof Roll	All	Top of Subgrade and Aggregate Base

CONCRETE TESTING						
Structure	Mix Designation	Testing Frequency	# of 28 Day Cylinders	Required 28 Day Compressive Strength (PSI)	Slump Range	Air Content
Hand-Formed Curb & Gutter and Flatwork	3F52	1/100 CY	3	4,500	2 - 5"	5 - 8.5%
Slip-Formed Curb & Gutter and Flatwork	3F32	1/100 CY	3	4,500	1/2 - 3"	5 - 8.5%

BITUMINOUS TESTING				
PLEASE SEE DIVISION 2 OF PROJECT MANUAL FOR REQUIRED TESTING METHOD				
Density Testing Method	Density Test	Test Rate	Mix Tests	Mix Test Rate
Maximum Density	Nuclear Density	1 per 500 LF	MnDOT Gyrotory Mix Properties	1 / mix type / day
	Density Cores	1 Companion Per Lot	MnDOT Gyrotory Mix Properties	
Quality Compaction	Roll Pattern	1 / mix type / project	Extraction & Gradation	

Add the following new paragraph to MnDOT 1603.2:

Copies of all test results, either passing or failing, shall be provided to the Observer, Owner, and Engineer. Failing test results shall be retested to confirm compliance with the project specifications.

GR - 22 (1606) STORAGE OF MATERIALS

The provisions of MnDOT 1606 are modified and/or supplemented with the following:

Any disturbed area shall be cleaned up and fully restored to the pre-existing condition prior to closing out this project. The Contractor shall be required to install protective fencing and silt fence around the storage area. The protection, cleanup, and restoration of the project storage area shall be the Contractor's responsibility; no compensation will be made for this work. It is anticipated that all work, including stockpiling of materials, will be completed within the roadway right-of-way.

GR - 23 (1607) HANDLING MATERIALS

The provisions of MnDOT 1607 shall apply.

GR - 24 (1608) UNACCEPTABLE MATERIALS

The provisions of MnDOT 1608 shall apply.

GR - 25 (1609) DEPARTMENT PROVIDED MATERIAL

The provisions of MnDOT 1609 shall apply.

GR - 26 (1701) LAWS TO BE OBSERVED

The provisions of MnDOT 1701 are modified and/or supplemented with the following:

The Contractor shall not discriminate against prospective employees because of age, race, color, sex, creed, religion, nationality, or disability.

In the event the Owner is fined by the Minnesota Pollution Control Agency, Environmental Protection Agency, Minnesota Department of Health, or any other regulatory agency as a result of the Contractor's actions or lack of actions, the Owner will deduct from payment due the Contractor corresponding amounts to cover the cost of such fines, including the costs of related Engineering and legal fees.

Delete MnDOT 1701.2 in its entirety and replace with the following:

1701.2 WORKER CONDUCT

The Owner intends to provide a workplace free of violence, threats of violence, harassment, and discrimination. The Owner has zero tolerance for violence in the workplace. Contractors shall maintain a workplace free of violence, harassment, and discrimination. The Contractor must immediately remove from the Project any employee of the Contractor or a Subcontractor in violation of these requirements.

Delete MnDOT 1701.3 in its entirety.

Delete MnDOT 1701.5 in its entirety and replace with the following:

1701.5 PROMPT PAYMENT AND RETAINAGE

A. Prompt payment of Subcontractors is required by MINN. STAT. 471.425.

The Contractor must pay a Subcontractor no later than ten days after receiving payment from the Owner for undisputed Work provided by that Subcontractor. If the Contractor fails to pay a Subcontractor on time, then the Contractor must pay interest, at the rate of 1.5 percent per month or any part of a month, to the Subcontractor on the undisputed amount not paid on time. For an unpaid amount under \$100, the Contractor must pay the actual interest penalty (calculated at 1.5 percent per month) or \$10, whichever is greater.

MINN. STAT. 471.425, subdivision 4a. also provides that a Subcontractor who prevails in a civil action to collect interest penalties from a prime Contractor must be awarded its costs and disbursements, including attorney's fees, incurred in bringing the action.

B. Payment of retainage is governed by MINN. STAT. 337.10, and 15.72.

The Contractor may not withhold more than 5 percent in retainage from a Subcontractor, as provided by MINN. STAT. 337.10 subdivision 4(b). The Contractor must pay any retainage no later than 10 Calendar Days after the Contractor receives payment of retainage from the Owner, unless there is a dispute about the Work under a subcontract. If there is a dispute about the Work under a subcontract, the Contractor must pay out retainage to any Subcontractor whose Work is not involved in the dispute, and must provide a written statement detailing the amount and reason for the withholding to the affected Subcontractor.

Add the following new paragraph to MnDOT 1701:

1701.6 PROTECTION OF FISH AND WILDLIFE RESOURCES

The Project is located in an area with protected fish and wildlife resources and/or threatened and endangered species. The Contractor must protect these resources in accordance with State and Federal regulations, and must implement all applicable avoidance and minimization measures (AMMs).

The Environmental Document for this Project is available as noted below.

A. Blanding's Turtle -

https://www.dnr.state.mn.us/eco/nongame/projects/blandings_survey_conservation.html

B. Bats - <https://www.fws.gov/press-release/2022-11/northern-long-eared-bat-reclassified-endangered-under-endangered-species-act>

C. Migratory Bird Protection - <https://www.fws.gov/media/list-birds-protected-migratory-bird-treaty-act-2023>

GR - 27 (1702) PERMITS, LICENSES, AND TAXES

The provisions of MnDOT 1702 are modified and/or supplemented with the following:

The following permits will be acquired by the Owner (except as noted). The Contractor is required to follow the provisions of all permits:

Minnesota Pollution Control Agency (MPCA):

This Contract requires a Construction Stormwater General Permit (CSG Permit) administered by the MPCA. The Contractor shall become a co-permittee with the Owner to ensure compliance with the State of Minnesota Construction Stormwater General Permit (MNR100001), which is part of the National Pollutant Discharge Elimination System (NPDES) and the State Disposal System (SDS) Program. This permit establishes conditions for discharging storm water to waters of the State from construction activity disturbing one or more acres of total land area.

By completing the online CSG Permit application, the Contractor must ensure compliance with the terms and conditions of the permit that reference the "operator."

The Contractor shall cooperate with the Owner to implement a fully-documented inspection and maintenance program for all temporary erosion and sediment control measures as required by the Permit.

Minnesota Pollution Control Agency (MPCA):

The Owner shall obtain the MPCA Permit for a Sanitary Sewer Extension.

Minnesota Department of Health:

The Owner has submitted plans and specifications to the Minnesota Department of Health as required for Watermain Plan Review.

Rice Creek Watershed District Storm Water:

The Contractor shall become a co-permittee of the the Rice Creek Watershed District Storm Water permit. The Contractor shall be responsible to follow permit requirements, and shall not begin construction until the permit has been approved. The Contractor will be responsible for required escrow/fees required by the RCWD. The Owner has paid the permit application fee.

Anoka County:

The Contractor shall be responsible for any associated permit fee(s) for work within the Anoka County right-of-way. The Engineer will provide the Contractor with plans for the permit submittal. The Contractor shall become a registered right-of-way user with Anoka County as part of permitting process. This includes completing an Anoka County right-of-way user form, paying an application fee, providing insurance certificate(s) showing coverage of 2 million dollars (\$2,000,000) on Liability and 1 million dollars (\$1,000,000) on Workers Comp., and providing a ten thousand dollar (\$10,000) security. Permit fees and

associated costs to obtain the Right-of-Way permit and to become a registered right-of-way user shall be incidental to project costs. For more information on the Anoka County permit requirements and application process, contact the Anoka County Highway Department or visit their website; see Traffic Control Devices for further provisions.

Minnesota Department of Natural Resources (DNR):

The Contractor shall acquire a DNR Water Appropriations permit if any dewatering becomes necessary.

GR - 28 (1705) FEDERAL-AID PROVISIONS

The provisions of MnDOT 1705 shall apply only for Federally funded projects.

GR - 29 (1706) EMPLOYEE HEALTH AND WELFARE

The provisions of MnDOT 1706 are modified and/or supplemented with the following:

The Contractor, at their own expense, shall provide and maintain temporary toilet facilities at the site during the construction period sufficient for the scheduled workforce. The Contractor and Engineer shall agree to the location of the temporary toilet facilities.

The Contractor must not use motor vehicle Equipment that has an obstructed rear view unless the vehicle has a reverse alarm that is audible above the surrounding noise level; or an observer signals to the operator that it is safe to reverse.

Areas of special concern include, but are not limited to, excavation stability protection, fall protection, protection from overhead hazards, vehicle backup protection, confined space safety, blasting operations, and personal safety devices.

GR - 30 (1707) PUBLIC CONVENIENCE AND SAFETY

The provisions of MnDOT 1707 are modified and/or supplemented with the following:

Regular working hours will be from 7:00 a.m. to 7:00 p.m., Monday through Friday; and 9:00 a.m. to 5:00 p.m. on Saturday. The Contractor shall not be permitted to work on Sundays or holidays, except in the case of emergencies. Requests for modification of working hours must be approved by the Owner. The Contractor shall submit all requests in writing to the Engineer. The Contractor shall structure the proposed project schedule based on the stated working hours.

The Contractor shall comply with local and state ordinances on noise abatement. All equipment shall have effective mufflers on engine exhaust systems.

The Contractor shall be required to accommodate garbage collection while the project is under construction. Coordination shall include contact with the garbage companies service the area and maintaining access to the individual residences. If the Contractor fails to accommodate garbage collection, the Contractor shall contract independently to have the garbage removed at no cost to the Owner.

The Contractor shall provide any barricades, fences or other means of protection necessary to properly execute the work and adequately protect its employees, employees of the Owner, employees of the Engineer, and members of the public according to federal, state, and local regulators. All utility trenches shall be backfilled at the end of each working day to the satisfaction of the Engineer. All labor and materials necessary to comply with these provisions are incidental, and no payment shall be made.

The Contractor shall ensure that employees and Subcontractors do not display items such as, but not limited to, flags, banners, and symbols on the Project Site, that may disrupt the proper prosecution of the Work, impede public safety, or create a distraction for the traveling public.

GR - 31 (1710) TRAFFIC CONTROL DEVICES

The provisions of MnDOT 1710 shall apply.

GR - 32 (1712) PROTECTION AND RESTORATION OF PROPERTY

The provisions of MnDOT 1712 are modified and/or supplemented with the following:

The Contractor shall protect, and/or remove and reinstall all fences, street signs, retaining walls, and other items required to construct the proposed improvements. Work associated with protecting, and/or removing and reinstalling fences, street signs, lawn irrigation systems, and other items shall be considered incidental to the project unless specific bid items are included.

The Contractor shall take whatever steps necessary to protect adjoining properties and structures from hazards due to performance of the work. The Contractor is responsible for any and all damage to properties and structures that occur as a result of the Contractor's operations.

The street and utility construction may occur in close proximity to a number of existing structures. The Contractor shall use shoring or other means as necessary to ensure that those structures are protected during construction.

Existing residences may not be of modern construction and are thus sensitive to vibrating equipment. The Contractor shall take care when utilizing vibratory equipment to avoid damage to adjoining structures. Damage to structures resulting from the use of vibratory equipment are the responsibility of the Contractor. In the event of a complaint or perceived problem, a seismograph will be required to be provided at the Contractor's expense.

All labor and materials necessary to comply with the provisions of this section are incidental, and no payment shall be made.

Delete Paragraph MnDOT 1712.1.A in its entirety and replace with the following:

A. Monuments

The Contractor shall preserve all land and property corner monuments, Right-of-way monuments, and vertical and horizontal control point monuments in the vicinity of the Work. The Owner will mark all such monuments the Owner is aware of prior to construction. The Contractor shall notify the Engineer of any monument, whether the Owner has marked them or not, which the Contractor may disturb, in sufficient time to allow the Engineer to establish ties to the corner. The replacement of monuments removed by the Contractor shall be completed by the Owner at the Contractor's expense.

GR - 33 (1716) CONTRACTOR'S RESPONSIBILITY FOR WORK

The provisions of MnDOT 1716 are modified and/or supplemented with the following:

The Contractor shall guarantee and maintain the stability of all work, equipment and materials for a period of two years from the date the City Council approves the final pay voucher or the date of Notice of Acceptability of Work. The Contractor shall provide as part of the contract security a separate two-year maintenance bond to be dated to begin the date of Notice of Acceptability of Work. The provisions of this paragraph shall not be construed as restricting Contractor's liability for breach of contract by reason of non-conformance with the specification for defects or faulty workmanship.

GR - 34 (1717) AIR, LAND, AND WATER POLLUTION

The provisions of MnDOT 1717 are modified and/or supplemented 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 (MPCA) and MnDOT 1717, 2573 and 2575.

Add the following requirements to MnDOT 1717.1.D:

The Contractor shall be responsible for dust control.

Add the following requirements to MnDOT 1717.2:

D. MPCA Construction Storm Water Permit

By signing the Proposal and completing the electronic online NPDES CSW permit, the Contractor is a co-permittee with the Owner and must ensure compliance with the terms and conditions of the Construction General Storm Water Permit (MN R100001). The Contractor is responsible for those portions of the permit referencing the "operator". This permit establishes conditions for discharging storm water to waters of the State from construction activities that disturb one acre or more of total land area. A copy of the permit is available at <https://www.pca.state.mn.us/water/construction-stormwater>, or by calling (651) 296-3890.

The Contractor is not authorized to perform any Project Work which disturbs soil or which involves Work in waters of the State until the Permit is in effect and the Owner has received the required documentation.

Contractor must provide an Erosion Control Supervisor as per MnDOT 2573.3. The Contractor is solely responsible for all inspections, maintenance, and records required in Section 11 of the General Permit. Immediately notify the Engineer of site visits by Local Permitting Authorities performed in accordance with Section 24.10 of the Permit. The Contractor must obtain the Engineer's approval before starting any Work required by regulatory authorities which (1) the Contractor believes will result in additional compensation from the Owner; or (2) will impact the design or requirements of the Contract documents or impact traffic.

The Contractor must use Best Management Practices to help minimize turbidity of surface waters and relieve runoff from extreme weather events. The Contractor must report a stormwater sediment release from the Project Site to the Minnesota Duty Office (1-800-422-0798) at the time the Contractor or Owner discovers the release. The Contractor must also immediately contact the Minnesota Duty Officer during any emergency situation involving an uncontrolled stormwater release.

Erosion control shall be placed and maintained by the Contractor as directed by the Engineer. The Contractor shall use the appropriate means of control for individual situations. The erosion control types may include but are not limited to silt fence, fiber blanket, rock construction entrances, diversion ditches, and catch basin inlet protection, all of which will be considered incidental to the project cost unless a bid item is provided in the Bid Form. Failure to maintain the erosion control will be sufficient cause to withhold further payments on the project until the maintenance is complete.

The erosion control measures for the project have been identified in the plan set and the NPDES Stormwater Pollution Prevention Plan (SWPPP); however, modifications can be made depending on actual site conditions.

Emergency Best Management Practices must be enacted to help minimize turbidity of surface waters and relieve runoff from extreme weather events.

Prior to final acceptance of the project or the end of the warranty period, as applicable, the Contractor shall remove all erosion control items.

GR - 35 (1801) SUBLETTING OF CONTRACT

The provisions of MnDOT 1801 are modified and/or supplemented with the following:

Modify the first sentence of the second to the last paragraph of MnDOT 1801 to read as follows:

The Contractor must ensure that the subcontracts at least contain the following (if required by the Contract):

GR - 36 (1802) QUALIFICATIONS OF WORKERS

The provisions of MnDOT 1802 shall apply.

GR - 37 (1804) PROSECUTION OF WORK

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

Delete the first sentence of the first paragraph of MnDOT 1804.1.

Delete the third and fourth paragraphs of MnDOT 1804.1 and replace with the following:

Should the Contractor fail to maintain satisfactory progress, the Engineer will require that the Contractor provide additional resources (e.g., labor, Materials, Equipment) as necessary to bring the Work up to the level of progress required in the current accepted Progress Schedule to ensure completion of the Work within the time(s) specified in the Contract.

GR - 38 (1805) METHODS AND EQUIPMENT

The provisions of MnDOT 1805 shall apply.

GR - 39 (1807) FAILURE TO COMPLETE THE WORK ON TIME

The provisions of MnDOT 1807 are modified and/or supplemented with the following:

Contractor and Owner recognize that time is of the essence and that the Owner will suffer financial loss and other losses if the work is not completed within the times specified by the Owner, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay the Owner as follows:

- MnDOT Table 1807-1 Schedule of Liquidated Damages is hereby deleted. The liquidated damages shall be \$1,000 per calendar day for all stated completion dates, as well as for any intermediate completion dates.

GR - 40 (1901) MEASUREMENT OF QUANTITIES

The provisions of MnDOT 1901 shall apply.

GR - 41 (1902) SCOPE OF PAYMENT

The provisions of MnDOT 1902 are modified and/or supplemented with the following:

Modify the second sentence of MnDOT 1902 to read as follows:

This includes compensation for all risk, loss, damage, and expense incurred by the Contractor for performing the Work required by the Contract subject to the General Conditions.

GR - 42 (1903) COMPENSATION FOR ALTERED QUANTITIES

The provisions of MnDOT 1903 are modified and/or supplemented with the following:

The Owner reserves the right to reduce certain quantities or delete certain items from each section of the bids as the Owner sees fit, either before or after the Award of Contract.

There will be no additional compensation due to remobilization of equipment as necessary to complete punch list items or other items not completed by the Contractor.

There will be no additional compensation due to restocking charges for materials not used on the project.

GR - 43 (1908) FINAL ESTIMATE AND PAYMENT – CONDITIONS AND PROCESS

MnDOT 1908 is deleted in its entirety and replaced with the following:

1908 FINAL ESTIMATE AND PAYMENT – CONDITIONS AND PROCESS

Absent complete and legally effective releases or waivers of all Lien rights arising out of the Work, and of Liens filed in connection with the Work, the Owner may retain out of any monies due said Contractor sums sufficient to cover all unpaid liens/claims.

The Owner cannot make final payment to the Contractor until the Contractor demonstrates that it and all its Subcontractors have complied with the Income Tax withholding requirements of Minnesota Statutes, section 290.92 for wages paid for Work performed under the Contract. To establish compliance, the Contractor must submit a “Contractor Affidavit” either online or in paper form (IC134) to the Minnesota Department of Revenue. The Contractor will receive written certification of compliance when the Department of Revenue determines that all withholding tax returns have been filed and all withholding taxes attributable to the Work performed on the Contract have been paid. The Contractor must then provide this written certification to the Owner to receive final payment.

Every Subcontractor working on the Project must submit an approved “Contractor Affidavit” from the Minnesota Department of Revenue to the Contractor before the Contractor can file its own Contractor Affidavit. The Contractor is advised to obtain the certification from each Subcontractor as soon as the Subcontractor completes Work on the Project. Experience has shown that waiting until the Project is complete to obtain the forms from all Subcontractors is likely to result in significant additional Work for the Contractor as it will be difficult or impossible to collect all forms.

The Department of Revenue, in association with the Department of Employment and Economic Development, offers a free seminar to help contractors understand tax law requirements. The Department strongly urges the Contractor and all Subcontractors to attend the “Employment Taxes & Employer Responsibilities Seminar” or similarly offered classes. You can find a schedule and more information on the Department’s website at: <https://www.revenue.state.mn.us/sites/default/files/2019-05/Employment%20Taxes%20Seminar%20Flyer.pdf>.

Complying with this requirement is considered part of the Work under this Contract. The Department will enforce this requirement equally with all other Contract requirements. Contractor delay in

complying with this requirement will cause the Department to delay final payment and Contract Acceptance. The Department may also report non-compliance to the Department of Revenue, which may result in enforcement action by the Department of Revenue.

Contractor Affidavit requirements and Form IC134 can be found here:
<https://www.revenue.state.mn.us/contractor-affidavit-requirements>.

GR - 44 (1910) COST ESCALATION

MnDOT 1910 is deleted in its entirety and replaced with the following:

Under no circumstances shall compensation adjustments be made for in the cost of motor fuels (diesel and gasoline) consumed in prosecuting the Contract work.

DIVISION 2

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DIVISION 2

SPECIFICATIONS

2021 MOBILIZATION

The provisions of MnDOT 2021 are modified and/or supplemented as follows:

2021.5 BASIS OF PAYMENT

The Contractor shall assume multiple mobilizations (incidental) for clearing and grubbing operations.

Payment will be made based on the following schedule, with partial payments in accordance with MnDOT Table 2021.5-1:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2021.501	MOBILIZATION	LS

2101 CLEARING AND GRUBBING

The provisions of MnDOT 2101 are modified and/or supplemented as follows:

Delete Paragraph 2101.1 in its entirety and replace with the following:

2101.1 DESCRIPTION

This work consists of removing and disposing of the trees, brush, stumps, roots, and other plant life, including dead and decayed matter, within the construction area designated for removal by the Contract or as directed by the Engineer.

2101.3 CONSTRUCTION REQUIREMENTS

The Contractor shall assume multiple mobilizations for this Work.

B. Grubbing Operations

All depressions resulting from grubbing operations shall be filled and compacted within seven (7) days (incidental).

C. Disposal Limitations

No disposal of debris shall be allowed on-site unless authorized by the Engineer.

2101.4 METHOD OF MEASUREMENT

B. Area Basis

Modify the first sentence of MnDOT 2101.4.B to read as follows:

If the contract specifies the unit as an acre, the Engineer will determine quantities by measuring, to the nearest 0.05 acre, all areas cleared and all areas grubbed within the limits as shown on the plans or staked by the Engineer.

2101.5 BASIS OF PAYMENT

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2101.501	CLEARING & GRUBBING	LS
2101.502	CLEARING	EACH
2101.502	GRUBBING	EACH
2101.505	CLEARING	ACRE
2101.505	GRUBBING	ACRE

2104 REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES

The provisions of MnDOT 2104 are modified and/or supplemented as follows:

2104.3 CONSTRUCTION REQUIREMENTS

B. Haul Salvaged Materials

Salvaged Materials, not required for installation elsewhere under this Contract, shall be loaded and hauled to the designated storage area(s) where they shall be unloaded and deposited in a manner satisfactory to the Engineer.

C. Removal Operations

Removals made by sawing, shall result in a neat, straight line, or a square edge. The use of wedges driven into the saw cut to break off the portion to be removed will not be permitted.

Add the following new paragraphs to MnDOT 2104.3.C:

C.7 Concrete Curb and Gutter

All concrete curb and gutter scheduled for removal and marked by the Engineer in the field shall first be saw cut, using a wet saw, and then removed.

The Contractor shall be responsible for protecting curb and gutter within the project that is to remain in place. Any damage to existing curb and gutter shall be the responsibility of the Contractor, and shall be repaired or replaced as directed by the Engineer with no additional compensation thereto.

C.8 Pipe Removal

Removal of storm sewer pipe and culvert, as noted in the plans, shall be in manner and at the stage of construction so that drainage will be maintained.

Add the following new paragraph to MnDOT 2104.3:

G. Abandon Operations

Sanitary sewer, storm sewer, and/or watermain pipe that is to be abandoned shall be filled with a granular or other approved material and capped watertight. Filling and capping of the abandoned pipe shall be included in the unit price for abandonment.

Manhole structures that are to be abandoned shall first have the cone section removed (to a depth specified by the Engineer) (incidental) and then filled with granular or other approved material to the top of the barrel section. The remainder of the backfilling shall consist of the native soils. Abandoning a manhole is not allowed unless specifically called for in the plans.

2104.4 METHOD OF MEASUREMENT

B. Length

The Engineer will measure abandonment of pipe by length of pipe sealed and abandoned as specified.

Add the following new paragraph to MnDOT 2104.4.E:

E1. Salvage and Reinstall Landscape Structures

All landscape structures and landscaping (including, but not limited to plantings, gardens (including topsoil), rocks, mulch, retaining walls, boulders, monuments, fences, posts, and edging) shall be salvaged and provided to the homeowner. At the end of the project, the salvaged items shall be reinstalled at their original location or as directed by the Engineer. Items damaged during this process shall be replaced by the Contractor. The Contractor shall coordinate with the Engineer to identify the landscaping items to be salvaged and reinstalled. The Contractor shall prepare an invoice for the work to be done and shall present the invoice to the Engineer. Invoices for this work shall be paid for under this item. All invoices shall be approved by the Engineer before being paid.

2104.5 BASIS OF PAYMENT

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 Bid Form and as listed in the Plans.

All costs of hauling salvaged materials shall be included in the cost of salvaging the material.

Payment at the Contract bid price per linear foot of abandoned pipe shall be payment in full for all costs involved.

Saw cutting necessary for the removal of sidewalks or concrete curb and gutter shall be considered incidental with no direct compensation made.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2104.502	REMOVE PIPE APRON	EACH
2104.502	REMOVE MANHOLE	EACH
2104.502	REMOVE GATE VALVE & BOX	EACH
2104.502	REMOVE HYDRANT	EACH
2104.502	REMOVE DRAINAGE STRUCTURE	EACH
2104.502	SALVAGE CASTING	EACH
2104.502	SALVAGE SIGN	EACH
2104.503	SAWING CONCRETE PAVEMENT (FULL DEPTH)	L F
2104.503	SAWING BIT PAVEMENT (FULL DEPTH)	L F
2104.503	REMOVE WATER MAIN	L F
2104.503	REMOVE SEWER PIPE (STORM)	L F
2104.503	REMOVE SEWER PIPE (SANITARY)	L F
2104.503	REMOVE CURB & GUTTER	L F
2104.504	REMOVE CONCRETE DRIVEWAY PAVEMENT	S Y
2104.504	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	S Y
2104.504	REMOVE BITUMINOUS PAVEMENT	S Y
2104.518	REMOVE CONCRETE WALK	S F
2104.601	SALVAGE AND REINSTALL LANDSCAPE STRUCTURES	LS
2104.603	ABANDON STORM SEWER	L F
2104.603	ABANDON SANITARY SEWER	L F
2104.603	ABANDON WATER MAIN	L F

2106 EXCAVATION AND EMBANKMENT – COMPACTED VOLUME METHOD

Private development projects are required to provide a final excavation and compaction testing report upon completion of grading activities. The report must be completed by a certified testing agency and include sketches indicating excavation limits, bottom elevations, and tests taken to evaluate native soils and fill material. The report must also include a summary statement that natural soils in the bottom of excavations are suitable for the proposed construction and that the fill material tested meets or exceeds the specified minimum compaction requirements. Upon review and approval of the testing report by the City Engineer, building permits can be processed.

The provisions of MnDOT 2106 are modified and/or supplemented as follows:

2106.1 DESCRIPTION

Add the following new paragraph to MnDOT 2106.1:

A. Dewatering

The Contractor shall provide groundwater excavation dewatering as necessary to allow for construction on a stable foundation. The work potentially involves the drawdown of the water table (using wells or other means), placement of temporary barriers, or other satisfactory types of water control to allow for construction and to protect the improvements. Dewatering operations are controlled by permit from the DNR or other agencies. Dewatering operations must be in accordance with the MnDOT 2573. Rerouting surface water is not considered dewatering and is incidental.

The Contractor is responsible for application for any necessary permits and compliance with all conditions of permits. The Contractor shall also be responsible for noise control during dewatering as directed by the Engineer.

The Contractor shall make their own determination as to the extent of the groundwater on the project prior to bidding. No additional compensation will be made for a higher than expected groundwater table or any compliance requirements from regulatory agencies.

Dewatering systems and excavations must remain inside construction limits.

2106.2 MATERIALS

A.5 Excavation – Channel and Pond

Excavation – channel and pond includes topsoil excavation.

B.1 Common Embankment

Delete the second paragraph of MnDOT 2106.2.B.1 and replace with the following:

Select Grading Material used for Common Embankment may contain up to 100 percent recycled Materials composed of recycled concrete (maximum of 75 percent), recycled asphalt, or glass (maximum of 10 percent). The bitumen content must be 3.5 percent or less.

B.3 Select Granular Embankment

Select Granular Material in accordance with MnDOT Table 3149.2-1 for use as Select Granular Embankment shall also be free-draining, non-recycled (virgin) sand with 100% passing the 3/8 inch sieve.

2106.3 CONSTRUCTION REQUIREMENTS

A. General

Where connection to an in-place roadway is made: at the termini of new road construction, cut vertically to the bottom of in place surfacing. Then, cut back within the construction limits at a 1:20 (Vertical:Horizontal) taper to the bottom of the recommended subgrade excavation.

Mining of materials for removal from the project area and replacement with less desirable materials by the Contractor shall not be permitted.

Management of the excavated materials on the site is the Contractor's responsibility. All suitable material shall be utilized for roadway construction. Excess material shall become property of the Contractor.

B. Contractor Quality Control (QC) Testing and Aggregate Certification

Correct areas represented by failing QC or Quality Assurance (QA) tests. Submit test results to the Engineer within one business day.

C. Moisture Control

Note that optimum moisture content determination tests and moisture tests during compaction are required for all compaction requirements, including quality compaction, LWD, penetration index, and specified density.

The Owner's proctor test results are used to determine optimum moisture determination.

E. Excavating Operations

Subgrade excavations shall be performed for the removal of any unstable or unsuitable materials which may be encountered. Such excavations shall be backfilled with suitable excess material generated from the common excavation, or granular embankment material as directed by the Engineer. If the Contractor proceeds without the approval of the Engineer, all work and material required for restoration of the roadbed to the proposed grade shall be at the Contractor's expense.

I. Finishing Operations

Common Topsoil Borrow meeting the requirements of MnDOT 3877.2.A shall be used only when specifically authorized by the Engineer. It shall only be used when there is not sufficient in place topsoil to restore the disturbed area. This work shall not be substituted for the work required of the Contractor to salvage and replace existing topsoil.

All topsoil (salvaged and borrow) shall be free of all sticks, rocks/stones, and debris. Topsoil shall be of a consistency acceptable to the Engineer.

Excess topsoil may be disposed of outside the road core as directed by the Engineer.

2106.4 METHOD OF MEASUREMENT

B. Embankment Material

Granular embankment shall be used only as directed by the Engineer.

Add the following new paragraph to MnDOT 2106.4:

D. Dewatering

The Engineer will measure dewatering by the lump sum.

If dewatering is needed outside of the working hours of the City, the Contractor shall request written approval from the City Engineer. Such approval shall be subject to the condition deemed necessary to mitigate noise impact.

2106.5 BASIS OF PAYMENT

The Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required as Quality Control (QC). The Owner shall be responsible for all inspections and tests required as Quality Assurance (QA).

Payment for Dewatering will be made at the unit price bid on a lump sum basis and shall be compensation in full for materials, labor, and equipment necessary to complete the work as specified. Permits necessary for this work shall be considered incidental.

Payment for Excavation – Common will be at the unit price bid per cubic yard as an excavated volume, and shall be compensation in full for excavation (including salvaging and stockpiling topsoil), preparing the excavation and embankment areas, loading, hauling, placing and compacting fill, stockpiling materials, spreading topsoil, and disposal of material as required. Payment for Excavation-Common shall not include the volume of items paid for separately as removals (e.g. curb, bituminous pavement, concrete pavement, reclaimed material).

Potholing to locate existing utilities may be required. All labor and materials used for potholing will be incidental.

Payment for Excavation – Subgrade will be made at the unit price bid per cubic yard as an excavated volume, and shall be compensation in full for excavation, hauling, stockpiling, and embankment, and the disposal of unsuitable materials. This work shall also include the replacement and compaction of suitable material within the excavated area unless it is directed by the Engineer that embankment material be used to replace the excavated material volume.

Delete MnDOT 2106.5.A in its entirety.

B. Schedule

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2106.507	EXCAVATION – COMMON	C Y
2106.507	EXCAVATION – SUBGRADE	C Y
2106.507	EXCAVATION – CHANNEL AND POND	C Y
2106.507	GRANULAR EMBANKMENT (CV)	C Y
2106.507	SELECT GRANULAR EMBANKMENT (CV)	C Y
2106.507	COMMON EMBANKMENT (CV)	C Y
2106.601	DEWATERING	LS

2108 GEOSYNTHETIC CONSTRUCTION MATERIALS

The provisions of MnDOT 2108 are modified and/or supplemented as follows:

2108.1 DESCRIPTION

Delete note (5) in MnDOT 2108.1 and replace with the followings:

- (5) Provide confinement of granular materials.

2108.2 MATERIALS

A. Geotextiles

Geotextiles for stabilization shall conform to the requirements of MnDOT 3733, Type 5.

2108.3 CONSTRUCTION REQUIREMENTS

Delete and replace MnDOT 2108.3.B with the following:

B. Geotextile

If multiple pieces of geotextile are required, overlap geotextiles a minimum of 36 inches.

Sewing geotextiles may be used in lieu of overlapping if there is a Quality Assurance sewing test result provided prior to installation. Use a "double spool" machine capable of sewing a Federal Type 401 locking stitch (ASTM D6193-16) or approved better stitch. Sew a flat "J," or butterfly seam type (ASTM D6193-16) using thread with a minimum strength of 25 pounds, with 1-2 rows of stitching and 5-7 stitches per inch. Meet the required seam strength for the specified geotextile type. Provide geotextiles manufactured by the same operator, thread, and sewing machine used for the sewing sample.

Adhesives listed on the Approved Products List may be used in lieu of overlapping or sewing for Types 3, 4, and 5 geotextiles. The approved list for adhesives is found under the geosynthetics sub-heading on the Approved Products List. Apply adhesive per the Adhesive Seams Guidelines found on the geosynthetic/adhesive seams links on the Approved Products List.

2108.5 BASIS OF PAYMENT

Delete the first paragraph of MnDOT 2108.5 and replace with the following:

The Contract Unit Price for geosynthetics includes the cost of providing, placing, overlapping or sewing.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2108.504	GEOTEXTILE FABRIC TYPE 5	S Y

2111 TEST ROLLING

The provisions of MnDOT 2111 are modified and/or supplemented as follows:

2111.3 CONSTRUCTION REQUIREMENTS

A representative of the Owner and Contractor shall be present during test rolling.

For full depth reclamation, the reclaimed material shall be test rolled prior to placement of the bituminous base course.

If it rains after a test roll has been performed and the test roll has been accepted, the Contractor, at the discretion of the Owner and Engineer, will be required to perform an additional test roll prior to commencing with construction at no additional compensation.

2112 SUBGRADE PREPARATION

The provisions of MnDOT 2112 are modified and/or supplemented as follows:

2112.3 CONSTRUCTION REQUIREMENTS

A. General

Maintain drainage of surface water to avoid unnecessary saturation of the subgrade.

2112.5 BASIS OF PAYMENT

The Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required as Quality Control (QC). The Owner shall be responsible for all inspections and tests required as Quality Assurance (QA).

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2112.519	SUBGRADE PREPARATION	RDST

2123 EQUIPMENT RENTAL

The provisions of MnDOT 2123 are modified and/or supplemented as follows:

2123.3 SPECIFIC REQUIREMENTS

Add the following item to the list in MnDOT 2123.3:

- (14) Street Sweeper with Pickup Broom: Provide self-propelled street sweeping equipment with a pick-up broom.

Throughout construction, constructed streets and roadways adjacent to the project shall be swept and cleaned as directed by the Engineer, and shall be in conformance with the NPDES permit. The Engineer may require additional sweeping of roads to ensure safety for the general public, protect the environment, uphold local requirements, or as otherwise directed. Material that is tracked off the project site shall be swept within 24 hours.

Removal of dirt and debris shall be accomplished to the satisfaction of the Engineer. All materials shall be collected and retained within the sweeping equipment as they are swept. Disposal of the swept material shall be in accordance with MnDOT 2104.3.D.

2123.5 BASIS OF PAYMENT

Payment for a Utility Crew at the bid unit price per hour shall include all labor and equipment for work associated with additional utility work which has not been previously indicated or accurately shown in the plans, or as directed by the Engineer. This item is not for a Contractor to fulfill their obligation to locate private utilities prior to excavation as required by the Contract Documents.

Add the following new paragraph to MnDOT 2123.5:

A. Street Sweeper with Pickup Broom

Payment for street sweeping will only be made for hours of time required to maintain cleaned roadways for the traveling public, as approved by the Engineer. No payment shall be made for sweeping that is normally required to construct the project, including, but not limited to, removal of

bituminous millings, sweeping between bituminous lifts, and sweeping prior to placement of pavement markings. No payment will be made for sweeping done by "kickoff brooms."

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2123.610	STREET SWEEPER (WITH PICKUP BROOM)	HOURL
2123.610	UTILITY CREW	HOURL

2130 APPLICATION OF WATER FOR DUST CONTROL

The provisions of MnDOT 2130 are modified and/or supplemented as follows:

2130.5 BASIS OF PAYMENT

Delete the third paragraph of MnDOT 2130.5 in its entirety.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2130.523	WATER	MGAL

2211 AGGREGATE BASE

The provisions of MnDOT 2211 are modified and/or supplemented as follows:

2211.2 MATERIALS

Aggregate base shall be Class 5 in accordance with MnDOT 3138.

When mixing recycled Aggregate with virgin Aggregate, the minimum Los Angeles Rattler of Carbonate virgin Aggregate is 40%. Meet all other virgin Aggregate requirements in 3138.2.B.

For virgin materials (MnDOT 3138.2.B), the Contractor/Supplier may not knowingly allow brick and other objectionable material and must employ a QC process to screen it out, before it becomes incorporated into the final product. The amount of Brick must not exceed 1 percent. The amount of other objectionable materials including but not limited to: wood, plant matter, plastic, plaster, and fabric must not exceed 0.3 percent.

The Contractor may substitute reclamation material (recycled bituminous and aggregate) for class 3, 4, 5, or 6, if used for base, subbase, stabilizing aggregate, or fine aggregate bedding. Gradation must meet the requirements in MnDOT Table 3138.2-6.

2211.3 CONSTRUCTION REQUIREMENTS

B. Contractor Quality Control (QC) Testing

If required by the Schedule of Materials Control, perform Contractor QC testing and submit results and all required forms to the Engineer within one business day.

C. Placing and Compacting

The Contractor shall install the aggregate base immediately, no more than 24 hours after completion and approval of the Grading Grade. If placement of the aggregate base is done more than 24 hours after the initial test roll, a second test roll shall be required and paid for by the Contractor.

The Contractor shall be responsible to maintain the aggregate base until completion of bituminous surfacing with no direct payment therefore. Additional aggregate base required due to erosion, washouts, trench settlements or other similar causes shall be replaced by the Contractor without additional compensation therefore.

D.4 Moisture Testing

Note that moisture tests during compaction are required for all compaction requirements, including quality compaction, LWD, penetration index, and specified density.

2211.5 BASIS OF PAYMENT

The Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required as Quality Control (QC). The Owner shall be responsible for all inspections and tests required as Quality Assurance (QA).

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2211.507	AGGREGATE BASE (CV) CLASS 5	C Y
2211.509	AGGREGATE BASE CLASS 5	TON

2215 RECLAMATION

The provisions of MnDOT 2215 are modified and/or supplemented as follows:

2215.1 DESCRIPTION

Pulverizing and blending shall be accomplished in a single operation for FDR.

2215.3 CONSTRUCTION REQUIREMENTS

A. General

Provide traffic control in accordance with the current MN MUTCD for reclaiming operations. If flaggers are needed, the Contractor shall provide them and the cost associated with flaggers shall be included in the bid price for full depth reclamation.

E.1 Pulverizing Operation

Perform a test strip to ensure that the reclamation material meets the correct specifications. Aggregate materials shall have uniform: appearance, texture, moisture content, and performance characteristics. When reclaiming operations are not feasible as determined by the Engineer due to a lack of existing gravel base or other suitable subgrade material, the Contractor shall suspend reclaiming operations and remove and salvage the existing pavement by milling.

E3. Placing and Compacting

Where subsurface utility installation work is to occur, remove and stockpile the reclaimed material prior to performing the utility work. Any contaminated reclaimed material shall be removed and replaced as directed by the Engineer with no additional compensation provided to the Contractor.

Excess reclamation material not incorporated into the Work shall become property of the Contractor and shall be removed and disposed of at no cost to the Owner.

2215.5 BASIS OF PAYMENT

The Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required as Quality Control (QC). The Owner shall be responsible for all inspections and tests required as Quality Assurance (QA).

Test strips shall be included in the cost of Full Depth Reclamation, with no additional compensation provided.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2215.504	FULL DEPTH RECLAMATION	S Y

2232 MILL PAVEMENT SURFACE

The provisions of MnDOT 2232 are modified and/or supplemented as follows:

2232.3 CONSTRUCTION REQUIREMENTS

B. Operations

Provide traffic control in accordance with the current MN MUTCD for milling operations. If flaggers are needed, the Contractor shall provide them and the cost associated with flaggers shall be included in the bid price for milling.

The Contractor shall be responsible for marking and verifying the condition of existing structures within the roadway prior to beginning pavement milling.

2232.5 BASIS OF PAYMENT

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2232.504	MILL BITUMINOUS SURFACE (___")	S Y

2331 PAVEMENT JOINT ADHESIVE

2331.1 DESCRIPTION

This work consists of applying pavement joint adhesive to the face of the longitudinal construction joint formed between the concrete curb and gutter and the bituminous pavement. Joint adhesive is to be applied to the exposed face of the concrete gutter pan immediately prior to paving the bituminous wear course.

2331.2 MATERIALS

Provide joint adhesive meeting requirements as specified in Table 2331.2-1.

Table 2331.2-1 Joint Adhesive Requirements			
Test	Temperature	ASTM	Specification
Brookfield Viscosity	400°F	D3236	4,000 – 10,000 cp
Cone Penetration	77°F	D5329	60 – 100 dmm
Resilience	77°F	D5329	30% minimum
Ductility	77°F	D113	30 cm minimum
Ductility	39.2°F	D113	30 cm minimum

Tensile Adhesion	77°F	D5329	500% minimum
Softening Point	---	D36	170°F minimum
Asphalt Compatibility	---	D5329	Pass

2331.3 CONSTRUCTION REQUIREMENTS

A. Equipment Requirements

Use a jacketed double boiler type melting unit, with both agitation and recirculation systems. Provide a pressure feed wand application system.

B. Material Handling

Submit a copy of the manufacturer's recommendations for heating, re-heating, and applying the joint adhesive material.

Remove the joint adhesive material from the packaging immediately before it is placed in the melter. Joint adhesive packaging must be clearly marked with the name of the manufacturer, the trade name of the adhesive, the manufacturer's batch and lot number, the application/pour temperature, and the safe heating temperature.

Feed additional material into the melter at a rate equal to the rate of material used.

Verify the pouring temperature of the joint adhesive at least twice per day at the point of discharge. Stop production if the adhesive falls below the recommended application/pour temperature. When the temperature of the adhesive exceeds the maximum safe heating temperature, stop production, empty the melter, and dispose of that adhesive in an environmentally safe method.

Do not blend or mix different manufacturer's brands or different types of adhesives.

C. Joint Adhesive Application

Clean and dry the face of the longitudinal joint before applying joint adhesive. Apply the joint adhesive material to the entire exposed face of the concrete gutter pan where an adjacent HMA pavement will be constructed. Recommended band thickness is approximately 1/8 inch. An application shoe attached to the end of application wand is recommended. Do not overlap the joint by greater than 1/2 inch at the top of the joint or 2 inches at the bottom of the joint. Apply the joint adhesive immediately in front of the HMA paving operation. If the adhesive is tracked by construction vehicles, repair the damaged area and restrict traffic from driving on the adhesive.

D. Quality Control

Acceptance of the joint adhesive material is based on the certification by the manufacturer that the sealant meets the requirements listed in Table 2331.2-1. Field sampling shall be used to verify that the delivered joint adhesive meets the requirements of the Specification. The Contractor shall take a sample from the application wand during the first 20 minutes of placing sealant from each melter on the Project in the presence of the Engineer.

Each sample shall consist of two aluminum or steel sample containers with the capacity to hold 5 pounds of sealant each. The two sampling containers shall be labeled with the project number, date, time, location, manufacturer and lot number of the sealant. Each container shall be numbered one of two, or two of two. The Engineer reserves the right to conduct supplementary sampling and testing of the sealant material.

The Contractor shall document the locations where the material from each lot number of sealant is placed.

2331.4 METHOD OF MEASUREMENT

The Engineer will measure the length of joint adhesive applied.

2331.5 BASIS OF PAYMENT

The Contract Unit Price for Joint Adhesive is compensation in full for equipment, Materials and labor required to complete the Work.

No payment will be made for adhesive material that exceeds the maximum safe heating temperature or its disposal.

If a field sample fails to meet any of the requirements in Table 2331.2-1, the Work completed with the material from the lot that the field sample represents, shall be subject to a two percent reduction in the Contract Unit Price of the final Lift of the plant mixed asphalt pavement.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2331.603	JOINT ADHESIVE	L F

2357 BITUMINOUS TACK COAT

The provisions of MnDOT 2357 are modified and/or supplemented as follows:

2357.5 BASIS OF PAYMENT

Delete paragraph 2357.5.A in its entirety.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2357.506	BITUMINOUS MATERIAL FOR TACK COAT	GAL

2360 PLANT MIXED ASPHALT PAVEMENT (LOCAL AGENCY)

The provisions of MnDOT 2360 are modified and/or supplemented as follows:

2360.1 DESCRIPTION

Bituminous pavement payment incentives shall not apply.

2360.2 MATERIALS

G. Mixture Quality Management

Delete and replace the third through sixth sentences of the first paragraph of MnDOT 2360.2.G.4.b with the following:

Sample mixture from behind the paver. Sampling from the truck box at the plant site is not allowed unless approved by the Engineer. In addition to the QC sample, the Contractor will also bring an additional split of the mixture sample to the plant site and store for the Owner for 10 calendar days.

2360.3 CONSTRUCTION REQUIREMENTS

D. Compaction

Delete the first paragraph of MnDOT 2360.3.D.1 and replace with the following:

Compact the pavement to at least the minimum required Maximum Density values in accordance with Table 2360.3-1. Density evaluation will not include longitudinal joint density.

Delete MnDOT Table 2360.3-2 in its entirety.

2360.4 METHOD OF MEASUREMENT

When paying for Material by Square Yard the Engineer will measure the Plan dimensions for standard width and/or irregular width paving at the dimensions and thickness specified. There will be no additional payment for asphalt pavement constructed with a greater thickness or width than required by the Plan.

The Engineer may direct the Contractor to construct asphalt pavement in thicknesses different than that shown on the plan for small quantities. The Method of Measurement will be a direct proration from the original thickness to the changed thickness, with payment to be made at Contract Unit Prices.

2360.5 BASIS OF PAYMENT

The Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required as Quality Control (QC). The Owner shall be responsible for all inspections and tests required as Quality Assurance (QA).

Where bituminous driveway pavement is measured by the square yard, aggregate base material and excavation required beneath the driveway pavement shall be considered included in the cost of the bituminous driveway pavement.

B.13 Compaction – Maximum Density

Use a maximum pay factor of 1.00 for pay factor A – payment incentives shall not apply to this Project.

Delete MnDOT Table 2360.5-6 Incentive and Disincentive Schedule for Longitudinal Joint Density, 4 percent Design Void in its entirety.

Delete MnDOT Table 2360.5-7 Incentive and Disincentive Schedule for Longitudinal Joint Density, 3 percent Design Void in its entirety.

Delete the last sentence of Paragraph 2360.5.B.13.b and replace with the following:

Use a pay factor of 1.00 for both pay factor B and pay factor C – no cores are taken at the longitudinal joint.

C. Schedule

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2360.504	TYPE SP __ WEAR CRS MIX (__, __) 2.0" THICK	S Y
2360.509	TYPE SP __ WEARING COURSE MIX (__, __)	TON
2360.509	TYPE SP __ NON WEAR COURSE MIX (__, __)	TON

2451 (CEAM 2600) STRUCTURE EXCAVATIONS AND BACKFILLS

The provisions of MnDOT 2451 shall apply, in addition to the provisions of CEAM 2600, Trench Excavation and Backfill/Surface Restoration, which are modified and/or supplemented as follows:

2451.2 (CEAM 2600.2) MATERIALS

The provisions of CEAM 2600.2 are modified and/or supplemented as follows:

A.1 Granular Material Gradation Classifications

Delete the third paragraph of CEAM 2600.2.A.1 and replace with the following:

Bedding and encasement materials for pipe, unless noted otherwise, shall be Granular Material meeting the requirements of MnDOT 3149.2.B.1 Granular Material, except that 100 percent by weight shall pass the one inch sieve.

Add the following new paragraph to CEAM 2600.2:

D. Tracer Wire for Non-Conductive Pipe

Tracer wire for use with all thermoplastic pipe types shall be in accordance with CEAM 2611.2.I.

2451.3 (CEAM 2600.3) CONSTRUCTION REQUIREMENTS

The provisions of CEAM 2600.3 are modified and/or supplemented as follows:

Add the following new paragraph to CEAM 2600.3.A:

A7. Tracer Wire for Non-Conductive Pipe

Tracer wire for use with all thermoplastic pipe types shall be installed in accordance with CEAM 2611.3.B.4.

D. Placement of Insulation

Place insulation boards on a smooth, level foundation with the edges trim and square. Provide joint overlaps of a minimum of 6 inches on the underlying sheets. Install at least two wood skewers per board in each Layer driven flush with the surface of the material.

E. Pipeline Backfilling Operations

If insufficient suitable materials are available to complete backfilling, excess suitable materials from other areas of the project may be used to complete the work, as directed by the Engineer.

Granular foundation, bedding, and encasement materials shall be placed around all pipe within areas of rock excavation.

Bedding as specified within the CEAM Standard Specifications and shall be used for all ductile iron pipe (DIP) and reinforced concrete pipe (RCP) installations unless otherwise called for in the drawings or directed by the Engineer.

Delete the ninth paragraph of CEAM 2600.3.E in its entirety.

Backfilling above the encasement zone shall comply with the general requirements specified in 2600.3.E and the following:

1. Backfill within the roadbed or building pad areas shall be placed in accordance with MnDOT 2106.3.F and shall be compacted to Specified Density requirements in accordance with MnDOT 2106.3.G.1.
2. Backfill not within the roadbed or building pad areas shall be compacted to 95 percent of maximum density (MnDOT Standard Proctor).
3. Maximum backfill lift thicknesses may be increased or decreased by authority and at the discretion of the Engineer in consideration of material type, material disposition, or the demonstrated capability of compaction equipment.
4. The Engineer shall have full authority to suspend backfill operations until the preceding lift of backfill has been determined by the Engineer to be fully compacted and a passing compaction test has been taken. No additional compensation for lost time shall be made if backfill operations are suspended by the Engineer for the purposes of determining adequate trench backfill compaction.

2451.5 (CEAM 2600.5) BASIS OF PAYMENT

The provisions of CEAM 2600.5 are modified and/or supplemented with the following;

Delete the third paragraph of CEAM 2600.5 and replace with the following:

Furnishing and placing of granular materials for foundation, bedding, cover or backfill placement as specified in connection with pipe or structure items shall be incidental to the pipe or structure item without any direct compensation being made.

2461 STRUCTURAL CONCRETE

2461.2 MATERIALS

E. Concrete Mix Designs

Modify MnDOT Table 2461.2-6 as follows:

For Concrete Grade P, Piling, Mix Number 1P62, the Maximum W/C Ratio shall be 0.63.

Modify MnDOT Table 2461.2-11 as follows:

For Level 2 mixes, when there is a change of more than 5% Total Cementitious, resubmittal of the mix design is required in accordance with MnDOT 2461.2.E.3.a, "Preliminary Test Data Requirements for Level 2 Mixes."

2461.3 CONSTRUCTION REQUIREMENTS

F.2 Certificate of Compliance

Add the following items to the list in MnDOT 2461.3.F.2:

- (22) Fibers, brand and dosage per cubic yard.
- (23) Approved Ready-Mix (RMX) (per project requirements)

G.6 Estimating Concrete Strength by the Maturity Method

Modify MnDOT Table 2461.3-3 as follows:

For Normal Strength Concrete, Testing Ages shall be 1,3, 7, 14 and 28 Calendar Days.

2462 PRECAST CONCRETE

2462.3 CONSTRUCTION REQUIREMENTS

G.4 Test Methods and Specimens

Delete and replace the first paragraph of MnDOT 2462.3.G.4 with the following:

Take samples randomly in accordance with ASTM D3665, "Standard Practice for Random Sampling of Construction," Section 5, at a rate defined in accordance with the Schedule of Materials Control. Perform sampling and testing in accordance with the Concrete Manual.

Delete and replace the fourth paragraph of MnDOT 2462.3.G.4 with the following:

Furnish 4 inch by 8 inch cylinder molds, unless the maximum Aggregate size is greater than 1 ¼ inches, then furnish 6 inch by 12 inch cylinder molds.

2501 PIPE CULVERTS

The provisions of MnDOT 2501 are modified and/or supplemented as follows:

2501.3 CONSTRUCTION REQUIREMENTS

Add the following new paragraph to MnDOT 2501.3:

H. Geotextile

Use Geotextile 3733 Type 1 to wrap concrete pipe joints or for other drainage applications.

2501.5 BASIS OF PAYMENT

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2501.502	___" RC PIPE APRON	EACH
2501.502	___" SPAN RC PIPE-ARCH APRON	EACH
2501.602	TRASH GUARD FOR ___" PIPE APRON	EACH
2501.602	TRASH GUARD FOR ___" SPAN PIPE APRON	EACH

2502 SUBSURFACE DRAINS

The provisions of MnDOT 2502 are modified and/or supplemented as follows:

2502.1 DESCRIPTION

The location and alignment of the subsurface drains and outlets are shown in a general manner on the Plans. Modifications to the proposed alignment may be made by the Engineer in the field to ensure that the drain properly collects groundwater and infiltration water that may accumulate in the bottom of granular base material.

Perforated corrugated thermoplastic (TP) pipe or perforated corrugated PE pipe as designated, shall be installed in accordance with the requirements for subcut drains, (MnDOT 2502.3.B) **except that perforated pipe drains shall be bedded on coarse filter aggregate (MnDOT 3149.2.H). Trenches shall also be backfilled with coarse filter aggregate.**

Tracer wire shall be installed with all thermoplastic pipe in accordance with CEAM 2611 and CEAM 2621.

2502.5 BASIS OF PAYMENT

The connection of the subsurface drain to a drainage structure shall be considered incidental unless the subsurface drain is connected to an existing drainage structure.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2502.503	4" PERF TP PIPE DRAIN	L F
2502.602	CONNECT INTO EXISTING DRAINAGE STRUCTURE	EACH
2502.602	4" PVC PIPE DRAIN CLEANOUT	EACH

2503 (CEAM 2621) PIPE SEWERS

The provisions of MnDOT 2503 shall apply, in addition to the provisions of CEAM 2621, Sanitary Sewer and Storm Sewer Installation, which are modified and/or supplemented as follows:

2503.2 (CEAM 2621.2) MATERIALS

The provisions of CEAM 2621.2 are modified and/or supplemented with the following:

A.1 Ductile Iron Pipe and Ductile Iron and Gray Iron Fittings

All ductile iron pipe and fittings used in sanitary sewer applications shall be furnished with an Interior Lining Protecto 401 by U.S. Pipe, Protecto 401 by American Cast Iron Pipe Company (ACIPCO), or an approved equal as determined by the Engineer. This lining shall also be applied to the fittings and pipe used to construct outside drops

A3. Reinforced Concrete Pipe and Fittings

Reinforced concrete pipe and fittings shall conform with the requirements of MnDOT Specification 3236 for the type, size and strength class specified.

Reinforced concrete aprons shall be of the same strength class as the pipe. Trash guards and "U" bolt fasteners shall be hot dipped galvanized after fabrication as per MnDOT Standard Specifications 3392 and 3394. Aprons that are thirty-six (36) inch (pipe size) and larger require steel sheet piling (see detail STR-9).

Manufacturers of reinforced concrete pipe may produce an alternate "offset joint" on the spigot end of the pipe. This type of offset joint is to be used with the profile or pre-lubricated pipe seal systems. See MnDOT Standard Plate 3006.

A5. Polyvinyl Chloride Pipe and Fittings

Sanitary sewer polyvinyl chloride (PVC) pipe and fittings shall conform to the CEAM requirements. Joints shall be either O-ring rubber gasket or solvent-cemented according to the manufacturer's specifications and with the approval of the Engineer. All service wyes and service pipe shall be Schedule 40.

PVC pipe used for storm sewer installations shall conform to the requirements of MnDOT 2503.

PVC pipe and fittings for pressure sewer and forcemains shall meet the requirements of CEAM 2611.2.A2 for watermain class pipe.

Submit a manufacturer's Certificate of Compliance with each pipe shipment including date manufactured, nominal and actual inside pipe diameters.

A9. Solid Wall High Density Polyethylene Pipe

Solid wall HDPE for pressure and gravity sewer pipes shall meet the requirements of CEAM 2611.2.A3 for watermain class pipe.

A10. Polypropylene Pipe

Polypropylene (PP) pipe is considered to be plastic pipe and must be installed according to MnDOT 2501.3.C.4 and must pass deflection testing for acceptance.

Add the following new paragraph to CEAM 2621.2:

F. Steel Casing Pipe

The casing pipe shall be welded steel pipe (new material) with a minimum yield strength of 35,000 psi. The wall thickness shall be a minimum of 0.50 inch.

2503.3 (CEAM 2621.3) CONSTRUCTION REQUIREMENTS

The provisions of CEAM 2621.3 are modified and/or supplemented with the following:

A. Installation of Pipe and Fittings

The Engineer shall receive notice 24 hours in advance for testing of sewers including leakage testing, deflection testing, and televising.

When the Contractor uses laser beam control for grade and alignment, the Contractor shall check into the grade stakes provided. Any discrepancies found between the laser beam elevation and grade stake elevation, or the line and grade shown on the plans, shall be immediately brought to the Engineer's attention before continuing pipe installation. Failure to check into grade stakes provided or to notify the Engineer of discrepancies shall put the full responsibility on the Contractor for any removal and reinstallation of pipe necessary to conform to the line and grade as shown in the Drawings.

Installation of HDPE pipe for pressure sewer and forcemains shall meet the requirements of CEAM 2611.3 for watermain class pipe.

A2. Pipe Laying Operations

Dewatering to maintain pipe trenches free of water shall be considered incidental, unless a bid item has been included for Dewatering.

Install pipe to the alignment, grade, and location as shown in the drawings and/or staked in the field. No deviation from the drawings and/or staked alignment, grade, or location is allowed. Deviation from the pipe grade, as provided by the Engineer, in excess of 0.05 percent may be cause for removal and relaying of the pipe by the Contractor with no additional compensation allowed therefore. No re-rounding of pipe will be allowed.

Add the following new paragraphs to CEAM 2621.3.A2:

When connecting to existing pipe, neatly cut the existing pipe off and trim flush with the proposed pipe or inside wall of proposed Structure. Assure the patch for the proposed pipe connection to the existing pipe is secure and waterproof. Repair unplanned damage to the existing sewer.

When connecting into an existing Structure, field verify the location and top of casting elevation, and the location, invert elevation, size and type of existing pipes connected to the structure. Core

drill (or saw) openings in the existing Structures. Provide a clean, water-tight fit seal to the proposed pipe. Repair unplanned damage to the existing Structure.

A3. Connection and Assembly of Joints

Use Geotextile 3733 Type 1 to wrap concrete pipe joints or for other drainage applications.

A4. Bulkheading Open Pipe Ends

Mark end of sewer stubs with a wooden 4 in x 4 in marker. The marker shall extend adjacent to the plug and to a depth 6 in below, and shall extend 2 ft above the ground line. The marker shall be continuous without any breaks, and shall be vertical or plumb.

C. Sewer Service Installations

It shall be the duty of the Contractor to keep a record of sewer service wye locations with respect to the nearest downstream manhole, but the Engineer will record ties on the end of all sewer services at the property line. When installing sewer services, the Contractor shall before backfilling, contact the Engineer or his representative and assist him in making ties to the end of the service in the open trench. At least two (2) ties shall be made for each service and if backfilling proceeds before such ties are made, the Contractor shall dig up the end of all such services with no additional compensation for the purpose of making ties. Recorded with the ties shall be size and depth of service. During backfilling the Contractor shall furnish and place a vertical four-inch by four-inch (4"x4") wooden stake set four-feet (4') above the finished ground surface minimum eight feet (8') in total length and extending down to the end of the sewer service. The four-inch by four-inch (4"x4") stake shall be painted light green with epoxy paint.

Contractor to provide Engineer with X, Y and Z GPS coordinates of wyes and service ends.

Where sanitary sewer services are to extend from existing mains, wyes shall be installed by cutting the existing sanitary sewer. Hub sleeves or Fernco-type connections will not be allowed with the connection unless approved by the Engineer. Installing saddles on the existing main is not allowed.

House services shall be kept to a minimum depth of ten feet (10') at the property line or as directed by the Engineer. All services shall project fifteen (15) feet past the right-of-way line and shall be installed at a two percent (2%) grade. Risers shall be used when the depth of cover over the top of the sewer main is more than twelve (12) feet. When necessary, risers shall be used to extend the service stub to a point within eleven (11) feet of the surface; where an airtight stopper fastened or braced in place to permit air testing of the pipe will then be installed.

E. Sanitary Sewer Leakage Testing

All leaks shall be sealed by the Contractor before final acceptance by the Owner.

The provisions of CEAM 2621.3.E.1.a are supplemented with the following:

The pressure gauge shall be marked in 0.1 psi increments and to be a standard calibrated gauge.

F. Deflection Test

The Owner reserves the right to have the Contractor measure the deflection of PVC pipe at any time, including during the guarantee period following the final acceptance of the sewer pipe.

G. Televising

All new sanitary sewer main shall be jetted clean and televised after the services are installed, as applicable, and prior to wear course paving. Televising should include panning the camera up to the sanitary sewer wyes and service lines so that it is visible. The Contractor shall supply two videos and two detailed reports within 15 days of the televising being complete. One set shall be supplied to the Engineer and one set to Owner. A digital copy of the report shall also be delivered to the Owner.

Prior to placement of wear course paving, the Engineer must review all sewer televising reports and conclude there are no subsurface deficiencies requiring excavation to correct.

The Contractor will be responsible for television inspection of the sanitary sewer after it has been constructed. The Owner reserves the right to view these television inspection records prior to final project acceptance and at any time within the warranty period.

Add the following new paragraph to CEAM 2621.3:

H. Sanitary Sewer By-Pass Pumping

The Contractor shall furnish, install, maintain, and remove temporary pumps, pipes, automatic controls, and related appurtenances to allow continuous operation of sanitary sewer facilities whenever necessary to ensure service will be maintained during construction. Sanitary sewer facilities shall include, but are not limited to gravity sanitary sewer main, sanitary sewer force mains, sanitary sewer services, sanitary sewer lift stations, and/or sanitary sewer grinder pumps.

Sanitary sewer pipe sizes are shown on the Plans. The Contractor shall be responsible for verifying all sanitary sewer pipe sizes and locations within the project limits to determine the most appropriate manner to provide sanitary sewer bypass pumping.

The Contractor shall submit copies of the proposed pumping, piping, and control systems for sanitary sewer bypass pumping to the Engineer a minimum of seven days in advance of installing the sanitary sewer bypass pumping system.

The Contractor shall have one standby pump available on-site for each pumping location to use in the event of a pump failure. The standby pump shall be adequately sized to handle the rates of sanitary sewer flow being bypasses.

2503.5 (CEAM 2621.5) BASIS OF PAYMENT

The provisions of CEAM 2621.5 are modified and/or supplemented with the following:

Sewer connections shall be paid per each connection of new sewer to existing sewer. All necessary labor, materials, and work required to make the connection shall be included in the price per each as provided in the Bid Form.

Payment shall be made at the unit price bid per linear foot. Sanitary sewer services shall be measured from the center of the sanitary sewer service to the end of the service stub. Riser service at the right-of-way end of the service pipe installation will be paid for as linear foot of service pipe. Sewer pipe payment shall be limited to eighty (80) percent of the actual amount installed until all sewer has been tested, accepted and backfilled to subgrade elevations. No additional compensation will be made for sewer and copper water service lines not constructed in a common trench.

All surplus excavated materials not required for backfill shall be disposed of by the Contractor at no expense to the Owner and in a manner satisfactory to the Engineer. All costs associated with the disposal of the surplus excavated materials are considered incidental to the pay item.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2503.503	___" SPAN RC PIPE-ARCH SEWER CL IIA	L F
2503.503	___" RC PIPE SEWER DES 3006 CL III	L F
2503.503	___" RC PIPE SEWER DES 3006 CL V	L F
2503.601	SANITARY SEWER BYPASS PUMPING	LS
2503.602	CONNECT TO EXISTING SANITARY SEWER	EACH
2503.602	CONNECT TO EXISTING STORM SEWER	EACH
2503.602	CONNECT INTO EXISTING DRAINAGE STRUCTURE	EACH
2503.602	CONNECT INTO EXISTING MANHOLE (SAN)	EACH

2603.602	CONNECT TO EXISTING SANITARY SEWER SER	EACH
2503.602	8"X4" PVC WYE	EACH
2503.603	TELEWISE SANITARY SEWER	L F
2503.603	4" PVC PIPE SEWER	L F
2503.603	—" PVC PIPE SEWER SDR 26	L F
2503.603	—" PVC PIPE SEWER SDR 35	L F
2503.603	4" PVC RISER PIPE	L F
2503.603	—" DUCTILE IRON PIPE SEWER	L F
2503.603	—" STEEL CASING PIPE	L F

2504 (CEAM 2611) WATERMAIN

The provisions of CEAM 2611, Standard Specifications for Watermain and Service Line Installation are modified and/or supplemented as follows:

2504.2 (CEAM 2611.2) MATERIALS

The provisions of CEAM 2611.2 are modified and/or supplemented as follows:

All watermain materials, including but not limited to ductile iron pipe and fittings, hydrants, valve boxes, gate valves, saddles, service saddles and service piping, corporation stops, curb stops and boxes, and retainer glands (Megalugs) and bolts shall be manufactured and produced in the United States.

A1. Ductile Iron Pipe and Ductile Iron and Gray Iron Fittings

Ductile iron pipe shall be Class 52. Ductile iron pipe, gray iron pipe fittings and accessories shall be manufactured by American Cast Iron Pipe Company, Clow Pipe Company, Tyler Pipe Industries Inc., United States Pipe and Foundry Company, Union Foundry Company or Engineer approved equal. All DIP water mains including valves, fittings, hydrants, and appurtenances shall be fully encased in polyethylene film of 8 mil minimum nominal thickness or 4 mil high-density cross-laminated per AWWA C105. Hydrant leads shall have polyethylene encasement in accordance with AWWA C105.

All fittings for watermain shall be mechanical joint, Class 350, Ductile Iron Compact Fittings in accordance with AWWA C153. Fittings shall be furnished with fusion bonded epoxy external coating in accordance with AWWA C550 and C116, 6 mil to 8 mil nominal thickness.

All restraints shall be fusion bonded epoxy coated on the inside and outside according to ANSI/AWWA C550 and C116. The thickness of the coating shall be 6 mil to 8 mil. All bolts and fasteners are to be stainless steel.

All mechanical and push-on joints shall have rubber gaskets conforming to ANSI/AWWA C111. All nuts and bolts shall be stainless steel t-bolts and approved by the Engineer and Owner. The raw materials analysis shall meet the chemical and physical requirements of AWWA C111, current revision. All tie rod restraints and corresponding nuts shall be coated with an approved rust-proofing material.

Copper jumpers shall be installed between the mechanical joint fittings. The copper jumper shall consist of a minimum of 1-1/2" x 10" wide flat copper strip with holes on either end to accommodate the bolts on the mechanical joints. The nuts and bolts used to affix more than one copper strap shall consist of Silicon Bronze meeting all ANSI/AWWA specifications. No grinding or chipping of the epoxy coatings shall be allowed.

A2. Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

All PVC watermain pipe shall conform to AWWA C900 (DR 18). Tracer wire shall be laid with all PVC watermain. 14-inch through 24-inch Polyvinyl Chloride (PVC) Pressure Pipe shall conform to the requirements of AWWA C905 for Water Distribution. All PVC water main pipe shall meet the requirements of ANSI/NSF 61 "Drinking Water System Components – Health Effects."

The bell shall consist of an integral wall section with a factory-installed, solid cross-section elastomeric ring that meets the requirements of ASTM F-477. Pipe joints shall be gasket, push-on type. Gaskets shall be part of a complete pipe section and purchased as such. Lubricant shall be as recommended by the pipe or fitting manufacturer and shall not adversely affect the potable qualities of the water to be transported. The gasketed joint shall meet the laboratory performance requirements specified in ASTM D3139.

All fittings for watermain shall be mechanical joint, Class 350, Ductile Iron Compact Fittings in accordance with AWWA C153. Fittings shall be furnished with fusion bonded epoxy external coating in accordance with AWWA C550 and C116, 6 mil to 8 mil nominal thickness.

B. Fire Hydrants

Hydrants shall be Waterous Pacer (model WB-67-250) with 5" Storz fitting, traffic type, eight and one-half feet (8-1/2') of bury. Fire hydrant bolts shall be stainless steel. The nozzle shall be a minimum of twenty-four inches (24") above grade while still maintaining the appropriate break-off elevation. A yellow (12") "Out of Order" tag per hydrant shall be installed on the pumper connection after backfilling. The "Out of Order" tag shall be removed by the City, not the Contractor, when all water main testing is complete. All hydrant valves shall be installed with Megalugs or be rodded to the tee on the main line. Refer to the City standard detail plate.

The following materials shall be furnished to the City and shall be incidental:

Hydrant Marker	Fiberglass, Candy Cane Style; 1 Each Installed Plus 1 Each Extra, Flat Connection to Hydrant
Hydrant Wrench	1 Each per 6 Hydrants Installed (2 Minimum)
Adjustable Gate Valve Key (or 6' Telescoping Rod with Swivel 2" Socket, extending to 11')	1 Each per 10 Gate Valves Installed (1 Minimum)
Yellow (12") "Out of Order" Tag	1 Each per Hydrant Installed

C1. Valve Housings

Valve housings shall be ductile iron (American made). Housings shall be vertical, adjustable for seven and one-half (7-1/2) feet of cover. Valve boxes shall consist of three (3) pieces with sufficient adjustment to provide at least six inches (6") of adjustment above and below grade. Refer to the City standard detail plate. The four-inch (4") drop lid shall have the word "WATER" on the lid and be a Mueller A-2300-20 or approved equal.

C2. Gate Valves

Shall be American made, Mueller A2370-20 or Engineer approved equal and be compression resilient seated gate valves in accordance with the AWWA C509 (latest revision) and all applicable ASTM standards. Valves shall be American, Clow, or American-made equivalent. Bonnet adaptors are required on all gate valves and will be considered incidental. All bolts and fasteners are to be stainless steel. Gate valve extensions are required where accessibility exceeds 10 feet (10') (installed prior to backfill). Refer to City standard detail plate.

C3. Butterfly Valves

The Owner does not allow butterfly valves.

D. Water Service Pipe and Fittings

All copper tubing used for services shall be new and unused ASTM #B88, Type K copper. No additional compensation will be made for sewer and copper water service lines not constructed in a common trench.

A saddle tap for services is to be used for PVC watermain regardless of size. Service saddles on mains shall have an epoxy coated ductile iron body with a single stainless steel strap and neoprene gasket, Mueller H-10526 or Engineer approved equal.

Corporation stops shall be Mueller H-15000 or Engineer approved equivalent ball valve design with threaded inlet and flare type joint. They shall be full size inlet and outlet for the respective services. Water service taps made directly to PVC or PE watermain pipe shall require single strap stainless steel saddles. Saddles shall be included in the cost of the corporation stop.

Curb stops shall be AWWA flared copper service pipe inlets and outlets. They shall have Minneapolis thread and pattern and be Mueller No. H-15154 Mark 2 Oriseal, Ford B22 Series, A.Y. McDonald 6104, or Engineer approved equal ball valve design for use with Minneapolis pattern curb boxes with stationary rods. Curb boxes shall be A.Y. McDonald 5614ATW 8 MINN curb box pentagon lid L/Rod 1.25 upper 1.5 TAP TW lid USA with Minneapolis top with 1 ¼" upper section for one inch (1") service and A.Y. McDonald 5615ATW 8 MINN curb box pentagon lid L/Rod 1.25 upper 1.5 TAP TW lid USA with two inch (2") upper section if curb stop is for 1 ½" service or approved equal. Boxes shall be supplied with stationary rod. Boxes shall be adjustable from 7'-0" to 8'-0" or to existing grade.

No additional compensation will be paid for any adjustments required to match final grade elevations. Where curb boxes are placed in concrete or bituminous pavement, a meter box cover, Ford Model A1 or approved equal, 8 in cover shall be installed at no additional compensation.

F. Mechanical Joint Restraints

All restraints shall be fusion bonded epoxy coated on the inside and outside according to ANSI/AWWA C550 and C116/A21.16. All bolts and fasteners are to be stainless steel or Cor-Blue t-head bolts.

Retainer glands shall be ductile iron designed to withstand the same pressures as the watermain pipe and fittings. Retainer glands shall be by American, US Pipe or Mega-Lug and shall be used at all changes in direction and at all fittings and valves. This shall be considered included in the cost of the watermain pipe.

Add the following new paragraph to CEAM 2611.2:

J. Polystyrene Insulation

Insulation board shall be rigid expanded polystyrene, conforming to the material requirements of CEAM 2600.2B. Placement of insulation shall be in accordance with the requirements of CEAM 2600.3.D.

K. Temporary Water Distribution System

A temporary water distribution system shall be required when existing users will be out of water service for a period exceeding eight hours, or as required at the discretion of the Engineer. All piping including hoses used for water service shall be ANSI/AWWA rated. All piping and fittings shall meet current NSF standards and shall be rated for residential or commercial use. The minimum pipe size shall be 2 in for mainlines and ¾ in for individual service connections. Larger pipe sizes may be required based on zoning or Contractor's phasing plans. No additional compensation will be granted for pipe sizes larger than the specified minimum.

L. Steel Casing Pipe

The casing pipe shall be welded steel pipe (new material) with a minimum yield strength of 35,000 psi. The wall thickness shall be a minimum of 0.25 in.

M. Sacrificial Anode Bag

The anode bag shall be a 32 pound (bare weight) pre-packaged magnesium soil anode which is connected to the ductile iron pipe via a 10-ft #12 AWG Type RHW-2 wire in conjunction with a CPSI Cathodi-Clamp®. Magnesium anodes are installed for the purpose of providing protective current for the buried watermain.

2504.3 (CEAM 2611.3) CONSTRUCTION REQUIREMENTS

The provisions of CEAM 2611.3 are modified and/or supplemented with the following:

Dewatering to maintain pipe trenches free of water shall be considered incidental.

During connection to existing mains, no water main shall be shut down longer than six (6) hours. At no time shall the Contractor operate gate valves. Connections to existing mains shall be coordinated with the Owner's Public Services Utility Department. The Public Services Utility Department requires a minimum seventy two (72) hour notice if residents or businesses are to be without water. Any residents who will be affected by the shutting off of water shall receive written notice at least forty eight (48) hours notice as to when and how long service will be interrupted. The Public Services Utility Department will supply notices of the water shut down to the Contractor for delivery by the Contractor to the effected residents.

During the installation of the new watermain, service shall be maintained to all properties. It may be necessary to maintain temporary pipes on the surface with connections to outside hose bibs. The temporary connections must be made according to Department of Health standards and approved by the Engineer. New watermain installations shall be coordinated so that no home or business is on temporary water service for more than 14 days unless prior arrangements have been made. Contractor shall schedule shutdowns so that all present water customers will have service from 6:00 a.m. – 9:00 a.m. and 4:00 p.m. – 9:00 p.m. every day. The Contractor shall be responsible for any improvements to homes or businesses necessary to facilitate the temporary water connections.

When it is necessary to connect to the existing water system or close existing portions of the water system due to construction operations, the Contractor shall discuss that phase of the project with the City Public Works Department five (5) working days in advance of the planned starting date to allow the orderly planning and coordination by the City. The Contractor shall provide temporary water service to all residences and businesses affected by the project.

The provisions of CEAM 2611.3.A.2 are modified and/or supplemented with the following:

All water main pipe shall be laid to seven and one-half feet (7-1/2') from finished grade to top of pipe except where crossing of sanitary or storm sewer line, or service. At that point, there shall be a minimum two-foot (2') vertical clearance. A horizontal separation distance of ten feet (10') shall be maintained to storm and sanitary sewers.

The provisions of CEAM 2611.3.A.4 are modified and/or supplemented with the following:

All watermain piping shall be constructed to resist the thrust existing at valves, hydrants and at all fittings using retainer glands and reaction blocking. The retainer glands and the reaction blocking shall be considered incidental to the project. All hydrants, valves and fittings shall be tied with two (2) three-fourth's inch (3/4") galvanized rods in addition to the required blocking. Refer to detail plate for size of blocking. Megalugs may be used with galvanized tie rods in lieu of threaded rod tied restraints.

The provisions of CEAM 2611.3.B.4 are modified and/or supplemented with the following:

The Contractor shall perform a conductivity test on all tracer wire prior to wear course paving of the streets. A low voltage circuit shall be completed with the use of a suitable voltage source and meter to ensure continuity of the tracer wire. In the event that a close clamp circuit cannot be completed, the cause shall be isolated and corrected. Thereafter, the section in which the defective test occurred shall be retested as a unit and shall meet the requirements.

The provisions of CEAM 2611.3C are supplemented with the following:

All corporation stops shall be tapped into watermains with diameters of 8" or greater. Corporation stops shall be tapped into the main only when full of water under operating pressure. No taps shall be made into a dry pipe. Corporation stops shall be turned into the pipe until tight and shall not be turned back to facilitate having the operating nut on top. **Contractor to provide Engineer with X, Y and Z GPS coordinates of corporation stops.**

Water service replacements with less than 10-feet of separation from existing sanitary sewer service locations shall be installed as allowed by Minnesota Plumbing Code 4715.1710 Subp.2. The Contractor shall be responsible for following the requirements as identified in this Code.

The water service shall be installed with seven and one-half feet (7-1/2') of cover as shown on the detail plate. The curb stop and box shall be located on the property line (unless otherwise noted on the plans or directed by the Engineer). The top of the curb box shall be set to proper grade with the extension at the mid-point. Curb boxes located in a driveway or parking lot shall be covered with a Ford A-1 Meter Box Cover or Engineer approved equal. The end of all service stubs shall be plugged. Contractor shall furnish and install six-foot (6') Steel Fence post, painted blue, extending forty-eight inches (48") above ground to mark the curb stop in new developments.

The Contractor shall connect the existing service pipe to the new curb stop. The Contractor shall reconnect the water service pipe in such a manner as to minimize joints. If the connection requires an additional coupler, the Contractor shall use only a flared copper to copper coupler. The contractor is required to notify the Engineer of any defects found in the existing copper service prior to reconnecting to the service. Existing copper services not suitable for reconnection shall be replaced within the limits of the public right-of-way and drainage and utility easements at the contract unit price.

Add the following new paragraphs to CEAM 2611.3.D:

Hydrants, gate valves and valve boxes shall be set plumb with valve boxes placed directly over valves. Top of valve boxes shall be set one-half inch (1/2") below finished grade unless otherwise noted on the plans. Top of valve boxes shall be adjusted by turning the threaded screw sections to achieve proper final elevations. Internal top sections shall not be used to accomplish the adjustment.

All hydrants shall be given one (1) additional coat of paint after installation. All surfaces shall be cleaned prior to application of the final field coat.

Hydrants shall be set at such elevations that the connecting pipe will have a minimum of seven-foot, six-inch (7'-6") cover or as shown in the plans. Each hydrant shall be placed upon a brick or concrete not less than eight inches (8") thick, eight inches (8") wide, and sixteen inches (16") long. See detail plate. The back side of the hydrant opposite the pipe connection shall be firmly wedged against the vertical face of the trench with concrete blocking to prevent the hydrant from blowing off the line. Around the base of each hydrant shall be placed not less than one-third (1/3) cubic yard of crushed stone or washed rock with geotextile fabric covering to ensure complete drainage of the hydrant when closed.

Drain holes are open except in those areas where the static ground water table is higher than the drain hole location on the hydrant, where the drain holes shall be securely plugged according to the manufacturer's recommendation and specifications.

Add the following new paragraphs to CEAM 2611.3.D:

D1. Adjust Gate Valve & Box

During gate valve box adjustment activities, the Contractor shall place traffic cones or other traffic control devices to direct traffic around the castings being adjusted.

Gate valve boxes shall be adjusted to grade after placement of bituminous base and/or binder courses. The final surface elevation of the gate valve box shall be one-half inch ($\frac{1}{2}$ ") below the adjacent pavement surface elevation.

D2. Sacrificial Anode Bag

Anode bags shall be installed at hydrants and with every 200 ft of watermain pipe. Never lay the anode in contact with the pipe or with any abandoned or foreign system. After the anode has been laid in the trench it should be backfilled with well compacted moist soil. Once compacted, to ensure the soil is moist, a five-gallon (5) bucket of water should be added to the soil directly around the sacrificial anode. Water is to be supplied by the Contractor (incidental). **The use of water from residential properties is not allowed.**

Anode bags attachment devices shall be (CPSI Cathodi-Clamp®). Use of exothermic welding (cadwelding) to attach anodes to the watermain shall not be permitted. Anodes and attachment devices are to be installed per the manufacturers' recommendations. Details of the CPSI Cathodi-Clamp® can be found online at: <https://cpsolutionsinc.net/corrosion-control-engineering/>

The anode shall be installed to provide a minimum of five feet (5') of horizontal separation and sixteen-inches (16") below the watermain.

The provisions of CEAM 2611.3E are supplemented with the following:

After construction has been completed, all new mains and services shall be disinfected prior to being placed in service. Such disinfection shall consist of a uniform dosage of chlorine equivalent to fifty (50) parts per million which shall be retained in the system for at least twenty-four (24) hours. Disinfection shall be incidental to the cost of the pipe.

A predetermined dose shall be shaken into the pipe at the first joint attached to the existing water pipe, and the dosage shall be repeated at each pipe joint as the pipe laying progresses, or as may be directed by the Engineer.

When treated with dry calcium hypochlorite or with dry chlorinated lime, the newly laid pipe shall be filled very slowly to avoid washing the powder to the extremity of the pipeline.

Treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. This period shall be at least 24 hours and preferably longer as may be directed. After chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at other representative points shall be at least 5 parts per million.

In the process of chlorinating newly laid water pipe, all valves or other appurtenances shall not be operated while the pipeline is filled with the chlorinating agent.

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe at its extremities until the replacement water throughout its length, shall, upon a minimum of two (2) tests per closed system, both chemically and bacteriologically, be proven equal to the water quality served the public from the existing water supply system, and approved by the State Board or Department of Health. Both tests must be conducted by a certified independent lab. All costs associated with the testing shall be incidental to the watermain installation. If the tests, in the opinion of the Engineer proves unsatisfactory, chlorination shall be repeated until a satisfactory condition of the water within the pipe is established. If any test is unsatisfactory, the Contractor will be required to repeat both tests at their expense.

Unless the Engineer shall direct otherwise, cuts made in existing pipelines for the insertion of valves, fittings, repairs, or for any other purpose shall be chlorinated by shaking a quantity of the powder, pre-determined by the Engineer, into the pipe on each side of the cut-in. After slowly filling the section and reversing the flow, the chlorinated water shall be retained for several hours then flushed until no odor of chlorine can be detected in the wastewater, or preferably until a check shall have been made for residual chlorine.

The Contractor is cautioned to take EXTREME CARE when disinfecting watermain which will replace in-place watermain. The new main shall be thoroughly flushed before any in-place services are connected to the new watermain.

Chlorine Residual or Bacteriological Tests shall be conducted by the City's Public Works Department, unless directed otherwise by the Engineer. After the twenty-four (24) hour retention period, the chlorine residual at all test locations shall be at least fifty (50) parts per million and the bacteriological test shall be negative.

The Owner shall bear the initial cost of the testing. If retesting is required, the cost of this additional testing shall be at the Contractor's expense. All disinfection procedures, sampling, and testing shall meet the Minnesota Department of Health standards.

F. Electrical Conductivity Test

The Engineer shall receive at least 24 hours' notice for all testing. The Contractor shall perform all testing in the presence of the Engineer in the field.

A low voltage circuit shall be completed with the use of a suitable voltage source and meter to ensure continuity. If a close clamp circuit cannot be completed, the cause shall be isolated and corrected. Thereafter, the section in which the defective test occurred shall be retested as a unit and shall meet the requirements.

G. Hydrostatic Testing of Watermains

The Engineer shall receive at least 24 hours' notice for all testing. The Contractor shall perform all testing in the presence of the Engineer in the field.

Service pipes may be tested at the time of the foregoing test, if installed, at the Contractor's option; however, testing of service pipes may be completed as a separate operation from main testing. Service pipe testing, if done separately, shall be done with the corporation stop open.

Add the following new paragraph to CEAM 2611.3:

I. Temporary Water Distribution System

The temporary water distribution system shall be designed to meet a pressure requirement of 30 psi to 60 psi when in operation.

Prior to installing the temporary water distribution system, a detailed plan of the temporary water distribution shall be provided by the Contractor and approved by the Engineer. The Contractor shall allow one week for review and acceptance by the Engineer. The plan shall detail connection points, valves, redundancy measures, back feed ports, materials, mainline and service sizes, sampling points, emergency procedures, and other related information about the temporary water system including installation methods at all street crossings and driveways. The Contractor shall demonstrate that the level of service to the water users will not be significantly impacted and that the temporary system will supply water demands at pressures normal to the existing system. The

Contractor shall identify large or exceptional water users and incorporate their needs into the temporary water distribution system.

I1. Location

All above ground piping shall be installed with appropriate ramping or burial such that the piping will:

- Not be endangered by equipment or vehicular traffic;
- Not pose a hazard for pedestrians (tripping, etc.);
- Provide a barrier-free access; and
- Be constructed to safeguard against vandalism and tampering.

All driveway and street crossings must be buried.

The proposed phasing for the temporary water distribution system shall be planned such that no sleeves will be required to construct the new permanent water distribution system.

I2. Source Water Connection

Source water connections to fire hydrants are discouraged unless the Contractor can demonstrate that the hydrant has been disinfected and thoroughly flushed. The Owner and Engineer assume no responsibility for the quality of water obtained from a hydrant. After disinfection, the hydrant shall be pressurized at all times in which it serves as a source of potable water. Isolation valves are required at the source water connection, branches (two on 3-way, three on 4-way) and at every service.

I3. Reduced Pressure Zone (RPZ)

The Minnesota State Plumbing Code required protection of potable water. A Reduced Pressure Zone (RPZ) backflow preventer must be installed at each point of connection. That RPZ must be tested annually and rebuilt on a five-year operating cycle, in accordance with the State Plumbing Code. The Contractor shall provide certification of such for each RPZ utilized with the project. Installation of RPZs shall be included with the cost of the temporary water distribution system.

I4. Pressure Testing and Leakage

All above ground piping shall be regularly inspected to ensure leak tight connections at the beginning and during the period that the temporary water distribution system is in use. At the discretion of the Engineer, buried temporary water distribution piping shall satisfy hydrostatic pressure testing.

The Contractor shall make its own determination about water pressure maintained by the temporary water distribution system and shall determine if a pressure reduction valve(s) (PRV) is necessary. If so, the PRV shall be include with the cost of the temporary water distribution system.

I5. Chlorine Residual and Bacteriological Testing

After the temporary water distribution system is installed (both mainlines and services) in its final location, but before service piping is connected to the water users, the temporary water distribution system shall satisfy the chlorine residual and bacteriological testing standards and protocols for the commissioning of new watermain. Disinfection materials and procedures, and the collection and testing of water samples, shall be in accordance with the provisions of AWWA C-651. Testing shall be coordinated with the City's Public Works Department.

16. Service Connections

The service connection piping shall be installed and disinfected at the same time as the main line in order that disinfection is accomplished on the service piping. The final connection to the water user shall not be made until the chlorine residual and bacteriological testing requirements have been satisfied. A check valve shall be installed on the service connection between the mainline and the connection to the water user. Prior to connection to water users, individual service lines shall be thoroughly flushed. The final connectors shall be spray-disinfected and swabbed with a minimum 1 percent and maximum 5 percent sodium hypochlorite (bleach) solution to disinfect the fittings. The Contractor shall arrange for the plumbing system to be flushed to remove any elevated chlorine residuals. A typical service connection to a private building shall be at an outside hose bib, requiring the water valve at the meter to be shut-off. It is the responsibility of the Contractor to determine how to provide temporary water service to the satisfaction of the property Owner and the Engineer. The Contractor is responsible to provide an appropriate connection to the water user. The property Owner is under no obligation to allow the temporary water system to be connected to their internal system at any location other than on the public side of the curb stop. If a property Owner will not permit an above ground connection as typical, it shall be the Contractor's responsibility to make alternate arrangements to service the property. In lieu of making aboveground temporary servicing, the Contractor has the option to connect the temporary distribution system to the public side of the existing curb stop.

17. Operation

The temporary water distribution system shall be continually pressurized after the bacteriological testing is completed and be capable of supplying normal water demands throughout its installation. In the event of a main or service break, the Contractor shall take immediate steps to minimize water loss and to avoid system contamination. Each end of the broken pipe shall be elevated in a manner to avoid backflow into the pipe. All fittings used in the repair and the pipe ends shall be spray-disinfected and swabbed with a minimum 1 percent and maximum 5 percent sodium hypochlorite (bleach) solution to disinfect the connection. At the discretion of the Engineer, a round of chlorine and bacterial samples may be taken to ensure the integrity of the system.

18. Off-Hours Corrective Action

If corrective action is needed to the temporary water distribution system outside of normal working hours, the Engineer or Owner will attempt to contact the Contractor to take corrective actions. At the preconstruction meeting for the project, the Contractor shall provide the name and 24-hour contact information for the person(s) responsible for repairs. If, in the sole opinion of the Owner, the Contractor is unable to make the corrections in a timely manner, the Owner may direct their own forces to take corrective steps. The Contractor will be responsible for any costs incurred by the Owner.

19. Relocation of the Temporary Water Distribution System

The relocation of the temporary water distribution system either in whole or in parts by any means without conducting and passing the chlorine residual and bacteriological requirements shall not be permitted. Relocation is defined as depressurizing and moving the pipe work to service other water users.

Add the following new paragraph to CEAM 2611.3:

J. Irrigation System Repair

The Engineer shall attempt to field verify any existing irrigation systems in the project area prior to construction. The Engineer shall notify the Contractor of such known systems. The Contractor shall avoid or minimize disturbance to existing irrigation systems during construction.

Homeowners must be notified by the Contractor a minimum of 24 hours prior to any disturbances or disruptions of existing irrigation systems.

Temporary repairs (i.e. plugging, pinching off impacted lines, etc.) shall be required where feasible, allowing for partial use of the irrigation system by the homeowner during construction. Temporary repairs shall be incidental to the irrigation system repair.

Existing private irrigation systems (of all types and designs) impacted by construction are to be repaired and/or replaced. New components used in the repair/replacement shall be consistent with existing system components. The existing system and its components shall be salvaged and reinstalled where possible.

2504.4 (CEAM 2611.4) METHOD OF MEASUREMENT

The provisions of CEAM 2611.4 are modified and/or supplemented with the following:

B. Valves

Measurement for adjustment of gate valve boxes shall be on an "each" basis only for gate valve boxes that are adjusted in preparation for bituminous wear course placement. These gate valve boxes must be existing prior to the project. Initial gate valve box adjustment after base course construction or adjustment of gate valve boxes in areas outside of the bituminous roadway surface shall be considered incidental to the Gate Valve and Box pay item. Adjustment of gate valve boxes that were constructed under the contract shall also be incidental to the Gate Valve and Box pay item.

H. Ductile and Gray Iron Fittings

Ductile Iron compact fittings (AWWA C153) shall be measured by the pound. (See Appendix for Fitting Weights table.)

Add the following new paragraph to CEAM 2611.4:

K. Insulation

Insulation shall be measured on a square yard basis installed to the specified thickness, and shall include all materials, equipment, and labor required for placement.

L. Sacrificial Anode Bag

Measurement shall be by each 32 LB (bare weight) magnesium anode bag installed in conjunction with bolt replacements.

2504.5 (CEAM 2611.5) BASIS OF PAYMENT

Payment shall be at the unit price bid for each fire hydrant assembly installed, which shall be compensation in full for all labor, materials, and equipment necessary to install the fire hydrant, gate valve, and DIP lead from the water main to the hydrant. Hydrant extensions, if required, shall be considered incidental. Each hydrant shall have one candy-cane locator installed. Additional hydrant locators (one for each fire hydrant) and hydrant wrenches (one for every six hydrants installed, with a minimum of two per project) shall be provided to the Owner and delivered to the City's Public Services Utility yard.

All tie rods, nuts, bolts, mechanical joints and joint conductivity copper straps, including installation with ductile iron fittings as noted on the individual plans, will be incidental to the pipe construction. Payment for water main pipe shall be limited to 80 percent (80%) of the actual amount installed until all water main has been tested, accepted, and backfilled to subgrade elevations.

Payment at the lump sum unit price for Temporary Water Service shall include all costs of furnishing, installing, and removing the temporary water distribution system as required by the plans and specifications. No additional compensation will be made for multiple setups or for numerous temporary water systems due to phasing.

Payment shall be made for each installed at the unit price for Adjust Gate Valve & Box in the proposal and shall be compensation in full for all time, materials, equipment, and labor to adjust each valve box as directed by the Engineer, including multiple adjustments to suit blacktop lifts.

Irrigation System Repair: Payment at the bid unit price per each sprinkler system repair shall include all labor and materials required to satisfactorily repair each existing irrigation system impacted by construction, including but not limited to salvaging, repairing, or replacing the system and/or its components. If the Contractor damages an existing system unnecessarily or is otherwise negligent, the Owner reserves the right to require payment of the resulting excessive repair costs by the Contractor.

Installation of sacrificial anode bags and connection devices shall be considered incidental to valve or hydrant & valve installation, bolt replacements, and watermain pipe installation. No direct payment will be made for installation of sacrificial anode bags or connection devices.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2504.601	TEMPORARY WATER SERVICE	LS
2504.602	CONNECT TO EXISTING WATER MAIN	EACH
2504.602	CONNECT TO EXISTING WATER SERVICE	EACH
2504.602	HYDRANT	EACH
2504.602	ADJUST HYDRANT	EACH
2504.602	ADJUST GATE VALVE & BOX	EACH
2504.602	— " CORPORATION STOP	EACH
2504.602	— " GATE VALVE & BOX	EACH
2504.602	— " CURB STOP & BOX	EACH
2504.602	ADJUST CURB BOX	EACH
2504.602	IRRIGATION SYSTEM REPAIR	EACH
2504.603	— " TYPE K COPPER PIPE	L F
2504.603	— " WATERMAIN DUCTILE IRON CL 52	L F
2504.603	— " PVC WATERMAIN	L F
2504.603	— " STEEL CASING PIPE	L F
2504.604	4" POLYSTYRENE INSULATION	S Y
2504.608	DUCTILE IRON FITTINGS	LB

2506 (CEAM 2621) MANHOLES AND CATCH BASINS

The provisions of MnDOT 2506 shall apply, in addition to the provisions of CEAM 2621, Sanitary Sewer and Storm Sewer Installation, which are modified and/or supplemented as follows:

2506.2 (CEAM 2621.2) MATERIALS

The provisions of CEAM 2621.2 are modified and/or supplemented with the following:

B. Metal Sewer Castings

Metal Sewer Castings shall conform to the Standard Detail Plates. All castings shall be Class 35B or better, in accordance with MnDOT 3321. The words "SANITARY SEWER" or "STORM SEWER" shall be cast on top of each manhole cover in 2 inch letters as applicable. . Except as directed on the plans, all castings shall be used for the following situations:

1. Type B618 and D412 curb storm sewer casting shall be Neenah R-3067-V or approved equal, or as specified by the Engineer in the casting tabulation for the project.
2. In roads, concrete walks, and bituminous paths, storm and sanitary sewer casting shall be Neenah R-1642 with two pick holes or Engineer approved equal.

C. Precast Concrete Manhole and Catch Basin Sections

Manholes and catch basins shall conform to the Standard Detail Plates. Steps shall be manufactured from hi-test metal having a minimum tensile strength of 35,000 psi. Steps are required in sanitary sewer and storm sewer manholes.

Delete CEAM 2621.2.C, Item 3 and replace with the following:

- (3) Sanitary sewer inlet and outlet pipes shall be joined to the manhole with a watertight joint consisting of a rubber boot with a non-magnetic, corrosion resistant steel coupling band or equal.

Add the following new item to CEAM 2621.2.C:

- (7) The base of sanitary manholes shall be cast integral with the bottom section of the manhole unless noted otherwise.

Precast Segmental Block is not allowed.

Add the following new paragraph to CEAM 2621.2:

F. Chimney Seal

The adjusting rings and castings of each sanitary sewer and storm sewer manhole located within the project area shall be sealed with external chimney seal, Infi-Shield, Gator Wrap, or approved equal, meeting the material and installation requirements of the manufacturer.

The seal shall be made of ethylene propylene diene monomer (EPDM) rubber with a minimum thickness of 50 mils. The seal shall meet the requirements of ASTM C-433, F-411, and C-923.

Each band shall have a 2-inch (2") mastic strip on the top and bottom edge. The mastic shall be non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole and over the lip of the casing.

An inspection tab shall be secured to the top of the casting frame. If metal casting adjustments are utilized, the inspection tab may be removed after approval from the Engineer.

All sanitary sewer structures and storm sewer manholes shall be sealed with an internal molded polymer shield, such as the "I/I Barrier" manufactured by Strike Products, Flex Seal, or approved equal.

2506.3 (CEAM 2621.3) CONSTRUCTION REQUIREMENTS

The provisions of CEAM 2621.3 are modified and/or supplemented with the following:
The provisions of CEAM 2621.3 are modified and/or supplemented with the following:

C. Appurtenance Installations

It is the Contractor's responsibility to verify the type and quantity of casting assemblies prior to ordering materials.

All frame and ring castings within the roadway shall initially be adjusted to 1/2 in below the interim

bituminous surface elevation prior to the suspension of construction operations for the winter in the water main replacement areas, where the final wear course shall not be paved until the following construction season.

During all casting adjustment activities, the Contractor shall place traffic cones or other traffic control devices to direct traffic around the castings being adjusted.

Castings shall have no more than six (6) or less than two (2) adjusting rings at the final elevation. The maximum height of all adjusting rings and mortar/sealing compound shall not exceed 12 inches (12"). The use of shims to level adjusting rings shall not be allowed.

The final surface elevation of the frame or ring casting shall be 1/2 in below the adjacent pavement surface elevation and at-grade in turf areas unless noted otherwise.

Frame and ring castings within curbs shall be encased in a minimum of 4 in thick concrete around the outside of the adjustment rings. Rim elevations shall be set to correspond with the depressed curb as detailed in the Plans.

The rims shall be set to final grade by utilizing a manhole riser ring installation. The manhole riser ring installation shall be as per manufacturer's recommendations.

If the Contractor is unable to adjust the frame and ring casting using ductile iron adjusting rings then the Contractor shall adjust the entire existing frame and ring casting at no additional cost. This shall include all necessary pavement removal, saw cutting, bituminous patching, bituminous tack coat, and concrete adjusting rings as required to adjust each casting.

Concrete adjusting rings, when used at the direction of the Engineer, shall be reinforced rings manufactured for the specific purpose as use for adjusting frame and ring castings. The diameter or rectangular dimension shall conform to the type of casting on the structure.

Frame and ring castings shall be set to the designated elevation in a full bed of mortar. Mortar between the rings shall be one-half inch (1/2").

Add the following new paragraph to CEAM 2621.3.B:

C1. Chimney Seal

All chimney seal installation shall be performed in accordance with the manufacturer's recommendations. The Contractor shall be required to perform the installation of the first chimney seal in the presence of the Engineer to verify that the installation is acceptable and in accordance with the manufacturer's recommendations.

D. Manhole and Catch Basin Structures

For shallow structures, the Contractor may furnish precast structures with additional depth as necessary for pre casting, not to exceed a maximum of 2 ft deeper than the plan design build. The additional depth of manhole shall be filled with grout to match elevations of proposed pipe inverts.

Compaction around manholes and all structures within the street shall meet the 100 percent Standard Proctor Density requirement in the upper 3 feet. J-tampers and other smaller compacting equipment shall be used to accomplish the compaction requirements

Steps shall be aligned over the downstream side of the manhole and be:

- 1 in plus or minus horizontal alignment
- 1 in plus or minus vertical alignment with 16 in spacing

Catch basins under curb and gutter shall be installed to an alignment deviation of less than 0.20 ft with the top slab centered over the base. Deviations greater than 0.2 ft shall be corrected by the Contractor by moving the base to its proper location. All grade stakes involved must be saved by the Contractor. If a catch basin location must be adjusted and the grade stake shows the Contractor to be in error or the grade stake has been destroyed, the Contractor must make the correction at their expense.

All manholes must be protected or covered with plates, castings, or other approved materials at all times during construction to prevent sediment from entering the system. Sanitary manholes shall be covered to also prevent rainwater from entering the sanitary sewer system. This is included in the construction of the structure. **If a MPCA fine is issued to the Owner due to rain water infiltration of piped system, the contractor will be responsible to pay the per this contract.** This is included in the construction of the structure. A "Mirafi" or an Engineer approved equivalent fabric must be installed on all structures twenty-four (24) hours after being set or at the direction of the Engineer. No additional compensation allowed therefore.

When installing a new structure within an existing pipe network, the Contractor shall verify the structure location, invert elevation and line of any existing opening to ensure the installation of the proposed sewer facility can be constructed according to the plan requirements. The Contractor shall immediately inform the Engineer of any deviation from the plan requirements necessitated by existing conditions. The Contractor shall ensure that upon completion of the connection that the area of the connection be watertight. The Contractor shall ensure smooth even flow from the newly connected pipe to the invert of the existing structure.

The Contractor shall be held liable for any damage caused to the existing structure or any existing pipes due to negligence on the part of the Contractor. Replacement or repairing of any damage caused to existing facilities when ordered by the Project Representative or the Engineer shall be at the Contractor's own cost.

2506.4 (CEAM 2621.4) METHOD OF MEASUREMENT

The provisions of CEAM 2621.4 are modified and/or supplemented with the following:

Delete CEAM Paragraph 2621.4.B and replace with the following:

B. Manholes

Manholes will be measured by length in accordance with MnDOT 2506.4.A unless noted otherwise. Manhole lengths shall include depth of sumps.

Where manholes are measured by length, the casting assembly will be measured separately by each, in accordance with MnDOT 2506.4.C

Delete CEAM Paragraph 2621.4.C and replace with the following:

C. Catch Basins

Drainage structures of each design designation will be measured in accordance with MnDOT 2506.4.A unless noted otherwise.

In accordance with MnDOT 2506.4.C, where drainage structures are measured by length, the casting assembly will be measured separately by each. No separate measurement for casting assemblies will be made where drainage structures are measured as a unit.

H. Appurtenant Items

Chimney seals shall be measured by the number of each chimney seal provided and installed.

Add the following new paragraph to CEAM 2621.4:

I. Adjust Frame and Ring Casting

Measurement for adjustment of frame and ring castings shall be for existing castings that are adjusted in preparation for bituminous wear course placement or curb and gutter placement. Initial casting placement after base course construction, installation of new castings on catch basins or structures, or installation of any castings in areas outside of the bituminous roadway surface shall be considered included with the casting and/or manhole structure pay item.

2506.5 (CEAM 2621.5) BASIS OF PAYMENT

The provisions of CEAM 2621.5 are modified and/or supplemented with the following:

Add the following new paragraphs to CEAM 2621.5:

A. Casting Assembly

Payment for both sanitary sewer and storm sewer castings shall be made under the casting assembly pay item. This item shall include furnishing, installing, and adjusting each new casting assembly and be compensation in full for all materials, labor, and equipment required to set the furnished and install castings on new or existing structures to the required elevation for new pavement surface, including multiple adjustments to suit pavement lifts.

B. Chimney Seal

The bid unit price for chimney seal by the each shall be compensation in full for all materials, labor and equipment necessary to perform the work.

C. Construct Sanitary Manhole

The bid unit price for construct sanitary manhole by linear foot, shall be compensation in full for all materials, labor, equipment, casting adjustments, excavation, and backfilling necessary to install the manhole. A separate bid item shall be provided for the casting assembly.

D. Construct Drainage Structure

The bid unit price for construct drainage structure design special (2 ft x 3 ft) by each, shall be compensation in full for all materials, labor, equipment, casting, casting adjustments, base slab, excavation, and backfilling to install the catch basin. The casting assembly shall be considered included with the drainage structure.

The bid unit price for construct drainage structure by linear foot of each structure design and size, shall be compensation in full for all materials, labor, equipment, casting adjustments, base slab, excavation, and backfilling to install the drainage structure. A separate bid item shall be provided for the casting assembly.

No separate payment shall be made for connecting to a new drainage structure.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2506.502	CASTING ASSEMBLY	EACH
2506.502	ADJUST FRAME & RING CASTING	EACH
2506.503	CONST DRAINAGE STRUCTURE DESIGN SD-48	L F
2506.503	CONST DRAINAGE STRUCTURE DES 48-4020	L F
2506.602	CONST DRAINAGE STRUCTURE DESIGN SPEC (2'X3')	EACH

2506.602	CHIMNEY SEAL	EACH
2506.602	CASTING ASSEMBLY (SANITARY)	EACH
2506.602	RECONSTRUCT DRAINAGE STRUCTURE	EACH
2506.602	RECONSTRUCT MANHOLE (SANITARY)	EACH
2506.603	CONSTRUCT 48" DIA SANITARY MANHOLE	L F
2506.603	CONSTRUCT 8" OUTSIDE DROP	L F

2511 RIPRAP

The provisions of MnDOT 2511 are modified and/or supplemented with the following:

2511.2 MATERIALS

Add the following new paragraph to MnDOT 2511.3:

D. Geotextile Filter Material

Provide geotextile filter material, meeting the requirements of MnDOT 3733 and the following:

- (1) Type 3 for use under Class I and Class II random riprap;
- (2) Type 4 for use under Class III and Class IV random riprap and hand-placed riprap on slopes no steeper than 3:1, horizontal to vertical;
- (3) Type 7 for use under Class III and Class IV random riprap on slopes steeper than 3:1, horizontal to vertical, and under Class V random riprap.

2511.3 CONSTRUCTION REQUIREMENTS

Delete MnDOT 2511.3.F and replace with the following:

F. Quality Control (QC)

Refer to the requirements in the Schedule of Materials Control for Project specific requirements.

F.1 Gradation and Certification Requirements

For riprap meeting 3601.2.A and 3601.2.B test one gradation per year for each product using either:

- (1) FHWA Hydraulic Toolbox, Test method 5-692.212 in the Grading and Base Manual. Record and submit results using form G&B-108a, found on the MnDOT Grading and Base website,
- (2) WipFrag or an alternative image analysis software, approved by the Engineer. Record and submit test results using form G&B-108a, found on the MnDOT Grading and Base website, or
- (3) Wolman Count Method. Test method 5-692.211 in the Grading and Base Manual. Record and submit results using form G&B-108b, found on the MnDOT Grading and Base website.

Provide certification for each product, using Form G&B-104bb, and attach required test(s).

F.2 Carbonate Quarried Riprap

For riprap meeting MnDOT 3601.2.A and MnDOT 3601.2.B the supplier is required to have an approved QC Plan, prior to delivery of stone, when either of the following apply:

- (1) Quantities are greater than 100 cu. yds
- (2) Riprap is used for Bridge protection, as shown in the Plan

The Carbonate riprap QC Plan requirements are found on the MnDOT Geology Web page. Contact the MnDOT Geology Unit a minimum of 60 days prior to supplying riprap.

Provide certification, for each product, using Form G&B-104b, and attach required test(s).

F.3 Riprap meeting MnDOT 3601.2.C or 3601.2D, and 3601.2.E

Provide certification using Form G&B-104b, found on the MnDOT Grading and Base website.

Delete MnDOT 2511.3.G.1 and replace with the following:

G.1 Riprap meeting MnDOT 3601.2.A or 3601.2B

For gradation compliance the Engineer will visually inspect the riprap and perform the D85 test, test method 5-692.210, listed in the Grading and Base Manual and complete Form G&B-108a, found on the MnDOT Grading and Base website.

If the material fails to meet requirements based on the visual check or the D85 results, the Engineer will test the gradation using one of the following methods:

- (1) FHWA Hydraulic Toolbox, 5-692.212 test method, listed in the Grading and Base Manual and Form G&B-108a,
- (2) WipFrag or a similar image analysis software, as approved by the Engineer, and Form G&B-108a, or
- (3) The Wolman Count, 5-692.211 test method, listed in the Grading and Base Manual and Form G&B-108b.

2511.4 METHOD OF MEASUREMENT

Delete MnDOT 2511.4.B and replace with the following:

B. Filter Materials

No separate measurement shall be made for filter Materials or geotextile filter Material. Filter Materials shall be considered included with the installation of the riprap.

2511.5 BASIS OF PAYMENT

The bid unit price for riprap of each type and class includes the cost of providing the Materials, excavating, and preparing the foundations, placing the riprap stone, and providing and placing the filter Materials as required by the contract.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2511.507	RANDOM RIPRAP CLASS III	C Y

2521 WALKS

The provisions of MnDOT 2521 are modified and/or supplemented with the following:

2521.3 CONSTRUCTION REQUIREMENTS

Where private utilities are to be installed within the public right-of-way and drainage and utility easements, and are on the same side as the walk, the private utility work shall be coordinated with all applicable private utility companies such that all construction of private utilities will be completed prior to construction

of the walk. The Contractor shall be responsible for coordination with the private utilities, Engineer, and Owner to ensure that the private utilities are constructed prior to the walk. The Contractor shall give a minimum of two weeks notification to private utilities for the estimated completion date of curb, gutter, grading, and erosion control stabilization. No additional compensation from the Owner shall be provided to the Contractor for any claims of crews being delayed because of scheduling issues with private utility companies resulting from inadequate notification of curb, gutter, grading, and erosion control completion dates.

Add the following new paragraph to MnDOT 2521.3:

H. ADA Requirements (MnDOT Standard Plan Sheet No. 5-297-250)

H.1 Concrete Walk

The minimum continuous and unobstructed clear width of a Pedestrian Access Route (PAR) shall be 4.0 feet. All new or reconstructed sidewalk widths shall match or exceed in place sidewalk and in no case shall it be less than 5.0 feet in width except at locations where obstructions cannot be moved or at driveways where slopes exceed the maximum allowable grades. The cross slope of the sidewalk shall not exceed 2% and shall be measured across the entire surface width of the sidewalk. Curb ramps shall meet or exceed existing sidewalk widths and curb openings. Maintain a consistent flat smooth surface within the PAR.

Where sidewalk grade changes adjacent to fixed structures, the sidewalk shall be finished around these structures to the satisfaction of the Engineer.

Sawcut concrete curb ramp, sidewalk, and driveway contraction joints. Exceptions for tooling relief joints are allowed for large driveway placements, long sidewalk placements to prevent random cracks, and minor repairs. Obtain approval from the Engineer where tooling of contraction relief joints will occur.

Sawcut curb and gutter contraction joints within the PAR including contraction joints at zero-inch height curb locations.

Sawcut a visual joint at the top grade break of walkable flares to indicate a change in grade meeting MnDOT 2521.3.D, except the depth requirement is reduced to 1/4 inch.

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.

H.2 Grading

Fill sections shall be graded flush with the top of walk for a minimum 18 inches from the edge of walk at 2% slope and then down at a maximum 1:3 slope to existing terrain unless otherwise detailed in the Plan. Blend in the toe of fill slope and adjacent areas so as not to adversely affect drainage.

H.3 Landings

An initial landing is the first required landing of a pedestrian ramp. Form and place initial landings at the top of a ramped sloped surface (>2% longitudinal slope), with an independent concrete pour unless the initial landing is located 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.

Construct initial landings in a single concrete placement, whenever possible, as a single plane surface having no grade breaks. If single concrete placement is not possible, follow the requirements for tie bar placement in accordance with the details shown in Standard Plan 5-

297.250 Sheet 6 of 6 and tie adjacent landings together. Keep architectural elements such as brick pavers or concrete stamping outside the curb ramps and curb ramp landings.

Cast in-place or drill and grout tie bars will be required in accordance with the details shown in Standard Plan 5-297.250 Sheet 6 of 6. If cast in place, install tie bars through holes in the forms, with a form height at least equal to the walk thickness of the formed concrete shown in the Plans. These bars shall be deformed and shall be installed with 2" minimum concrete cover.

All necessary subgrade preparation and aggregate base placement for the entire ramp construction limit shall be done before the initial landing is constructed.

2521.5 BASIS OF PAYMENT

Delete Mn2521.5.A in its entirety.

Reinforcement bars for pedestrian curb ramps shall be included in the Bid Unit Price for the Concrete Walk.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2521.518	4" CONCRETE WALK	S F
2521.518	6" CONCRETE WALK	S F

2531 CONCRETE CURBING

The provisions of MnDOT 2531 are modified and/or supplemented with the following:

2531.1 DESCRIPTION

This work also consists of furnishing and installing Truncated Dome Systems at pedestrian curb ramps in compliance with the Public Rights-of-Way Accessibility Guidelines (PROWAG).

2531.2 MATERIALS

Add the following new paragraph to MnDOT 2531.2:

G. Truncated Domes

The Contractor, with approval of the Engineer, shall select a truncated dome product from the Approved/Qualified Products List.

2531.3 CONSTRUCTION REQUIREMENTS

C. Placing and Finishing Concrete

For concrete curb and gutter, including curb fill-ins, mechanical vibration of the concrete will be required to produce a smooth curb face. Contractor to stamp an "S" for sanitary sewer services and a "W" for water services in the top of the curb where services cross under the curb.

D. Slipform Machine Placement

Where existing driveways are being protected, or do not need to be removed, the Contractor shall hand pour the concrete curb along these driveways. No additional compensation will be granted the Contractor for this work.

L. Backfill Construction

Backfilling of the curb and gutter shall be completed prior to bituminous surfacing of the roadway.

M. Workmanship and Finish

Unacceptable work shall be removed and replaced with acceptable work as ordered by the Engineer.

Add the following new paragraph to MnDOT 2531.3:

N. Truncated Domes

Firmly press truncated domes into concrete filling the vent holes on the truncated dome plates.

Obtain Engineer's approval prior to cutting truncated domes. Minimum cut section surface area is two square feet. Grind cut edges smooth. A maximum of one cut section is allowed per pedestrian ramp. Coated colored truncated domes shall not be cut.

Screed the surrounding concrete finishing flush with the truncated dome plate edge. The maximum surface deviation is 3/16 inches. Provide a 3 inch minimum concrete border around the edges of the truncated domes.

Contractor shall modify the curb line radius in accordance with MnDOT Standard Plan 5-297-250 and may adjust the zero-length height curb locations up to 6 inches laterally if radial dome sections are used.

Add the following new paragraph to MnDOT 2531.3:

K. ADA Requirements (MnDOT Standard Plan Sheet No. 5-297-250)

K1. Concrete Curb and Gutter

Construct curb and gutter to meet the details in the Plan. When machine placed, the gutter inslope shall be poured at 3% inflow around the radius or at a minimum distance of 10 feet from any zero-height curb section. Construct the gutter inslope and transitions as detailed in the Plans. Modify the proposed gutter width to not protrude into the adjacent travel.

Leave a minimum 3 feet of in place curb and gutter between an existing joint and the saw cut. If the 3 foot minimum cannot be maintained, place the saw cut over the existing joint. Install epoxy coated reinforcement bars per Standard Plans 5-297.250 (Sheet 6 of 6) if construction joints are utilized within a quadrant radius.

Form, at a minimum, the top 1.5 inches of the gutter face (front of gutter). The existing roadway edge is not to be used 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 ramp exceeds 2.0% slope, adjust the flow line to 2% or less if feasible while following the roadway criteria as per Standard Plans 5-297.250 (Sheet 6 of 6). The bituminous patch in front of the truncated domes should be 1% minimum to 5% maximum slope 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%.

Drainage patterns shall not be altered unless called for in the Plans or approved by the Engineer.

Construct a contraction joint through the curb and gutter section where the curb height equals zero inches. If any curb and gutter joints fall within the Pedestrian Access Route (PAR), meet the requirements of MnDOT 2521.3.C.

When constructing directional curb where truncated domes are perpendicular to the path of travel, the triangular concrete area between the grade break/edge of truncated domes and the gutter face (front face of gutter) shall be constructed integral.

2531.4 METHOD OF MEASUREMENT

A. Length

Concrete valley gutter shall be measured per linear foot installed as measured through the flow line. No separate measurement shall be taken for any apron space necessary to connect the valley gutter to the adjacent curb and gutter.

B. Area

The Engineer will measure the area of square or rectangular truncated dome areas along the edge and radial truncated domes along the long chord multiplied by two.

2531.5 BASIS OF PAYMENT

Delete MnDOT 2531.5.A in its entirety.

Payment for concrete curb and gutter shall be limited to 80 percent of the actual footage installed until all curbing has been backfilled and topsoil placed.

Aggregate base material and excavation required beneath concrete driveway pavement shall be considered included in the cost of the concrete driveway pavement.

The Contract unit prices for Truncated Domes shall be compensation in full for equipment, labor and materials required to complete the Work.

B. Schedule

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2531.503	CONCRETE CURB & GUTTER DESIGN _____	L F
2531.504	6" CONCRETE DRIVEWAY PAVEMENT	S Y
2531.601	ADA COMPLIANCE SUPERVISOR	LS
2531.603	CONCRETE CURB & GUTTER DES SURMOUNTABLE	L F
2531.603	CONCRETE RIBBON CURB	L F
2531.603	7" CONCRETE VALLEY GUTTER	L F
2531.618	TRUNCATED DOMES	S F

2540 MAIL BOX

2540.1 DESCRIPTION

The provisions herein shall be applicable to all labor, materials, and equipment associated with managing and maintaining mail service for the duration of the project as herein.

2540.2 MATERIALS

When new mail boxes or standards are required, the design (size, color, material, etc.) of the mail box and standard shall be approved by the Owner prior to installation.

2540.3 CONSTRUCTION REQUIREMENTS

The Contractor shall be required to carefully remove each existing mail box and standard as necessary for construction (including any attached distribution box and/or sign). The mail box and standard shall be delivered to the homeowner for storage during construction. During construction, the Contractor shall furnish temporary mail boxes for all residents at an accessible location for interim mail delivery as approved by the Postmaster. Each box shall be clearly labeled and mounted on a stable standard. Upon completion of construction, the Contractor shall be required to reinstall the original box and standard as directed by the Engineer. There shall be no interruption of mail delivery.

Temporarily relocate the mail boxes in collaboration with the Engineer and the Post Office.

If the existing mail box or standard is in such a condition that removal and reinstallation is not feasible, the homeowner shall be provided a new mail box or standard for installation by the Contractor as directed by the Engineer. The Contractor may request to be relieved of their responsibility for reinstallation by the Engineer, and notification of such relief of responsibility shall only be granted in writing from the Engineer.

In rural areas when addresses are removed with mail boxes, or in any situation when temporary addresses are required, the Contractor shall provide reflective address labels visible for emergency vehicles.

If a concrete base existed prior to construction, a new concrete base shall be installed for the mail box support. The bid item for new mail box support shall include the placement of concrete at the support base.

2540.4 METHOD OF MEASUREMENT

A. Temporary Mail Box

Measurement for temporary mail box shall be per each temporary mail box furnished and installed.

B. Mail Box

Measurement for mail box shall be per each new mail box furnished and installed, as directed by the Engineer.

C. Mail Box Support

Measurement for mail box support shall be per each new mail box support furnished and installed, as directed by the Engineer.

2540.5 BASIS OF PAYMENT

Payment shall be at the bid unit price per each temporary mail box. This shall include the salvage of existing mail box and standard, coordination of temporary mail delivery with the Postmaster, reinstallation of salvaged mail box and standard, and removal of temporary mail boxes as specified.

Payment shall be at the bid unit price per each mail box. This shall include furnishing and installing a new mail box, as directed by the Engineer. Disposal of the existing mail box which was unsuitable for reinstallation shall be at the Contractor's expense.

Payment shall be at the bid unit price per each mail box support. This shall include furnishing and installing a new mail box support, as directed by the Engineer. Disposal of the existing mail box support which was unsuitable for reinstallation shall be at the Contractor's expense.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2540.602	TEMPORARY MAIL BOX	EACH
2540.602	MAIL BOX	EACH
2540.602	MAIL BOX SUPPORT	EACH

2557 FENCING

The provisions of MnDOT 2557 are modified and/or supplemented with the following:

2557.4 METHOD OF MEASUREMENT

Add the following new paragraph to MnDOT 2557.4:

A. Repair Dog Fence

Measurement will be made of each underground fencing system (per parcel, lot or address) that is to be repaired. Additional compensation shall not be made for repairing the same underground fencing system on multiple occasions or at multiple locations on the same parcel, lot or address. If an underground fencing system is damaged causing the need for repair, repairs beyond the initial repair to that same system will be incidental. Use only an approved epoxy splice kit for underground wire repair. If damage occurs more than once along the property's street frontage, the entire front footage adjacent to the curb shall be replaced.

Compensation will not be made for damage to underground fencing systems that have been identified on the plans or in the field by the Engineer. It is the Contractor's responsibility to protect fencing systems previously identified at no additional compensation.

2557.5 BASIS OF PAYMENT

Add the following new paragraphs to MnDOT 2557.5:

A. Repair Dog Fence

Payment for Repair Dog Fence shall be compensation in full for all labor, materials, and equipment necessary to complete the specified work for the identified parcel, regardless of the number of locations or occasions that the identified system requires repair.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2557.602	REPAIR DOG FENCE	EACH

2563 TEMPORARY TRAFFIC MANAGEMENT

2563.1 DESCRIPTION

Furnish, install, maintain, and remove all traffic control devices required to provide safe movement of traffic and pedestrians through the Project at all times from commencement of the Work until project acceptance. Do not close streets or pedestrian facilities, except as authorized. The Engineer may modify the requirements for traffic control as deemed necessary.

All temporary traffic management must conform to and be installed in accordance with:

- the "Minnesota Manual on Uniform Traffic Control Devices" (MN MUTCD);
- the "Minnesota Temporary Traffic Control Field Manual" (Field Manual);
- the "Speed Limits in Work Zone Guidelines";

- the “Minnesota Flagging Handbook”;
- the “MnDOT Standard Signs and Markings Manual”;
- the Plan; and
- all applicable standard Specifications and Special Provisions.

Manuals listed above may be found at: <http://www.dot.state.mn.us/trafficeng/publ/index.html>.

2563.2 MATERIALS

A. Temporary Signs and Devices

Reflectorize all signs, paddles, and other traffic control devices including those used for daytime operations. Fabricate temporary rigid signs and devices with retroreflective sheeting material of the appropriate color listed on the Approved Products List (APL) for either “Sheeting for Rigid Temporary Work Zone Signs, Delineators, and Markers (Type IX and XI)” or “Sheeting for Rigid Permanent Signs, Delineators, and Markers (Type IX and XI)”. The sheeting Materials APL is located at the following link: <http://www.dot.state.mn.us/products/signing/sheeting.html>.

Inplace signs that still apply during temporary operations need no change in sign sheeting.

B. Vehicle Conspicuity Tape

The Approved Products List for “Conspicuity Vehicle Sheeting (Type VII)” is found at <http://www.dot.state.mn.us/products/signing/sheeting.html>.

C. Truck/Trailer Mounted Attenuators

The Approved Products List for “Mobile Crash Attenuators” is found at: <http://www.dot.state.mn.us/products/temporarytrafficcontrol/mobilecrashattenuators.html>.

D. Drum Sheeting

On Projects requiring drums per MnDOT Standard Plate 8000 (Channelizers – Type B), provide all drums with six inch fluorescent orange and white sheeting material with no gap between sheeting layers.

E. Crashworthy Signs, Traffic Control Devices, and Ballast

Signs and traffic control devices must meet the crash testing requirements of the AASHTO Manual for Assessing Safety Hardware 2016 (MASH-16). The Owner may require a letter of compliance stating that all signs and traffic control devices comply with MASH-16 requirements. The Letter of Compliance must include drawings of the different signs and devices along with a copy of the FHWA issued Letter of Eligibility or MnDOT MASH Crashworthy Evaluation.

See MnDOT Technical Memorandum No. 19-03-T-01 for information and timelines on the allowable use of crashworthy devices tested under NCHRP-350. <https://techmemos.dot.state.mn.us/techmemo.aspx>.

The approved ballast system for signs and devices mounted on temporary portable supports is sandbags, unless it is designed, crash tested, and approved for the specific device. Add a deicer during freezing conditions to prevent the sand from freezing. Place sandbags at the base of the sign or traffic control device. Do not use any ballast that causes a sign or traffic control device to become hazardous to motorists or workers.

2563.3 CONSTRUCTION REQUIREMENTS

A. Traffic Control Plan, Maintenance, and Inspection

Submit a proposed traffic control plan to the Engineer for acceptance, at least seven days before implementation. If Field Manual layouts are used, specify layout number(s) but do not submit the layouts from the Field Manual. Do not implement the proposed traffic control until accepted by the Engineer.

Immediately repair or replace all traffic control devices that become damaged, moved, or destroyed, and all ballasts that are damaged, destroyed, or otherwise fail to stabilize the device.

Meet the traffic control device quality standards as required in the Field Manual. Immediately replace unacceptable traffic control devices. Signs that are dirty and result in a noticeable loss of reflectivity at night are considered unacceptable and must be cleaned or replaced. Respond promptly to any call from the Engineer concerning the notification of unacceptable traffic control devices.

Provide the names, address, and phone numbers of at least two individuals responsible for placing and maintaining traffic control devices to the Engineer at the Pre-construction Conference. These individuals will be "on call" 24 hours per day, seven days per week during the times any temporary traffic control devices are in place.

Inspect all traffic control devices daily, including one nighttime inspection per week. Verify that the devices are placed in accordance with the Traffic Control Plan, these Special Provisions, and the MN MUTCD. Immediately correct discrepancies between the actual placement and the required placement. Respond immediately to any call from the Engineer concerning any request for improving or corrective traffic control devices.

B. Traffic Control Signs and Devices

The Engineer may require extra traffic control devices in addition to the traffic control devices shown on the Plan or in the Field Manual.

Roll-up signs are not allowed unless authorized by the Engineer.

Cover, modify, or remove all signs that are not consistent with traffic operations. Cover the entire sign or that part of the legend that is inappropriate. Sign covers must conform to the Typical Temporary Sign Covering Detail Sheet found in the Plan or at the following link:

<http://www.dot.state.mn.us/trafficeng/workzone/wz-templates/pdf/layout%2020A.pdf>

Maintain street identification signage at all times. Signs may be installed on temporary supports if the permanent sign Structures are affected by operations. This is necessary to maintain the 911 emergency system.

Post mount all signs that will remain in the same location for more than 30 consecutive days. This does not include portable signs which are set up and taken down at the beginning and end of each Work shift.

When the proper location of a sign is on pavement, do not core through the surface. If there is a conflict with underground utilities, attempt to move the sign while maintaining its visibility to traffic. If it is not possible to drive posts into the ground, mount signs on portable supports as approved by the Engineer.

When signs are removed, the sign posts and stub posts must also be removed from the Right-of-way. Posts left in place for future use or removal at a later date must be properly delineated with tubular markers, flags, or other delineation as approved by the Engineer at no additional cost.

All in place signs and delineators that interfere with the Contractor's normal operation may be temporarily relocated by the Contractor at the direction of the Engineer. Store salvaged signs in such a manner as to protect the sign from scratching, fading, or other harmful effects until the signs are reinstalled. After completing work at each sign location, or at the direction of the Engineer, replace the signs as near to their original location as possible or to a location designated by the Engineer. Reinstall sign Structures according to the Type C & D Sign Structural Details Sheet located at the following link:

<http://www.dot.state.mn.us/trafficeng/signing/plansheets/groundmounted.pdf>

Signs and structures damaged by the Contractor shall be replaced at the Contractor's Expense.

C. Traffic Safety

Do not suspend material, equipment, tools or personnel over lanes or pedestrian facilities open to traffic.

Protect traffic and pedestrians from excavations, drop-offs, falling objects, splatter or other potential construction hazards.

Do not store Materials or Equipment in the Work zone clear zone unless approved by the Engineer. If Materials or Equipment must be stored within the Work zone clear zone, protect with temporary barrier. If the Engineer agrees that temporary barrier is not practical, delineate with Type B channelizers.

Do not park vehicles or construction Equipment in the clear zone or any location that obstructs traffic control devices. Workers are not allowed to park their private vehicles within the Project limits unless approved by the Engineer.

D. High Visibility Apparel

During night work or low light conditions, all workers must wear high visibility Class E long pants and retro-reflective headgear in addition to the ANSI Class 2 or 3 vest, shirt, or jacket.

All high visibility apparel must be worn in the manner for which it was designed. All apparel worn on the torso must be closed in the front to provide 360-degree visibility. A worker's high visibility apparel must be removed from service and replaced if it becomes faded, worn, torn, dirty, or defaced, reducing the conspicuity of the apparel.

E. Night Work

Night work is not permitted on this project without prior approval of the Engineer.

F. Vehicle Warning Light Specification

All vehicles and Equipment operating in the Right-of-way must have operable warning lights that are amber in color and meet the appropriate SAE specification. The SAE specification requirements are as follows:

- Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles – SAE Specification J845.
- Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles – SAE Specification J595.

Details on SAE Specification can be found at: <http://www.dot.state.mn.us/const/wzs/lighting.html>.

G. Lane Closure Requirements

Temporary lane closures or other traffic restrictions by the Contractor, during work hours and consistent with any time restrictions, will be permitted only during those hours and at those locations approved by the Engineer. Request temporary lane closures at least two Business Days prior to the closure.

Temporary lane closures will be permitted in accordance with the hours and number of lanes allowed as indicated in the Metro Lane Closure Manual; <http://www.dot.state.mn.us/metro/trafficeng/laneclosure/index.html>. Lane closures that cross segments as defined in the Manual shall follow the more restrictive limits.

Place traffic control devices in any temporary lane closure that is adjacent to traffic and extends beyond 1000 feet as shown on Layout 61 of the Field Manual. When the lane closure is in place three days or longer, use only Type III barricades.

Use Drum Channelizers in all lane closure tapers and in any shifts in traffic alignment.

Maintain a minimum of two miles between temporary lane closures.

Temporary lane closures will not be permitted during inclement weather, nor any other time when, in the opinion of the Engineer, the lane closure will be a greater than normal hazard to traffic.

H. Truck/Trailer Mounted Attenuators (TMAs) for Mobile/Short Duration Operations

Truck/Trailer Mounted Attenuators (TMAs) must be used on all shadow and protection vehicles operating totally or partially in a traffic lane if any temporary traffic control zone is defined as “Mobile/Short Duration” by the Field Manual. All references to “should” in the Field Manual in regards to TMA use for Mobile/Short Duration layouts are hereby changed to “shall.” This requirement applies to all operations utilizing Field Manual layouts 9, 12, 13, 36, 41, 49, 50, 51, 54, 55, 63, 76, 77, 78, and 79. Providing TMAs for “Mobile/Short Duration” work zones is incidental.

I. Flagging Operations

Flaggers must attend a training session taught by a MnDOT-Qualified Flagger Trainer. The trainer must have completed a “MnDOT Flagger Train the Trainer Session” within the last five years and be on file as a qualified Trainer with MnDOT. Provide all flaggers with the MnDOT Flagging Handbook. Flaggers must be in possession of the handbook while flagging on the Project. Furnish the signed “Checklist for Flagger Training” or “Flagger Qualification Card” to the Engineer any time a new flagger reports to work on the Project. The “Checklist for Flagger Training” and other forms and information is found at: <http://www.dot.state.mn.us/const/wzs/flagger.html>.

All signs associated with the flagging operation must be removed or covered when flagging operations are not present.

Coordinate the flagging operations in a manner that causes minimum delay to the traveling public.

J. Milling, Sealcoating, and Paving Operations

Traffic will be allowed on the milled surface.

When traffic is allowed to drive on the milled and newly paved surfaces, install interim striping and provide appropriate warning signs such as “GROOVED PAVEMENT” and “BUMP” with “Advisory Speed” plaques as shown on Layouts 35 and 66 of the Field Manual.

Taper and/or chamfer any drop-off where traffic will cross from or to the in-place surface, or from or to the milled surface, so as to provide the safe passage of traffic.

Schedule construction operations to minimize traffic exposure to uneven lanes, milled edges, and edge drop-offs. If these conditions cannot be avoided, provide and maintain the appropriate traffic control in accordance with the “LONGITUDINAL DROP OFF GUIDELINES” in the Field Manual.

Do not mill any notches for surfacing tapers until immediately prior to paving. The Engineer may allow notches if temporary bituminous is installed and maintained to provide for the safe passage of traffic until the surfacing is completed. Constructing and milling tapers and/or chamfers is incidental.

Maintain traffic with a minimum of delay during milling and paving operations at intersections controlled by signals or by all-way stop signs.

Intersecting Streets, other than Intersections controlled by signals or all-way stop signs, may be closed during milling and paving operations in the Intersection if there are adequate alternate routes for the intersecting Street traffic. Do not close adjacent intersecting Streets to traffic concurrently. Notify the local Road authorities of the schedule to close intersecting Streets 48 hours in advance of the closure.

When traffic is allowed to drive on the sealed surface, provide and install "LOOSE GRAVEL" and "FRESH OIL" signs with "Advisory Speed" plaques as shown on Layouts 35 and 66 of the Field Manual.

K. Maintenance and Staging of Traffic Control

Pedestrian traffic must be maintained and guided through, or around, the Project at all times.

2563.4 METHOD OF MEASUREMENT

All traffic control required to complete the project as shown in the Plans and as specified will be made as a lump sum payment under item 2563.601 (Traffic Control). Payment includes all costs associated with furnishing, installing, maintaining, relocating and subsequently removing traffic control devices (including flaggers) as required. No additional measurement for payment will be made for individual activities and devices that constitute Traffic Control, except for other traffic control Bid items specifically listed on the Bid Form.

If the Contractor fails to properly provide, install, maintain, or remove any of the required traffic control devices, the Owner may correct the deficiency and deduct the costs from any moneys due or becoming due to the Contractor in accordance with the General Conditions.

2563.5 BASIS OF PAYMENT

Partial payments for lump sum item 2563.601 (Traffic Control) will be made as follows:

Table 2563.5-1 Traffic Control Partial Payments	
Percent of Original Contract Completed	Pay this Percentage of Traffic Control
5	50
10	75
50	95
All work completed and all traffic control removed	100

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2563.601	TRAFFIC CONTROL	LS

2564 TRAFFIC SIGNS AND DEVICES

The provisions of MnDOT 2564 are modified and/or supplemented with the following:

2564.3 CONSTRUCTION REQUIREMENTS

A. General

Unless designated otherwise, or directed by the Engineer, all existing sign panels removed shall be salvaged and delivered to the Owner.

The signing Contractor shall submit all street sign names to the Owner for review following the preconstruction conference prior to ordering the materials.

2564.5 BASIS OF PAYMENT

Add the following new paragraphs to MnDOT 2564.5:

A. Sign Panel Type Special

The bid unit price for each Sign Panel Type Special (street name sign) shall include the cost of providing and installing the sign panels, the sign post, brackets, and all mounting hardware necessary for sign panel attachment. Each installation of Sign Panel Type Special shall include two blades of each street name (four blades total.) Multiple sign panels may be installed on the same sign post as directed by the Engineer.

B. Install Salvaged Sign

The bid unit price for each salvaged sign to be reinstalled shall include the cost of re-installing the salvaged sign panels on a new sign post, using new brackets and mounting hardware. Multiple sign panels may be installed on the same sign post as directed by the Engineer.

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2564.518	SIGN PANELS TYPE C	S F
2564.602	SIGN PANELS TYPE SPECIAL	EACH
2564.602	INSTALL SALVAGED SIGN	EACH

2572 PROTECTION AND RESTORATION OF VEGETATION

The provisions of MnDOT 2572 are modified and/or supplemented with the following:

2572.3 CONSTRUCTION REQUIREMENTS

A. Protecting and Preserving

Any trees or shrubs not designated for removal shall be fully protected by the Contractor during construction. Any trees or shrubs removed or damaged by the Contractor, which were not designated for removal, will be replaced at the Contractor's expense.

2572.5 BASIS OF PAYMENT

All work under this section shall be considered incidental to the contract with no additional compensation allowed unless provided for in the Bid Form.

2573 STORM WATER MANAGEMENT

The provisions of MnDOT 2573 are modified and/or supplemented with the following:

2573.1 DESCRIPTION

The Contractor will be required to comply with NPDES General Storm Water Permit regulations to prevent erodible materials from leaving the site, even if such permit is not required due to the project scope, size or location.

2573.2 MATERIALS

BMP devices shall be a MnDOT approved product. The Contractor shall verify with the Engineer prior to installation that the proposed BMP device is suitable for prevention of soil and sediment erosion in the field.

2573.3 CONSTRUCTION REQUIREMENTS

A.5 Temporary Sediment Control Measures

All manholes shall be protected from surface water drainage. All storm sewer systems shall be protected from sedimentation, along with downstream ponding areas. All catch basins shall be protected with approved means of protection, immediately following construction.

M. Maintenance

The Contractor shall be responsible for the maintenance of all-temporary erosion and sediment control measures. These measures shall be repaired, replaced, or supplemented as set forth in the NPDES General Storm Water Permit.

If the Contractor fails to provide maintenance of the temporary erosion and sediment control measures as set forth in the NPDES permit requirements, the Engineer shall have the authority under the terms of this contract to hire the work done and deduct the costs incurred from the amounts due to the Contractor.

The Contractor shall be assessed liquidated damages for each specified area for which the Contractor has not installed or repaired erosion and sediment control devices (including sod) within 48 hours after receiving written notice.

2573.5 BASIS OF PAYMENT

H. Schedule

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2573.501	STABILIZED CONSTRUCTION EXIT	LS
2573.501	EROSION CONTROL SUPERVISOR	LS
2573.502	STORM DRAIN INLET PROTECTION	EACH
2573.502	CULVERT END CONTROLS	EACH
2573.503	SILT FENCE, TYPE ____	L F
2573.503	FLOTATION SILT CURTAIN TYPE ____ WATER	L F
2573.503	SEDIMENT CONTROL LOG TYPE ____	L F
2573.603	LINEAR SEDIMENT TRAP	L F

2574 SOIL PREPARATION

The provisions of MnDOT 2574 are modified and/or supplemented with the following:

2574.3 CONSTRUCTION REQUIREMENTS

C. Topsoil

The topsoil shall be free from roots, stick, chunks of miscellaneous debris, rocks larger than 1 in, and garbage. Topsoil placement shall be approved by the Engineer prior to installation.

2574.4 METHOD OF MEASUREMENT

E. Topsoil Borrow

Topsoil borrow shall be imported only at the direction of the Engineer. Load tickets will be required for payment.

2574.5 BASIS OF PAYMENT

B. Schedule

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2574.507	COMMON TOPSOIL BORROW	C Y
2574.508	FERTILIZER TYPE _____	LB

2575 ESTABLISHING TURF AND CONTROLLING EROSION

The provisions of MnDOT 2575 are modified and/or supplemented with the following:

2575.1 DESCRIPTION

All disturbed areas within the project shall be either seeded or sodded to an equal or better condition to that which was in place prior to construction and as directed by the Engineer. All exposed areas of the site shall receive seed and mulch, sod or rolled erosion prevention product within two weeks after final grade on slopes flatter than 1(V):3(H) and one week on slopes steeper than 1(V):3(H). Restoration may include areas outside of the construction limits as determined by the Engineer.

For City of Lino Lakes Native Plant Establishment Policy see section 2575.3 S below.

If bituminous base is placed, the final turf establishment shall be installed within two weeks of bituminous placement. Failure to install final turf establishment within two weeks of the bituminous base being placed will result in penalty of \$100 per calendar day to be deducted from any monies due or coming due to the Contractor.

All areas adjacent to the roadway disturbed by construction shall be excavated to a depth as specified to allow for placement of topsoil. The Contractor shall import topsoil as necessary to provide for a minimum depth of topsoil specified. All rock, Class 5, debris, and excess concrete shall be removed from the area behind the curb to the satisfaction of the Engineer prior to the placement of topsoil. The Contractor shall cut a clean, square edge and install sod or seed in areas as directed by the Engineer.

Where boulevard sodding is identified by the plans, sod shall be placed in the boulevard area adjacent to curb and gutter installation/replacement. A minimum of 4 ft and maximum of 6 ft of sod shall be placed along curb unless the extended area is directed by the Engineer.

2575.2 MATERIALS

C. Seeding

Unless otherwise specified in the plans, the seed mixture shall be MnDOT Mixture 25-151 at the rate specified.

C. Sod

Sod shall meet the requirements of either MnDOT 3878.2.A or MnDOT 3878.2.C. The sod type shall be a commercially produced Kentucky bluegrass blend, densely rooted and locally grown. Sod placed behind the curb shall be road salt tolerant.

F. Rolled Erosion Prevention Products

The Machine Direction (MD) Tensile Strength and TD Tensile Strength requirements of MnDOT Table 3885.2-1 and Table 3885.2-2 are modified as follows:

Machine Direction (MD) Tensile Strength, minimum (pounds per foot):

Category 10	Category 20	Category 30	Category 25	Category 35	Category 45
70	160	160	160	160	160

TD Tensile Strength, minimum (pounds per foot):

Category 10	Category 20	Category 30	Category 25	Category 35	Category 45
50	110	150	110	110	110

Natural Netting shall be used unless otherwise specified.

2575.3 CONSTRUCTION REQUIREMENTS

A. General

The Contractor is cautioned to salvage all available and suitable topsoil from the project site for spreading on areas to be restored.

Permanent turf establishment shall commence within seven days after finish grading has been completed, unless the NPDES permit requirements specify a more stringent timeline.

Delete MnDOT 2575.3.A.4 and replace with the following:

A.4 Substitutions

The Engineer may allow substitutions for the following Materials: plastic, geotextile, mulch, Rolled erosion prevention, and hydraulic erosion control products. The Engineer may authorize requested substitutions for specific locations shown in the Plan. Provide substitutions equal to or better than initially specified Material.

F. Placing Sod

In areas where there will be sidewalk construction, a bio-roll may be placed behind the back of curb until the sidewalk work is completed. The entire boulevard area must receive sod within two weeks following sidewalk construction. No additional compensation will be allowed for the additional mobilization required to complete the work as specified.

While laying or immediately after completing the sod placement on each area, the sod shall be watered and compressed into the underlying soil by rolling or tamping in the presence of the Engineer. If, after rolling, the surface of the sod is not free of bumps or depressions, the Contractor shall make suitable corrections to the topsoil and/or subgrade, replace the sod and roll the sod at no additional cost to the Owner. New sod shall be level with existing adjacent sod and the thatch or base soil shall be approximately one inch below the top of adjacent curb, gravel shoulder, or sidewalk. The Engineer reserves the right to have sod re-laid in areas where this specification is not met without any cost to the Owner.

Leftover sod and topsoil material shall be removed from the street immediately after installation.

K.3 Seed

The Contractor shall be responsible for maintaining seeded areas until accepted by the Owner and the requirements of MnDOT 2575.3.L are met. The Contractor shall be solely responsible for replacement and/or repair of any seeded areas that may wash out, erode, or fail to grow prior to acceptance with no additional compensation therefore.

Add the following new paragraph to MnDOT 2575.3:

R. Water (Turf Establishment)

Watering will become the responsibility of the homeowner only after the maintenance period has expired AND final acceptance of the turf has been obtained.

R.1 Sodded Areas

For sodded areas, the maintenance period, in accordance with MnDOT 2575.3.K.1 is 30 days. Sod shall be placed in accordance with MnDOT 2575.3.F and maintained in accordance with MnDOT 2575.3.K. The Engineer will accept sod in accordance with MnDOT 2575.3.N.

R.2 Seeded Areas

For seeded areas, the Engineer will accept the area after the perennial seed germinates, vegetation is at least 4 inches in height, and cover is uniform.

The Engineer may direct the Contractor to water portions of the project after final acceptance of the turf at the bid unit price. When so directed, the Contractor shall be responsible for notifying the Engineer, and keeping a log of watering hours and meter readings when they are on the project watering the turf establishment area.

For sod placed late enough in the season such that watering cannot be completed in the Phase year, the Engineering and the Contractor shall agree on a date as to when watering operations will cease in a specific Phase year, and again when they will resume in year following the Phase year, such that all sod placed in conjunction with the project will be watered for the required maintenance period.

S. City of Lino Lakes Native Plant Establishment Policy

The following shall apply for all native planting areas or open space areas, such as pond areas and wetland areas not identified through a mitigation plan, in the City of Lino Lakes:

Duration/ Acceptance

Maintenance for native planting areas shall be a minimum of three (3) years from the seeding date and meet the following performance standards:

Native vegetation cover:	No less than 70% absolute cover
Non-native vegetation cover:	No more than 15% absolute cover
Bare ground:	No more than 15% absolute cover
At least 50% of species listed in seed mix present.	

Vegetation Management Supervisor

Contractor or Developer to provide a Vegetation Management Supervisor to perform or oversee all work related to establishing native vegetation. This person must have:

1. At least a Bachelor's degree in Horticulture, Natural Resources Management, Conservation Biology, or a related discipline.

2. A minimum of three years of experience in ecological restoration, management of native vegetation, or similar work.
3. Persons performing herbicide applications must be State of Minnesota Department of Agriculture licensed pesticide applicators with Category J.
4. Documentation of education and licenses must be provided to the City of Lino Lakes.

Restoration Contractor/Vegetation Management Supervisor to review site preparation and seed bed preparation and work with developer to produce site conditions that are conducive to successful establishment of native plants.

Mulch should be Type 3, certified noxious weed free, as described in MnDOT Standard Specifications for Construction 3882.2. Tags for mulch must be provided to the City.

Watering will be the responsibility of the Contractor/Developer for the duration of the maintenance period.

City recommends that the Contractor/Developer establishes a fine for driving over seeded areas.

City will provide standard monitoring forms for Contractor/Developer use.

Monitoring

Site should be monitored and assessed by Vegetation Management Supervisor every 4-6 weeks of the growing season (May to October). Monitoring reports must be provided to the city within two weeks of the site visit associated with the report. These reports should reference areas as named in the final approved plans (i.e. ponding areas, outlots, etc.) and should include the following:

1. Dates and methods used for any work performed on the site, including site preparation, live plant installation, seed installation, stabilization/mulch types, watering, and any maintenance activities, such as mowing, herbicide application, or burning.
2. Seeding dates, labels, rates, and total quantities of seed installed.
3. Issues and problem areas related to Minnesota Department of Agriculture listed noxious weeds, as well as any other non-native and/or invasive weeds. Weed infestations greater than one-quarter acre and 50% relative plan cover should be indicated on provided maps.
4. Herbicide application forms, dates, and maps of areas treated.

Final Inspection and Approval

A vegetation assessment must be performed, at the Contractor's or Developer's expense, at the end of the three year maintenance period. This inspection should include separate lists of species present for each seeding area and see mix type, absolute cover and frequency of each species, and absolute cover of bare ground. Vegetation assessment should be performed with established vegetation sampling methods.

2575.5 BASIS OF PAYMENT

K. Schedule

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2575.504	SODDING TYPE LAWN	S Y
2574.504	ROLLED EROSION PREVENTION PRODUCT, CAT. ____	S Y
2575.504	RAPID STABILIZATION METHOD 4	S Y
2575.505	DISK ANCHORING	ACRE
2575.505	SEEDING	ACRE
2575.508	SEED MIXTURE 25-151	LB

2575.509	MULCH MATERIAL TYPE 1	TON
2575.523	WATER	MGAL
2575.523	RAPID STABILIZATION METHOD 3	MGAL

2582 PAVEMENT MARKINGS

The provisions of MnDOT 2582 are modified and/or supplemented with the following:

2582.1 DESCRIPTION

The Contractor shall be responsible for the layout of all temporary and permanent pavement markings (striping). The Owner will check and approve layout before application of pavement markings is allowed.

All striping shall be completed as soon as possible and within 48 hours after placement of the final lift (in accordance with manufacturers' requirements).

2582.2 MATERIALS

For pavement marking installations between the dates of October 15 and April 1, provide and use pavement marking materials listed on the Late Season pavement marking Materials Approved Products List.

All new development striping and pavement markings shall be multi comp with treated glass beads (GR IN). The provisions of MnDOT 2582 shall apply.

2582.3 CONSTRUCTION REQUIREMENTS

B. Application

The Engineer's involvement in the application of the material shall be limited to field consultation and inspection. The Contractor will place necessary 'spotting' at appropriate points to provide horizontal control for striping and to determine necessary starting and cutoff points. Longitudinal joints, pavement edges and existing marking may serve as horizontal control when so directed.

2582.5 BASIS OF PAYMENT

Layout is incidental with no additional compensation allowed therefore.

Delete MnDOT 2582.5.A in its entirety.

B. Schedule

Payment will be made based on the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2582.503	—" SOLID LINE PAINT	L F
2582.503	4" BROKEN LINE PAINT	L F
2582.503	4" DBLE SOLID LINE PAINT	L F
2582.503	—" SOLID LINE MULTI COMP	L F
2582.503	4" BROKEN LINE MULTI COMP	L F
2582.503	4" DBLE SOLID LINE MULTI COMP	L F
2582.518	PAVT MSSG PAINT	S F
2582.518	PAVT MSSG MULTI COMP	S F
2582.518	CROSSWALK PAINT	S F
2582.518	CROSSWALK MULTI COMP LTI COMP	S F

SANITARY SEWER LIFT STATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This specification applies to the construction of a new Sanitary Sewer Lift Station. The rehabilitation of existing facilities will require supplemental design and specification.
- B. The lift station work shall consist of furnishing all labor, materials, tools and equipment necessary to complete the Sanitary Sewer Lift Station and appurtenant work as specified herein and as shown on the plan sheets signed by a duly licensed professional engineer under the laws of the State of Minnesota.
- C. The Contractor will be responsible for constructing a new wet well and valve vault, installing a minimum of two (2) submersible pumps and one (1) submersible mixer in the new wet well, furnishing and installing piping, fittings, and valves in the wet well and valve vault, and furnishing and installing discharge piping, fittings and valves between the influent sanitary sewer and the new sanitary forcemain. The Contractor will also be responsible for furnishing and installing pumps, discharge connection elbows, guide rail systems, concrete slabs, transducer, floats, control panel, SCADA communication equipment, emergency power system, cable and conduit, and all necessary work for the construction of the fully functional pumping system. The completed lift station shall be operable at design flow and head conditions.
- D. The construction of the lift station's wet well, valve vault, discharge and forcemain piping, and influent piping may require dewatering. Dewatering is considered incidental to the work.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. A48 - Standard Specification for Gray Iron Castings
 - 2. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 3. A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - 4. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
 - 5. D2000 - Standard Classification System for Rubber Products
- B. Great Lakes - Upper Mississippi River Board (GLUMRB) Recommended Standards for Wastewater Facilities 2018 Edition (Ten States Standards)
- C. City of Lino Lakes General Specifications and Standard Detail Plates for Street and Utility Construction (City Standard Specifications)

1.03 DESIGN

- A. Flow and Head
 - 1. The design flow of the sanitary sewer lift station will be selected based on the ultimate (full build out) peak hourly flow projected for the lift station service area. Consideration shall be given to seasonal variations in flow when applicable.

2. For large service areas, portions or all of the lift station components may be designed and constructed in phases, as determined by the Engineer.
 3. Hydraulic analysis shall be completed to determine the total dynamic head (TDH) at the design flow based on the proposed wet well and discharge elevations and piping, fitting, and valve dimensions.
- B. Pumps
1. All sanitary sewer lift stations shall have at least two (2) submersible pumps.
 2. The firm capacity (capacity with the largest pump out of service) of the pumps shall equal or exceed the design flow at the design head conditions. Three or more pumps shall be considered when the design flow exceeds three hundred gallons per minute (300 gpm).
 3. If the raw wastewater received by the lift station will contain wipes, rags, or other fibrous materials, then the pumps shall be chopper type, specifically designed for pumping fibrous material. The pump type shall be confirmed with Owner and Engineer prior to pump selection.
- C. Wet Well
1. The wet well shall be a precast concrete manhole with a minimum inner diameter of ten feet (10').
 2. The wet well shall be sized to provide a minimum detention (storage) time of sixty (60) minutes at the design average flow rate. The Owner reserves the right to require additional detention time depending on the location and size of the lift station. The detention time in the wet well may be reduced if it can be demonstrated that detention time is provided in the upstream gravity sewers, subject to review and approval by the Owner and Engineer.
 3. The wet well shall be sized to provide a minimum active volume corresponding to a minimum cycle time of six minutes for pump sizes of 50 HP or less. For pumps larger than 50 HP, the cycle time and active volume shall be determined by the Engineer.
 4. Rectangular structures may be accepted in lieu of circular structures for larger lift stations, subject to review and approval by the Engineer.
 5. The stainless steel bird screen on the exterior opening of the wet well vent pipe shall be removable.
- D. Valve Vault
1. The valve vault shall be a precast concrete manhole with a minimum inner diameter of six feet (6').
 2. The wet well inner diameter shall be sized to contain access steps, discharge piping, bypass piping, check valves, gate valves, air release valves, and appurtenant valves with sufficient clearance for operation and maintenance.
 3. The valve vault shall be deep enough so that the discharge piping is below the frost line and has at least eighteen inches (18") clearance between the bottom pipe face and the floor of the structure.
 4. Rectangular structures may be accepted in lieu of circular structures for larger lift stations, subject to review and approval by the Engineer.
- E. Elevations
1. All ground elevations, structure base and slab elevations, concrete fill elevations, and piping invert or centerline elevations shall be shown on the drawings.
 2. The preliminary wet well control elevations shall be determined as described below and finalized in the field during start-up.
 - a. The high water alarm elevation shall be a minimum of twelve inches (12") below the lowest influent invert elevation, and it shall be low enough to provide the minimum detention time described above.
 - b. The lag pump on elevation shall be six inches (6") below the high water alarm elevation.

- c. The lead pump on elevation shall be six inches (6") below the lag pump on elevation.
- d. The pumps off elevation shall provide no less than the minimum active volume, as described above, between the lead pump on and pumps off elevations.
- e. The low water alarm elevation shall be six inches (6") below the pumps off elevation.
- f. The base elevation shall provide the minimum submergence of the pumps below the low water alarm elevation.

F. Structural

- 1. A project-specific Geotechnical Report shall be prepared by a duly licensed professional engineer under the laws of the State of Minnesota for each lift station project. The geotechnical investigation shall include, at a minimum, one (1) standard penetration test (SPT) boring at the wet well location and one (1) additional boring every two hundred feet (200') along the entire length of the forcemain, unless otherwise determined by the Engineer. The report shall include, at a minimum, discussion of procedures, site geology, subsurface soil conditions, strength characteristics, groundwater conditions, field boring logs, engineering analysis including allowable bearing capacity, and recommendations. The lift station structural design shall follow the findings and recommendations of the Geotechnical Report.
- 2. The lift station structures, including ballast if necessary, shall be designed to offset the buoyant force from groundwater. The groundwater elevation shall be assumed to be at the ground surface, unless another elevation is determined by the project-specific Geotechnical Report. The ratio of the total lift station weight, including soil in the case of an extended base, shall equal or exceed one and one half (1.5) times the buoyant force.

G. Forcemain

- 1. The forcemain diameter shall be determined as part of the hydraulic analysis. The diameter shall be a minimum of four inches (4"), unless chopper or grinder pumps are provided to reduce the size of solids. The diameter shall result in a minimum velocity of two feet per second (2 fps) at design pumping rate(s).
- 2. The discharge piping within and between the lift station structures shall be ductile iron pipe (DIP) as specified in Part 2.
- 3. The forcemain piping, beginning downstream and outside of the valve vault, shall be PVC or HDPE as specified in Part 2.
- 4. The quantity of buried pipe fittings between and downstream of the structures shall be minimized to the greatest extent feasible.

H. Electrical, Instrumentation and Control, SCADA

- 1. The electrical service, transfer switch, motor starters and disconnects, control panel, emergency power system, SCADA communication, connections, and appurtenant electrical work shall be designed by a duly licensed electrical professional engineer under the laws of the State of Minnesota.
- 2. The pumps shall be automatically controlled based on the water level in the wet well. Unless otherwise directed by the Owner, the primary control water levels shall be sensed by a submersible level transducer, and the backup high alarm and low alarm water levels shall be sensed by two (2) backup float switches.
- 3. Variable frequency drives (VFDs) shall be included when variable pumping rates are desired.
- 4. Unless otherwise directed by the Owner, the lift station shall include one (1) stationary, outdoor, natural gas engine-generator set and accessories. The generator manufacturer shall be Ziegler CAT, Cummins, or approved equal.

5. Unless otherwise directed by the Owner, automatic transfer equipment shall be included and compatible with the emergency power source. Manufacturer shall be ASCO or approved equal.
6. To maintain compatibility with the Owner's existing facilities and SCADA system, all instrumentation and control equipment and services shall be supplied by:
SyCom, Inc., 6710 Penn Ave. S., Richfield, MN 55423
Tim Kamrath: (612) 861-3451, tjk@sycom.us

1.04 SITE REQUIREMENTS

- A. Access
 1. The lift station shall include a fourteen-foot (14') wide bituminous driveway.
 2. The access driveway will include a commercial driveway apron with a ten-foot (10'-0") radius. Refer to the City Standard Detail Plates.
- B. Security
 1. All hatches and enclosures shall include padlock hasps for Owner-supplied padlocks.
 2. Fencing, gates, and lighting requirements shall be determined by the Owner according to individual site location and conditions.
- C. Bollards
 1. The control panel, generator, transformer, and any other aboveground electrical facilities shall be protected with bollards. The bollard locations shall be shown on the Site Plan.
 2. The bollards shall be eight-inch (8") diameter epoxy-coated steel pipe filled with concrete.
 3. The buried length shall be four feet (4'-0") minimum, and the aboveground length shall be four feet (4'-0"). The buried portion shall be encased in reinforced concrete. The aboveground portion shall have a Federal Safety Yellow plastic cover.
 4. The top of the bollard shall be domed, and the base shall slope away.
- D. Hydrant
 1. At least one water hydrant supplied by the municipal water system shall be located within fifty feet (50') of the center of the wet well.
- E. Restoration
 1. The lift station site shall be restored in accordance with the City Standard Specifications.

1.05 SUBMITTALS

- A. The following plans, at a minimum, shall be prepared by the Engineer and submitted for approval by Owner. Multiple plans may be included on one sheet when practical.
 1. Site Plan
 2. Above Grade Wet Well and Valve Vault Plan
 3. Sectional Wet Well and Valve Vault Plan
 4. Sectional Wet Well and Valve Vault Profile (one per pump/pipe size)
 5. Details (vent pipe, pipe seal, pipe support, anchors, concrete slab, bollard)
 6. Electrical Site Plan
 7. Electrical Section
 8. Electrical One-Line Diagram
 9. Electrical Details
- B. Shop drawings shall be submitted for approval by Engineer. Submit the following as a minimum for review:

1. Detailed specifications, dimensions, and weights of pumps, hatches, valves, piping, structures, manholes, helical piles, and other appurtenances.
 2. Buoyancy analysis.
 3. Typical installation guide.
 4. Access hatch drawings.
 5. Technical manuals.
 6. Parts list.
 7. Operation and Maintenance data.
- C. Work shall not begin until all the submittals have been received and approved by the Owner. The Contractor shall allow the Owner a reasonable time to review, comment, and return the submittal package after a complete set has been received. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE STRUCTURES

- A. The wet well and valve vault structures shall be constructed of Class I precast reinforced concrete with R4 joints, as shown on the detail drawings, and in accordance with the approved shop drawings. The concrete mix shall be Type I or II cement with C3A content less than 8 percent (Sulfate resistant) with entrained air content of not less than 4 percent and not more than 7 percent, Grade A concrete with a cement water ratio of 0.50 and a minimum compressive strength of 4,000 psi at 28 days. Precast structures shall have attained the specified design strength when delivered to the project site.
- B. The top slab of the structures shall be Type II precast reinforced concrete having the dimensions shown on the detail drawings and in accordance with the approved shop drawings. Frames for access hatches and vent pipe shall be cast in the slab when fabricated. Cut-outs to accommodate all piping entering the wet well shall be performed or pre-cut and provided with a seal or water stop to ensure a watertight connection between pipe and structure. The type of seal proposed shall be submitted to the Engineer for approval before installation of the wet well is undertaken. Top slabs shall be designed for a minimum three hundred pounds per square foot (300 psf) live load.
- C. Joints between barrel riser sections and top slab shall be sealed with two strips of flexible bitumastic preformed joint compound.

2.02 PUMPS

- A. Pumps
Contractor shall furnish and install a minimum of two (2) submersible pumps. The motors shall be non-overloading at any point on the pump curve. The pumping units shall be rated for continuous duty. Pumps shall operate at the design flow rate and total dynamic head (TDH) determined by the Engineer. Pump manufacturer shall be Flygt, Hydromatic, Myers, or approved equal.
- B. Pump Design
1. Pumps shall be centrifugal, non-clog, solids handling, submersible, explosion proof wastewater type pumps capable of handling raw unscreened wastewater and passing a three-inch diameter solid sphere. The pump casing shall have a centerline discharge equipped with an automatic pipe coupling arrangement for ease of installation and piping alignment. The pumps shall automatically connect to the discharge piping when lowered into position. The pumps shall be easily removable by one (1) operator with a portable hoist for inspection or service,

- requiring no bolts, nuts, or other fasteners to be removed for this purpose, and no need for personnel to enter the wet well.
2. If the raw wastewater received by the lift station will contain wipes, rags, or other fibrous materials, then the pumps shall be chopper type, specifically designed for pumping fibrous material. The pump type shall be confirmed with Owner and Engineer prior to pump selection.
 3. If variable pumping rates are desired, for example to accommodate phased development, then the pumps shall be variable speed with use of variable frequency drives (VFDs).
 4. The pump volute, motor, and seal housing shall be high quality grey cast iron, ASTM A48, Class 35B. Volute shall have integral spiral shaped cast grooves at the suction. All external mating surfaces shall be machined and Buna-N Rubber o-ring sealed. All fasteners exposed to the pumped liquids shall be 316 stainless steel.
 5. The pump lifting handle shall be stainless steel, type 304 or 316.
 6. The pump impellers shall be dynamically balanced, multi-vane, backswept, non-clogging design. The impeller shall be Cast Iron (ASTM A48, Class 35B), Hard Iron (ASTM A532), or Ductile Iron (ASTM A536). The impeller shall be coated with an abrasion resistant epoxy coating, Scotchkote or equal.
 7. A wear ring system shall be installed to provide efficient sealing between the volute and impeller. Replaceable metal wear rings shall have a Brinell hardness of 200 or more.
 8. The pump shaft shall be AISI Type 431 stainless steel. Pump shaft shall be extension of motor shaft.
 9. The pump shaft shall rotate on two (2) bearings. The pump bearings shall have a B10 bearing life of a minimum of 50,000 hours.
 10. The pump shall be provided with an oil chamber for the shaft sealing system. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside.
 11. The pump shall have an electrode probe mounted in the seal chamber. The probe shall be connected via a submersible cable to the control panel to alarm a seal failure when liquid is sensed, including a light in the control panel to notify the operator of a problem.
 12. The pump shall have two (2) mechanical seals mounted in tandem. Each seal shall be held in contact with its own spring. The lower of the tandem set of seals shall function as the primary barrier between the pumped liquid and the stator housing. This set shall consist of two (2) rings, both of which will be tungsten carbide. The upper of the tandem set of seals shall operate in an oil chamber located just below the stator housing. This set shall contain one (1) tungsten carbide ring and one (1) carbon ring that function as an independent secondary barrier between the pumped liquid and the stator housing.
 13. Protect all metal surfaces in contact with pumpage, other than stainless steel or brass, with a factory applied spray coating of exterior epoxy paint.

C. Pump Motors

1. The motors shall be submersible type that has been tested and approved by Factory Mutual and U.L. as explosion proof suitable for use in a Class I, Division I, and Group D explosion proof area. The motor stator rotor, and bearings shall be mounted in a sealed submersible housing. The stator windings shall have Class F or better insulation. Motors shall be equipped with thermal overload protection capable of resetting automatically after cool-down.
2. The pump and motor shall be designed so that they may operate partially or totally submerged in the water. The pump and motor shall be rated for continuous duty.
3. The motor stator shall be held in place by a removable end ring that may be easily removed in the field without the use of heat or a press. The electrical power cord shall be terminated in a terminal box, which is sealed on the top and

bottom to allow disconnection of the power leads without allowing moisture entry into the motor casing.

4. The power cable shall be sized according to NEC and ICEA standards and shall be of sufficient length to reach the terminal strips inside the control panel without any need for splices. The outer jacket of the cable shall be oil resistant chloroprene rubber. The motor and cable shall be capable of continuous submergence underwater without the loss of watertight integrity to a depth of sixty-five feet (65').
5. Motors shall be sized so they are not loaded above full-load rating at any point on the impeller operating curve. Operation in the motor "service factor" range is not acceptable.
6. Minimum motor efficiency shall be 0.83.
7. Motors shall be suitable for the type of power available at the site.

2.03 PUMP GUIDE RAILS, CABLE HOLDER, LIFTING CHAIN

- A. Lift stations shall be equipped with dual stainless steel guide rails to guide the pump into proper alignment with the discharge elbow. The guide rails shall extend from the discharge elbow to the upper guide holder at the access door. Guide rails shall be full length, single piece construction from the factory. Field welded guide rails shall not be acceptable. All guide rail piping and bracing inside the wet well structures shall be stainless steel. The guide rail diameter and guide rail bracing spacing shall be as recommended by the pump manufacturer. Intermediate guide rail braces shall be stainless steel.
- B. A 316 stainless steel cable holder shall be provided to support the cables.
- C. Each pump shall be equipped with a 316 stainless steel lifting chain long enough and strong enough to raise the pump for removal and inspection.
- D. All piping and bracing inside the wet well structure shall be stainless steel with the exception of the discharge pipe, discharge elbow, and drain line. Provide intermediate stainless steel support at intervals not to exceed 10 feet (10')

2.04 SUBMERSIBLE MIXER

- A. Submersible Mixer and Mounting System
 1. Contractor shall furnish and install one (1) submersible mixer in the wet well. The mixer shall be 0.5 HP minimum.
 2. Mixer motor shall be explosion proof, rated for continuous and intermittent duty, non-overloading throughout its full performance range, and equipped with thermal overload protection.
 3. Mixer bearings shall have a minimum bearing life of 50,000 hours.
 4. Mixer propeller shall be non-clogging with wide, thin, and smooth blades with backswept design.
 5. Mixer materials shall be stainless steel or ASTM A48 cast iron.
 6. Mixer shall include a stainless steel mounting system, lifting chain, and bow shackle. Mixer mounting angle shall be adjustable.
 7. Mixer manufacturer shall be Flygt, Hydromatic, Myers, or approved equal.

2.05 ACCESS HATCH

- A. Access Hatch
 1. Pump manufacturer shall verify access hatch size and location in top slab for clearance of pumps positioned as shown on the Drawings. Minimum clearance of three inches (3") required. Access hatch in the wet well shall be provided with safety grating.

2. Door leaves shall be minimum quarter-inch (1/4") thick aluminum, diamond pattern, rated for HS-20 wheel loading.
 3. Channel frame shall be minimum three-inch (3") welded aluminum with anchor flange around the perimeter.
 4. Each door leaf shall be equipped with heavy duty recessed hinges, totally enclosed spring or torsion bar operators as necessary for easy operation, drop handle, and automatic hold open arm with release handle. Locate hold open arm release handle such that it can be easily operated without endangering personnel.
 5. Maximum hatch opening force shall not exceed fifteen (15) pounds when applied perpendicularly to the hatch edge through any part of the hatch-operating arc.
 6. Each door leaf shall be secured with snap lock with removable handle and padlock hasp welded to each leaf and frame.
 7. Aluminum surfaces shall be mill finished. Apply bituminous paint to the exterior of the frame in contact with concrete.
 8. All mechanical fasteners and hardware shall be stainless steel.
 9. Approved Manufacturers: Halliday or Bilco.
- B. Safety Grating
1. The protective safety grating panel shall be supplied as part of each hatch and shall be one and one half inch (1-1/2") "I" bar aluminum grating with Safety Orange powder-coated finish.
 2. Grating shall be hinged and supplied with a positive latch to maintain unit in an upright position.
 3. Grating shall have a six inch (6") viewing area on each lateral unhinged side for visual observation and limited maintenance.
 4. Grating support ledges on three hundred pounds per square foot (300 psf) loaded access covers only shall incorporate nut rail with a minimum of four (4) stainless steel spring nuts.
 5. A padlock hasp for Owner-supplied padlock shall be provided.
 6. Approved Manufacturers: Halliday or Bilco.

2.06 PIPING AND VALVES

- A. Ductile Iron Pipe (DIP)
1. Ductile iron pipe shall conform to the requirements of ANSI A21.51 (AWWA C151) standard specification for centrifugally cast ductile iron pipe for water or other liquids.
 2. Ductile iron pipe in exterior locations shall be provided with flanged, or mechanical joint type ends as shown on the plans.
 3. Ductile iron pipe in interior locations shall be ANSI/AWWA thickness Class 53 minimum.
 4. Ductile iron flanges shall conform to ANSI/AWWA C115 standard 125# template and shall be rated for 250 psi. Mechanical joints and push-on joints shall conform to ANSI/AWWA C111 standard for rubber gasket joints for ductile iron and gray iron pressure pipe and fittings.
 5. Unless otherwise shown on the plans, ANSI/AWWA short-body ductile iron fittings shall be furnished. Short body fittings shall conform to ANSI/AWWA C110. Flanged long radius elbows, reducing on-the-run tees, side outlet fittings eccentric reducers and laterals shall conform to ANSI B16.1 standard specification for flanged fittings and flanges. All fittings shall be ductile iron. Compact fittings conforming to ANSI/AWWA C153/A21.53 may be supplied for mechanical and push-on joints.
 6. Ductile iron pipe and fittings shall be furnished with Protecto 401 Ceramic Epoxy Lining by U.S. Pipe or American Cast Iron Pipe Company (ACIPCO), or an approved equal. Pipe used for exposed interior locations shall not have a

- bituminous exterior coating but shall be furnished with a shop primed coating of Tnemec Primer, or equal, to facilitate painting as specified.
7. All bolts and fasteners shall be stainless steel.
- B. Polyvinyl Chloride (PVC) Pipe
1. PVC pipe shall be in accordance with the City Standard Specifications Section 2611.2.A2.
 2. Tracer wire shall be installed with all PVC forcemains in accordance with the City Standard Specifications.
- C. Polyethylene (PE) Pipe
1. PE pipe shall be in accordance with the City Standard Specifications Section 2611.2.A3.
 2. Tracer wire shall be installed with all PE forcemains in accordance with the City Standard Specifications.
- D. Swing Flex Check Valves
1. Check valves shall be of the swing-flex, full body flanged type, with domed access cover and only one moving part, the valve disc. Valves shall be capable of submerged service. All valves shall be of the same manufacture. Check valves to have a pressure rating of 150 psi minimum at 150° F.
 2. Valve body shall be cast iron ASTM A126, Class B. 100% pipe flow area, with no restrictions at any point through the valve. Seating surface at a 45° angle to minimize disc travel. Full size access port, allowing removal of the disc without removing the valve from the pipeline.
 3. The valve cover shall be cast iron ASTM A126, Class B, domed in shape, to allow the disc to fully open should waste solids collect behind the disc.
 4. The cover gasket shall be Lexide NK-511, and the cover bolts shall be stainless steel.
 5. The disc shall be Buna-N (NBR), ASTM D2000-BG, one-piece construction, compressed molded with an O-ring type sealing surface, containing steel and nylon reinforcements in both the pivot and central disc area. The disc shall be provided with non-slam closing characteristic through a short thirty-five degree (35°) disc stroke and a memory flex disc return action.
 6. Backflow capabilities shall be provided by means of an optional screw type backflow actuator. Actuator shall be field installable without modification to the valve or a need for special tools.
 7. Coating shall be ANSI/AWWA C550 epoxy coating, inside of body and cover. Manufacturer's standard exterior primer and finish coat shall be provided.
 8. Check valves shall be manufactured by Val-Matic (Series 500) or APCO (Series 100).
- E. Gate Valves
1. Valves three inches (3") and larger shall be resilient wedge gate valves conforming to AWWA C509.
 2. Valves shall be manufactured by American Flow Control or Mueller.
 3. Valve boxes shall be Tyler, 6860G with base or approved equal, screw type for five and one quarter inch (5¼") shaft, Buffalo type cast iron, American made. Cover to be Tyler drop lid marked with "Sewer" or equal. Box to be adjustable a minimum of six inches (6") up and down from the specified depth of pipe bury.
- F. Air Release Valves
1. General:
 - a. Air release valves, air/vacuum release valves and combination air valves shall conform to AWWA C512 and be manufactured by APCO Valve Corporation; Val-Matic, or equal.

- b. Body, cover, and baffle shall be cast or ductile iron. Fasteners, internal linkage, internal parts, floats, and float guide shall be stainless steel. Elastomers shall be Buna-N.
 - c. Valves shall be rated for an operating pressure of 150 psi.
 - d. All valves shall be furnished with an inlet shut-off ball valve. Discharge lines shall extend down to eighteen inches (18") above the floor.
 - e. Valves on sewage lines shall be equipped with backflushing attachments consisting of a 1-inch blowoff valve, 1-inch shut-off valve, quick disconnect coupling and a minimum of 6 feet of backflushing hose.
 - f. A pipe saddle shall be added if valve and pipe tap size required for flow condition are too large to allow adequate thread depth.
 - g. Venting rate and size for all valves shall be within the manufacturer's recommendations.
- 2. Air release valves shall allow entrained air in pipelines to escape through an air release orifice. After entrained air escapes, the valve orifice shall close by a needle mounted upon a compound lever mechanism actuated by a float. Air release shall remain closed until more air accumulates and the opening cycle is repeated. Sewage air release valves shall be APCO Series 400 SARV, Val-Matic Series 49A, or equal, with back flushing accessories.
 - 3. Air release/vacuum breaker valves shall exhaust air from piping upon pump startup and allow air to re-enter piping when pump shuts down. Equip with adjustable throttling device to regulate flow of air escaping during pump startup. Sewage air release/vacuum breaker valves shall be APCO Series 401 SAVV, Val-Matic Series 300, or equal, with back flushing accessories.
 - 4. Combination air valves shall be a single housing style that combines the operating features of both a vacuum and air release valve, as well as an air release valve when the system is under pressure. Sewage combination air valves shall be APCO Series 440 SCAV, Val-Matic Series 800, or equal, with back flushing accessories.

2.07 WALL SLEEVES AND SEALS

- A. Wall sleeves shall be heavy wall stainless steel pipe with continuous welded waterstop. Anchor waterstop collar shall have outside diameter four inches (4") greater than the outside diameter of wall sleeve.
- B. Wall seals shall be Link Seal as manufactured by Thunderline Corp., or equal.

2.08 PIPE SUPPORTS

- A. Steel Pipe Supports
 - 1. Pipe supports shall conform to the requirements of MSS SP-58, MSS SP-69 and MSS SP-89. Where pipe supports contact bare piping or in-line devices, provide supports of compatible material so that neither shall have a deteriorating action on the other.
 - 2. Pre-engineered support systems constructed of electrogalvanized steel products factory-fabricated by firms regularly engaged in the manufacture of these items shall be used for this work.
 - 3. Adjust support size and style to account for pipe insulation.
 - 4. Where needed, use stainless steel epoxy adhesive anchor bolts, Hilti injection adhesive anchors or equal, for building attachments.
 - 5. All meters, valves, equipment, and other point loads shall be independently supported to prevent undue pipe stress and failure. The piping shall support no meter, valve, or other equipment.
 - 6. All anchor bolts installed as part of a pipe support system, regardless of location or application, shall be manufactured of Type 316 Stainless Steel.

7. All hanger rods, bolts, u-bolts, turn buckles, aircraft cable, nuts, and washers shall be Type 316 stainless steel.
8. Unless otherwise indicated on the drawings, piping shall be supported at one and one half inch (1-1/2") out from the face of walls and at least three inches (3") below ceilings.
9. Unless specified to be fabricated of stainless steel, all fabricated pipe supports shall be blasted to a white clean condition after fabrication and hot-dip galvanized in accordance with ASTM A123.

2.09 ANCHOR BOLTS AND HARDWARE

- A. The Contractor shall furnish all necessary anchor bolts, washers, hex nuts, and gaskets as well as templates required for setting anchors. All anchor bolts, washers, and hex nuts shall be 316 stainless steel.

2.10 FOUNDATION MATERIALS

- A. Granular materials furnished for use in foundation, bedding, encasement, or backfill construction shall conform to the following requirements:
 1. Foundation material shall meet the requirements of MnDOT 3149.2H Coarse Filter Aggregate.
 2. Backfill material shall meet the requirements of MnDOT 3149.2B2 Select Granular Material.

2.11 FINISHES

- A. Products
 1. All paints and materials furnished shall be the standard product of a reputable manufacturer. The standard products of manufacturers other than that specified hereinafter as a descriptive standard will be accepted if they are equal in composition, durability, utility and in all other respects are equal for the purpose intended to those specified.
 2. All paint shall be delivered to the site of the work in unbroken containers. Each container shall show the name of the manufacturer, date of manufacture, the designated name of the paint or formula, the color, and any special instructions for mixing or application. All mixing and tinting will be done on the premises, and no material shall be reduced or changed, except as specified by the manufacturer. All paints shall be stored in a manner to prevent contamination of painting materials after containers are opened
 3. Paint and Coating Schedule:

ITEM	APPROVED MANUFACTURERS
Exposed pipe, valves, and fittings	Tnemec N140F Or Tnemec V140F Or Sherwin Williams Dura-Plate 235

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with the manufacturer's recommendations and as shown on the drawings. Coordinate access hatch and vent pipe locations and installation with wet well and valve vault precast concrete cover supplier.

3.02 WET WELL AND VALVE VAULT STRUCTURES

A. Excavation

1. Excavation consists of removal and disposal of excess material and unsuitable material encountered when establishing grade elevations. Remove unsuitable materials in accordance to the depth recommended by soils testing laboratory beneath structures to obtain the design bearing capacity.
 - a. Dewater excavations for special inspector to observe and determine excavation limits.
 - b. When bottoms of excavations are approved by soils testing laboratory but are slightly unstable only in relation to Contractor operations or convenience, Contractor may, with approval of Engineer, provide a compacted gravel course utilizing materials acceptable to the soil testing laboratory. Such work shall be considered as for the Contractor's convenience and at Contractor's own expense.
2. Slope sides of excavations as required to provide stability and to comply with Federal, State and Local laws and regulations. Shore and brace excavation to avoid wetland impacts and when required by project conditions.
 - a. Utilize cofferdams, steel sheet piling, shoring, underpinning, and other systems required to prevent damage to existing structures, settlement, slope stability problems, and undermining.
 - b. Remove construction related protection systems after their need is complete, in manner that will not loosen or damage soils, create slope stability problems, and otherwise damage existing and new structures. Leave construction-related protection systems in place subject to approval of Engineer, when their removal would create potential for damage to the soil conditions or to structures.
3. Excavate to required elevations and dimensions within a tolerance of plus or minus one tenth of a foot (0.10') and extending a sufficient distance as required to provide for the work, completion of the structures, observation, and testing.
 - a. When excavating for footings and foundations, do not disturb soil materials at and below excavation limits. Excavate by hand when necessary to prevent damage to soil materials that will remain.
 - b. Trim bottoms to required lines and grades to leave solid dense base of required bearing capacity.
 - c. Final removal limits shall be approved by soil testing laboratory prior to concrete placement.
4. Removal of materials beyond required subgrade elevations or dimensions without specific approval of soils testing laboratory as well as backfilling, compaction and remedial work recommended by soils testing laboratory at the over excavated area shall be at Contractor's own expense.
 - a. Under structures and their components fill unauthorized excavation utilizing one of the following systems and as acceptable to Engineer:
 - Extend indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.
 - Install lean concrete fill to bring elevations to required position.
 - Fill and compact unauthorized excavations with soil materials and to density required by Engineer.
 - b. Elsewhere, backfill and compact unauthorized excavations as indicated for authorized excavations of same classification.
5. Protect excavation bottoms from freezing. Remove frozen materials and provide unfrozen compacted materials acceptable to Engineer prior to placement of materials on them.

B. Filling, Backfilling, and Compacting

1. Surface compact excavations where noted, prior to installing fill material.

2. Proof roll subgrade areas, where noted with, as a minimum, a tandem axle dump truck loaded to at least twenty-five (25) ton weight. Truck shall traverse the structure footprint to detect areas of loose or soft soils. Loose or soft soils shall be defined as soils exhibiting "excessive rutting" from the truck tires (approximately one-inch (1") wheel rut depth).
3. Do not place fill required below structures until soil conditions encountered have been approved by special inspector.
4. Do not place material on muddy surfaces, frozen ground or on materials containing frost or ice.
5. Do not place material on or in water.
6. Do not proceed with backfilling of excavations until completion of the following:
 - a. Acceptance by Engineer of construction and structures below finish grade.
 - b. Observation, testing, approval, and recording of locations of underground utilities.
 - c. Removal of concrete formwork.
 - d. Removal of shoring, bracing, other protection systems, and backfilling and compaction of voids left by their removals.
 - e. Removal of unsuitable materials, construction related debris, and excess materials.
 - f. Walls, including interior walls that brace exterior walls and intermediate floors and roof construction is installed, cured, and obtained required twenty-eight (28) day compressive strength.
 - g. When existing in-place soil materials are of density less than that specified, but the soil material is acceptable to Engineer, perform removal, filling, disking of ground surface, moisture-conditioning to the optimum moisture content, and compact to provide specified density and bearing capacity as recommended by soils testing laboratory and acceptable to Engineer.
7. Placement and Compaction
 - a. Place materials in compacted layers of thickness required to obtain specified soil densities. Layers shall not exceed eight inches (8") or twelve inches (12") in loose depth for cohesive and cohesionless soil material, respectively, compacted by heavy compaction equipment and not more than four inches (4") or twelve inches (12") in loose depth for cohesive and cohesionless soil materials, respectively, compacted by hand operated tampers unless soil density tests substantiate specified densities will be obtained when material is placed in thicker lifts.
 - b. Place material in lifts uniformly to the same approximate elevation, not exceeding the final grade height, in manner required to prevent creation of unbalanced soil lateral pressures, wedging action of materials and soil pressures that exceed the design lateral soil conditions and to prevent damage to the structure.
 - c. Moisten or aerate each layer to the extent required to obtain the optimum moisture content required for the indicated compaction density. Prevent free water from appearing on surface during or subsequent to compaction operations.
 - d. Remove and replace with acceptable material or scarify and air dry otherwise acceptable soil material that is too wet to obtain specified soil density. Assist drying by disking, harrowing, or pulverizing, until moisture content is reduced to value required for compaction.
 - e. Compact each layer to the required density specified for each area classification. Hand tamp or utilize hand operated vibratory equipment when required to compact material placed immediately adjacent to walls.
 - f. Do not place additional layers until density of each layer in place complies with compaction requirements. Perform corrective work as required to obtain required density. Cost associated with correction work and retesting at failed test locations shall be at Contractor's expense.

- C. **Compaction Requirements**
 - 1. Compact material to provide the following minimum percentages of Standard Proctor Density, tested in accordance with ASTM D698, at the area classification indicated:
 - a. Under structures including footings, mat foundations, slabs-on-grade, and exterior equipment and piping support pads: one hundred percent (100%).
 - b. In backfill zones under piping areas within twenty feet (20') of outermost edge of structures: one hundred percent (100%). Refer to the City Standard Specifications for further piping area compaction requirements.
 - c. In backfill zones in upper three feet (3') under roadway and pavement subgrade: one hundred percent (100%)
 - d. In backfill zones not indicated above: ninety five percent (95%) unless otherwise indicated.
- D. The wet well and valve vault construction shall be completed in accordance with the plan sheets, standard details, and City Standard Specifications.

3.03 PROCESS PIPE INSTALLATION

- A. Piping shall be run as straight as practical along the alignment shown on the Drawings and with a minimum of joints. Piping and appurtenances shall be installed in conformance with reviewed shop Drawings and manufacturer's instructions. Piping shall be installed without springing or forcing the pipe.
- B. Thrust protection shall be provided as required. Flexible couplings shall be installed as connections to equipment, and where shown on the Drawings. Additional pipe anchors and flexible couplings beyond those shown on the Drawings shall be provided to facilitate piping installation, in accordance with reviewed shop drawings.
- C. Piping components and indicators shall be installed in accordance with manufacturer's instructions. Required upstream and downstream clearances, valves, and miscellaneous devices as shown on the Drawings shall be provided for an operable installation.
- D. Contractor shall provide materials and equipment necessary for the safe and timely installation of piping systems. Site shall be kept clean before, during and after pipe installation. Coordinate work with other trades.
- E. Clean pipe before installation. Foreign matter shall be removed prior to installation.
- F. **Pipe Supports and Anchors**
 - 1. Contractor shall provide hangers, supports, and anchors for adequate support and pipe restraint for pipe, joints, fittings, valves, etc.
 - 2. Do not support piping from other piping.
 - 3. Hangers, supports, and anchors shall be as indicated on the Drawings, and as required for compliance with MSS SP-69.
- G. **Pipe Flanges**
 - 1. Pipe flanges shall be set level, plumb, and aligned. Flanged fittings shall be installed true and perpendicular to the axis of the pipe. The bolt holes shall be concentric to the centerline of the pipe.
- H. **Wall Penetrations**
 - 1. Wall sleeves shall be securely supported by form work to prevent contact with reinforcing steel and tie wires.

3.04 BURIED PIPE INSTALLATION

A. Trench Excavation

1. Trench excavation shall be to a depth that will permit preparation of the foundation as specified and installation of the pipeline and appurtenances at the prescribed line and grade, except where alterations are specifically authorized. Trench widths 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 sheeting and shoring and to accommodate placement of appurtenances.
2. When unsuitable 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. Refill trench to trench bottom grade with concrete, gravel, or other approved suitable material to assure a suitable foundation.
3. Bottom trench widths shall allow for at least six inches (6") of clearance on each side of the joint hubs. The maximum allowable width of the trench at the top of pipe level shall be the outside diameter of the pipe plus two feet (2'), subject to the considerations for alternate pipe loading set forth below. The width of the trench at the ground surface shall be held to a minimum to prevent unnecessary disruption of the surface structures.
4. The maximum allowable trench width at the level of the top of pipe may be exceeded only by approval of the Engineer, after consideration of pipe strength and loading relationships. Alternate proposals made by the Contractor shall be in writing, giving the pertinent soil weight data and proposed pipe strength alternate, at least seven (7) days prior to the desired date of decision. Approval of alternate pipe designs shall be with the understanding that there will be no extra compensation allowed for increase in material or construction costs.
5. If the trench is excavated to a greater width than that authorized, the Engineer may direct the Contractor to provide a higher class of bedding and/or a higher strength pipe than that required by the Contract Documents in order to satisfy design requirements without additional compensation.
6. Cut soil true and even so barrel of pipe will have a bearing for the full length. Trenches shall be sufficiently straight between designated angle points to permit the pipe to be laid true to line in the approximate center of the trench.
7. Trench excavation shall be made by open cut. Trench sides shall be as vertical as possible and trench shall be so braced, sheeted, and drained that work may be performed safely therein.

B. Sheet piling and Bracing

1. Excavations shall be sheeted, shored, and braced as will meet all requirements of the applicable safety codes and regulations; comply with any specific requirements of the Contract; and prevent disturbance or settlement of adjacent surfaces, foundations, structures, utilities, and other properties. Any damage 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 sheeting, shoring, or bracing or through negligence or fault of the Contractor in any manner shall be repaired at the Contractor's expense and without delay.
2. The Contractor shall assume full responsibility for proper and adequate placement of sheeting, shoring, and bracing wherever and to such depths that soil stability may dictate the need for support to prevent displacement. Bracing, sheeting, and shoring 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.

3. Trench sheeting shall remain in place until pipe has been laid, tested for defects, and repaired if necessary, and the earth around it compacted in a minimum of one pass with vibrator equipment of a depth of one foot (1') over the top of the pipe. The sheeting, shoring, and bracing materials shall be removed only when and in such manner as will assure adequate protection of the in-place structures and prevent displacement of supported grounds. Sheeting and bracing shall be left in place only as required by the Contract Documents or ordered by Engineer. Otherwise, sheeting, and bracing may be removed as the backfilling reaches the level of respective support. Wherever sheeting and bracing is left in place, the upper portions shall be cut and removed to an elevation of three feet (3') or more below the established surface grade as the Engineer may direct.
- C. Pipe Bedding
1. Pipe shall be laid upon sound, granular material (minimum of six inches (6")), cut true and even so that the barrel of the pipe will have a bearing for its full length.
 2. If unstable material for bedding of pipe or trench backfill is encountered, notify the Engineer. Unstable material shall be removed and replaced with the foundation material specified herewith as may be ordered by the Engineer.
- D. Pipe Laying
1. Installation of pipe and fittings.
 - a. Installation of ductile-iron pipe and appurtenances shall conform to the requirements of AWWA C600 and the City Standard Specifications.
 2. Pipe shall be laid and maintained to the required line and grade.
 3. 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.
 4. While suspended and before being lowered into laying position, each pipe section and appurtenant unit shall be inspected by the Contractor to detect damage or unsound conditions that may need corrective action or be cause for rejection. Inspection procedures shall be approved by Engineer. The Contractor shall inform the Engineer of any defects discovered, and the Engineer will prescribe the required corrective actions or order rejection.
 5. 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.
 6. Trench excavation and bedding preparations shall proceed ahead of pipe placement as will permit proper placement and joining of pipe and fittings at the prescribed grade and alignment without unnecessary hindrance. All foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench, and they shall be kept clean by approved means during and after laying. The pipe 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.
 7. 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 adjoining unit.
 8. 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 connections, but they shall be no larger than necessary. No pipe material shall be laid in water nor when the trench or bedding conditions are otherwise unsuitable or improper.
 9. Unless otherwise permitted by Engineer, bell and spigot shall be laid with the bell ends facing upgrade and the laying shall start on the downgrade and proceed

upgrade. 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. Joint areas shall remain exposed and soil shall be prevented from entering the joint space until the joint seal is affected.

10. At all times when pipe laying is not in progress, including noon hour and overnight periods, all open ends of the pipe 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.
11. Wherever it is necessary to deflect ductile-iron pipe from a straight line either in the vertical or horizontal plane, to avoid obstructions, plumb stems, or produce a long radius curve when permitted, the amount of deflection allowed at each joint shall not exceed the allowable limits for maintaining a satisfactory joint seal as given in AWWA C600 for mechanical joints and push-on joints. The maximum angular deflection at any joint for other pipe materials and joints shall not exceed the manufacturer's recommendations. If the specified alignment requires angular deflections greater than recommended or allowed, the Contractor shall provide appropriate bends or shorter pipes such that the maximum angular deflection is not exceeded.
12. Contractor shall provide dewatering as necessary at no additional cost to the Owner. Contractor will be required to acquire the DNR Water Appropriations Permit if said permit is deemed necessary. Granular foundation material shall not be used in lieu of dewatering.

E. Backfilling in Pipe Zone

1. Backfill materials shall be carefully placed in uniform loose thickness layers up to twelve inches (12") thick, spread over the full width and length of the trench section to provide simultaneous support on both sides of the pipeline. Granular backfill free from rocks, boulders, or frozen material may be placed in twelve-inch (12") layers above an elevation one foot (1') above the top of the pipe. Place and compact material to a minimum ninety five percent (95%) Standard Proctor Density.
2. Should the materials available within the trench section be unsuitable or insufficient for this portion of the backfill as determined by the Engineer, the Contractor shall provide and place an approved material as defined in this Specification.

F. Backfilling above Pipe Zone

1. Backfill with suitable materials selected from the excavated materials to the extent available and practical. Contractor shall segregate undesirable materials encountered during excavation from suitable material.
2. Suitable materials are mineral soils free of rubbish, debris, frozen soil, oversize stone, concrete and bituminous chunks and other similar unsuitable material.
3. Place backfill materials in uniform depth layers not to exceed twelve inches (12") before compaction. Acceptably complete the compaction of each layer before placing material for the succeeding layer.
4. The intent of this specification is to compact the backfill enough to prevent large settlements above the pipe, but to use as little effort as possible to avoid disturbing the pipe and bedding at the pipe zone.
5. The method of means of placement and type of compaction equipment used is at the discretion of the Contractor. However, all portions of the trench backfill must meet the Engineer approval.
6. Any deficiency in quantity of backfill material will be furnished and installed by the Contractor at no additional compensation.
7. Excavated material not suitable or required for backfill is to be disposed of by the Contractor. Contractor shall remove the material from the site and dispose of

said material according to applicable Federal, State, and local regulations. No additional payment will be made for disposal.

8. Trench areas beyond existing or proposed roadbeds and driveways shall be compacted by any method approved by the Engineer such that the final density will be ninety five percent (95%) Standard Proctor Density.
9. In those areas where the pipe lines are constructed in existing or proposed roadways, parking lots or other areas where settlement may cause structural damage to other utilities, the backfill shall be compacted to ninety five percent (95%) Standard Proctor Density from the pipe zone to three feet (3') below finished grade, and one hundred percent (100%) Standard Proctor Density in the upper three feet (3') of the trench.
10. Tests to determine the compacted density of the backfill shall be ordered by Engineer if in Engineer's opinion the compaction is not adequate.

G. Restraining Pipe

1. All joints, including plugs, caps, tees, bends, and other thrust points shall be provided with restraining glands or tie rods.

3.05 PIPE PRESSURE TESTING

- A. Interior lift station piping to be hydrostatically tested prior to applying insulation and/or paint. Hydrostatic testing to be performed at 150 pounds per square inch for at least two (2) hours, for each such test. If a pressure change or leakage is detected, the cause shall be determined and corrected by the Contractor at no additional cost to the Owner and the Contractor will retest the piping at no additional cost to the Owner.
- B. Hydrostatic Testing of Pressure Forcemains
 1. After the pipe has been laid, including fittings and valves and blocking, all newly laid pipe or any valved section thereof, unless directed otherwise by the Engineer, shall be subject to hydrostatic pressure of 150 pounds per square inch. The duration of each such test shall be at least two (2) hours.
 2. Each section of pipe to be tested shall be filled with water, and air shall be expelled at the highest point. The required taps to expel air or to fill the water shall be supplied and installed by the Contractor at no cost to the Owner and shall be three quarter inch (3/4") and shall include an approved service saddle when required.
 3. The test apparatus shall be applied at the lowest elevation on the section to be tested. The apparatus shall be connected to the main at a service tap or special tap location.
 4. The pressure gauge shall be a standard pressure gauge. The dial shall register from 0 – 200 psi and have a dial size of four and a half inches (4 ½") with one (1) psi increments.
 5. The hydrostatic test, pressure requirement for an acceptable test shall be a maximum pressure drop of two (2) psi during the last hour of the two (2) hour pressure test. If this test requirement cannot be met, the Contractor shall investigate the cause, make corrections, and retest until the pressure drop requirement can be met.
- C. Contractor shall be responsible for necessary safety precautions during testing.
- D. Contractor shall notify Engineer seventy-two (72) hours prior to testing pipe.

3.06 START UP AND TESTING

- A. A factory-trained service representative shall be present at the time when the station is to be put into service and turned over to the Owner. The service representative shall instruct the Owner in the proper operation and maintenance of the equipment. The

service representative shall provide a minimum of eight (8) hours for installation, field testing, and training.

- B. At the time of start-up, the Contractor shall conduct the necessary pumping test to determine the proper operation of the system. The Contractor shall furnish all meters, equipment and water required for these tests, and the tests shall be conducted to check the operation of the pumping system. Necessary measurements of the electrical consumption shall be made to determine whether or not the pump is operating within the conditions recommended by the pump manufacturer. In the event that the tests show the equipment does not comply with the specifications of the pump manufacturer, this shall be sufficient cause to reject the pump and require the Contractor to remove it at no cost to the Owner. All tests therein required shall be supervised by the Engineer.

END OF DIVISION 33

APPENDIX A
CEAM STANDARD SPECIFICATIONS (2023)



CITY ENGINEERS ASSOCIATION OF MINNESOTA
Engineering Our Cities' Futures

STANDARD SPECIFICATIONS

2023 Edition

2600 Trench Excavation and Backfill/Surface Restoration

2611 Watermain and Service Line Installation

2621 Sanitary Sewer and Storm Sewer Installation

2631-CIPPS Sewer Pipe Rehabilitation - Cured In Place Pipe Systems

2641 – Pipeline Rehabilitation - Pipe Bursting Method

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SECTION 2600 – STANDARD SPECIFICATIONS FOR TRENCH EXCAVATION & BACKFILL/SURFACE RESTORATION

2600.1 DESCRIPTION

This work shall consist of excavation, trenching, backfilling, and restoration of existing surfaces for the construction of underground utilities.

The use of the term "Plans, Specifications and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation "Standard Specifications for Construction", and all supplements and amendments thereto, published prior to the date of advertisement for bids.

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

2600.2 MATERIALS

A Granular Materials

Granular materials furnished for foundation, bedding, encasement, backfill, or other purposes as may be specified shall consist of any natural or synthetic mineral aggregate such as sand, gravel, crushed rock, crushed stone, or slag that shall be so graded as to meet the gradation requirements specified herein for each particular use by the material manufacturer or as indicated in the Plans, Specifications, or Special Provisions.

A1 Granular Material Gradation Classifications

Granular materials furnished for use in Foundation, Bedding, Encasement, or Backfill construction shall conform to the following requirements:

Foundation materials shall have one hundred percent (100%) by weight passing the one and one-half inch (1 1/2") sieve and a maximum of ten percent (10%) by weight passing the No. 4 sieve. Not less than fifty percent (50%) of the material by weight that is retained on the No. 4 sieve shall have one (1) or more crushed faces. Hard, durable crushed carbonate quarry rock may be used for Foundation materials.

Bedding and encasement materials for flexible pipe shall meet the requirements of MnDOT Specification 3149.2 B, Granular Material, except that one hundred percent (100%) by weight shall pass the one-inch (1") sieve.

Backfill materials shall consist of suitable existing trench materials, except as otherwise specified in the Special Provisions. Suitable material shall be defined as a mineral soil free of foreign materials (rubbish, organics, and debris), frozen clumps, oversize stone, rock, concrete or bituminous chunks, and other unsuitable materials that may damage the pipe, prevent thorough compaction, or increase the risks of settlement.

A gradation report, certified by an approved independent testing laboratory, of the proposed granular materials shall be furnished to the Engineer before any of the granular materials are delivered to the project.

A2 Granular Material Use Designations

Granular materials provided for Foundation, Bedding, Encasement, or Backfill use as required by the Plans, Specifications, and Special Provisions, either as part of the pipe item work unit or as a separate contract item, shall be classified as to use in accordance with the following:

<u>Material Use</u>	<u>Zone Designation</u>
Granular Foundation	Placed below the bottom of pipe grade as replacement for unsuitable or unstable soils, to achieve improved foundation support.
Granular Bedding	Placed below the pipe midpoint, prior to pipe installation, to facilitate proper shaping and to achieve uniform pipe support. For flexible pipe installation, placed below the pipe midpoint to a point six inches (6") below the bottom of pipe or twenty five percent (25%) of the diameter below the pipe, whichever is greater.
Granular Encasement	Placed below an elevation one foot above the top of pipe, after pipe installation, for protection of the pipe and to assure proper filling of voids or thorough consolidation of backfill.
Granular Backfill	Placed below the surface base course, if any, as the second stage of backfill, to minimize trench settlement and provide support for surface improvements.

In each case above, unless otherwise indicated, the lower limits of any particular zone shall be the top surface of the next lower course as constructed. The upper limits of each zone are established to define variable needs for material gradation and compaction or void content, taking into consideration the sequence of construction and other conditions. The material use and zone designations described above shall only serve to fulfill the objectives and shall not be construed to restrict the use of any particular material in other zones where the gradation requirements are met.

B Insulation

Insulation shall be extruded rigid board material having a thermal conductivity of 0.23 BTU/hour/square foot/degree Fahrenheit/per inch thickness, maximum, at 40°F mean, a comprehensive strength of thirty-five (35) psi minimum, and water absorption of one quarter percent (0.25%) by volume maximum. Unless otherwise specified in the Plans, Specifications, or Special Provisions, board dimensions shall measure eight feet (8') long, two or four feet (2' or 4') wide, and one (1), one and one half (1-1/2), two (2), or three (3) inches thick.

C Geotextile Fabric

Geotextile fabric shall meet the requirements of MnDOT Specification 3733 and be used as required by the Plans, Specifications, and Special Provisions.

2600.3 CONSTRUCTION REQUIREMENTS

A General Provisions

A1 Maintenance of Traffic

Whenever work interferes with the flow of traffic along a roadway, the Contractor shall provide traffic control signing and public safety in accordance with the provisions Minnesota Manual on Uniform Traffic Control Devices (current edition and all amendments), MnDOT Specifications 1404 and 1710, and the Special Provisions. Neither road closures nor detours shall be permitted unless specified in the Special Provisions or authorized by the Engineer. Where road closures or detours are permitted by the Engineer, the Engineer shall determine the appropriate agencies, boards, or departments the Contractor must notify prior to taking the action and the proper advance notice to be provided to each body.

Compliance with this requirement shall not be construed to relieve the Contractor from the responsibility of notifying agencies or institutions whose services may be predicated upon a roadway being opened to traffic or whose services would be hindered if a roadway is closed to traffic. Such agencies or institutions shall include, but not be limited to, the police department, the fire department, municipal bus service, school bus service, and ambulance service, mail delivery, and waste hauler services. The Contractor shall keep the required agencies informed of changing traffic patterns and detour situations.

A2 Establishing Line and Grade

The primary line and grade 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 therefrom as will best serve the Contractor's operations wherever practical. For tunnel installation, line and grade stakes will be set directly above the proposed pipeline setting.

The Contractor shall arrange operations to avoid unnecessary 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, if negligent in providing necessary protection, shall bear the full cost of any re-staking.

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.

Unless otherwise specified in the Plans, Specifications, and Special Provisions the watermain shall generally be placed with the minimum specified cover. However, a greater depth may be required to avoid conflicts with other utilities and obstructions. Installation of watermain and services to a depth deeper than specified shall be considered incidental with no additional compensation allowed therefore.

The existing grade shown on the plans is approximate. Modification of the pipe location or differences in existing elevation shall not be cause for additional compensation.

In areas where direct conflicts arise between watermain and water services, with storm sewer, sanitary sewer, sanitary sewer services, sewer forcemains, septic tanks, or subsoil treatment systems, the following shall apply:

Watermain and services located near sewer forcemains:

A minimum of ten feet (10') of separation, measured horizontally between the outer surfaces of the pipes is required.

If ten feet (10') of separation cannot be provided, an approved additional measure of containment must be provided for either the watermain or the sewer forcemain.

Watermain and services located near septic tanks, or subsoil treatment systems:

A minimum of ten feet (10') measured horizontally between the outer surfaces of the watermain, tank and subsoil treatment system is required.

Watermain and services located near gravity sanitary and storm sewers:

A minimum of ten feet (10') measured horizontally between the outer surfaces of the pipes is required.

In locations where local conditions prevent the required separation indicated above (due to the presence of rock, buildings, other significant obstructions), the watermain may be laid closer to gravity sewer if **one** (1) of the following conditions is met:

The bottom of the watermain is laid at least eighteen inches (18") above the top of the sewer on a separate shelf; or

The sewer is constructed of materials and with joints that are equivalent to watermain standards of construction and is pressure tested to assure water tightness prior to backfilling.

Watermain and services crossing gravity sanitary and storm sewers:

A minimum vertical separation of eighteen inches (18") must be provided between the outer surfaces of the pipes, with preference that the watermain cross above the sewer, wherever possible.

One full length of water pipe shall be located so both joints will be as far from the sewer as possible.

Watermain above-water crossings:

The pipe shall be adequately supported and anchored, protected from vandalism, damage and freezing, and accessible for repair or replacement.

Watermain underwater crossings:

A minimum cover of five feet (5') shall be provided over the pipe unless otherwise approved by the Department of Health. When crossing water courses which are greater than fifteen feet (15') in width, the following shall be provided:

1. The pipe shall be of special construction, having flexible, restrained or welded watertight joints
2. Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding
3. Permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source.

A3 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 Plans 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 indicated on the plans or as directed by the Engineer, the removal of improvements such as pavement, curb, curb & gutter, walks, turf, etc., shall be subject to equivalent acceptable replacement after completion of underground work, with all expense of removal and replacement being borne by the Contractor to the extent that separate compensation is not specifically provided for in the Contract.

Obstructions such as street signs, guard posts, small culverts, mailboxes, 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 to the extent that separate compensation is not specifically provided for in the Contract.

The Contractor shall be responsible for protection of existing overhead utilities and poles. This shall include arranging with the utility owner and arrange paying the utility for holding poles that will be close to the edge of any trench. Holding of poles and repair of any damage to these facilities shall be considered incidental to the project with no additional compensation allowed. If relocation or removal of these facilities is required, the Owner will contact the concerned utility owner and arrange and pay for the relocation or removal at no additional expense to the Contractor.

In the event of damage to any surface improvements, either privately or publicly owned, in the absence of construction necessity, the Contractor will be required to replace or repair the damaged property to the satisfaction of the Engineer and without cost to the Owner.

A4 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, the Contractor shall cease work 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 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 and then only when the encroachment or relocation will satisfy all applicable regulations and conditions.

Wherever 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 and shall be at the Contractor's expense. No extra compensation will be allowed for delays caused by the interference of underground structures.

A5 Removal of Surface Improvements

Removal of surface improvements in connection with trench excavation shall be limited to actual needs for installation of the pipeline and appurtenances, based on the allowable trench widths and any other controls imposed in connection with the work. Removal operations shall be coordinated effectively with the excavation and installation operations as will cause the least practical disruption of traffic or inconvenience to the public. The debris resulting from removals shall become the property of the Contractor and shall be disposed of by the Contractor in accordance with MnDOT Specification 2104 and the Special Provisions. Removal debris shall not be deposited at locations that will block access to fire hydrants, private driveways, or other essential service areas, nor obstruct surface drainage. Removal and final disposal of debris shall be accomplished as a single operation wherever possible and, in any event, the debris shall be removed from the site before starting the excavating operations.

Removal of concrete or bituminous structures shall be by methods producing clean-cut breakage to pre-scored lines as will preserve the remaining structure without damage. Removal equipment shall not be operated in a manner that will cause damage to the remaining structure or adjoining property. Where not removed to an existing joint, concrete structures shall be sawed along the break lines to a minimum depth of one-third (1/3) of the structure depth.

Any reusable materials generated during the work, such as aggregate, sod, topsoil, shall be segregated from other waste materials and be stockpiled so as to maintain suitability and permit proper reuse.

The use of drop weight equipment for breaking pavement will be allowed to the extent that the Contractor shall assume full responsibility for any damages caused thereby. The pavement breaking operation shall not be allowed to become a nuisance to the public or a source of damage to underground or adjacent structures. The Engineer reserves the right to order discontinuance of drop weight breaking operations at any time.

A6 Temporary Service 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.

B Excavation and Preparation of Trench

B1 Operational Limitations and Requirements

Trench excavation must conform to all local, state and federal requirements. All work must be confined to the limits of the construction and to easements and right of way as indicated on the plans. The Contractor shall install at his expense the necessary trench support to meet the varying soil conditions and to protect existing structures and property. The trench shall be drained to provide stable excavation and permit the pipe to be laid in a dry trench.

Excavating operations shall proceed only so far in advance of pipe laying as will satisfy the needs for coordination of work and permit advance verification of unobstructed line and grade as planned, consistent with the Contractors methods and scheduling. Where interference with existing structures is possible or in any way indicated, and where necessary to establish elevation or direction for connections 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.

Wherever possible, excavated materials shall be placed in areas that will not block existing vehicle and pedestrian traffic and drainage ways. The Contractor shall review proposed methods of operation with the Engineer prior to beginning the work.

The Contractor shall backfill all trenches at the end of each work day, or upon written authorization of the Engineer, shall provide another approved method of protecting the trench area while work is not being performed.

All installations shall be accomplished by open trench with the exception that boring, jacking and tunnel construction methods shall be employed where specifically required by the Plans, Specifications, or Special Provisions.

The excavating operations shall be conducted so as to carefully expose all existing 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 methods of excavating shall be utilized to probe for and expose such critical or hazardous installations as gas pipe, power and communication cables, watermain, gravity and pressure sewers, and respective service pipes.

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. Blasting will be allowed only when proper precautions are taken to protect life and property, and then shall be restricted as the Engineer directs. The hours of blasting operations shall be set by the Owner. The Contractor shall assume full responsibility for any damages caused by blasting, regardless of the requirements for notification and approval. The Contractor shall secure any required permits for blasting and shall conduct blasting operations in conformance with all applicable local, state and federal laws, regulations, and ordinances.

B2 Classification and Disposition of Materials

Excavated materials will be classified for payment only when specifically provided in the Special Provisions, or the Proposal. All other materials encountered in the excavations will be considered incidental to utility construction, with no additional compensation provided thereto.

Miscellaneous excavated materials that are not specifically identified for payment in the Special Provisions or Proposal, exceed one (1) cubic yard in volume, cannot be re-used within the project limits, and in the opinion of the Engineer requires special means for handling and disposal, may be considered for payment through supplemental agreement as extra work. Miscellaneous excavated materials include but are not limited to organic soils, rubble, wood debris, boulder stone, masonry, concrete fragments, and metals.

Rock excavation shall be defined to include all hard, solid rock in ledge formation, bedded deposits and unstratified 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 (1) 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 backfill or other specified use, subject to selective controls. All suitable materials shall be reserved for backfill to the extent needed, 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. Unless otherwise specified in the Plans, Specifications, and Special Provisions, material handling as described above shall be considered incidental with no additional compensation provided.

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 in a manner that could 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 be disposed of as arranged for by the Contractor with no additional compensation.

B3 Excavation Limitations and Requirements

Trench excavating shall be to a depth that will permit preparation of the foundation as specified and installation of the pipeline and appurtenances at the prescribed line and grade, except where alterations are specifically authorized. Trench widths 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 sheeting and shoring and to accommodate placement of appurtenances.

Excavations shall be extended below the bottom of structures as necessary to accommodate any required Granular Foundation material. When rock or unstable foundation materials are encountered at the established grade, additional materials shall be removed as specified or directed by the Engineer to produce an acceptable foundation. Unless otherwise indicated or directed, rock shall be removed to an elevation at least six inches (6") below the bottom surface of the pipe barrel and below the lowest projection of flange and bell/spigot joint. All excavations below grade shall be to a minimum width equal to the outside pipe diameter plus two feet (2'). Rock shall be removed to such additional horizontal dimensions as will provide a minimum clearance of six inches (6") on all sides of appurtenant structures such as valves, housings, access structures, etc.

Where no other grade controls are indicated or established for the pipeline, the excavating 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 (6") of clearance on each side of the flange and bell/spigot joint. The maximum allowable width of the trench at the top of pipe level shall be the outside diameter of the pipe plus two feet (2'), subject to the considerations for alternate pipe loading set forth below. The width of the trench at the ground surface shall be held to a minimum to prevent unnecessary destruction of the surface structures.

The maximum allowable trench width at the top of pipe level may be exceeded only by approval of the Engineer, after consideration of pipe strength and loading relationships. Any alternate proposals made by the Contractor shall be in writing, giving the pertinent soil weight data and proposed pipe strength alternate, at least seven (7) days prior to the desired date of decision. Approval of alternate pipe designs shall be with the understanding that there will be no extra compensation allowed for any increase in material or construction costs.

If the trench is excavated to a greater width than that authorized, the Engineer may direct the Contractor to provide a higher class of bedding and/or a higher strength pipe than that required by the Plans, Specifications, and Special Provisions in order to satisfy design requirements, without additional compensation.

Excess excavated materials generated by utility construction without a specified use on the project site, shall become the property of the Contractor and disposed of offsite. Offsite disposal of excess excavated materials is considered incidental to the construction with no additional compensation allowed thereto.

The use of granular foundation materials shall not be used as an aid to facilitate installation of pipe in wet soil conditions. Use of these materials in this manner in lieu of providing adequate dewatering measures shall be considered incidental to the construction with no additional compensation allowed thereto.

B4 Sheeting and Bracing Excavations

All trench excavations that require slope support shall be sheeted, shored, and braced in a manner that will meet all requirements of the applicable safety codes and regulations; comply with any specific requirements of the Contract; and prevent disturbance or settlement of adjacent surfaces, foundations, structures, utilities, and other properties. Any damage to the work under contract, to adjacent structures, or other property, caused by settlement, water or earth pressures, slides, cave-ins, or other causes due to the failure or lack of sheeting, shoring, or bracing, through negligence or fault of the Contractor in any manner shall be repaired at the Contractor's expense and without delay.

The Plans, Specifications, and Special Provisions may require special precautions to protect life and property. The Engineer may order other precautions when excavation conditions appear to warrant additional measures. Failure of the Engineer to order correction of improper or inadequate sheeting, shoring, or bracing shall not relieve the Contractor's responsibilities for protection of life, property, and the work.

The Contractor shall assume full responsibility for proper and adequate placement of sheeting, shoring, and bracing, to prevent displacement. Bracing shall be so arranged as to provide ample working space and without increase of stress or strain on the in-place structures to any extent that may cause damage.

Sheeting, shoring and bracing materials shall be removed only when and, in such manner, as will assure adequate protection of the in-place structures and prevent displacement of supported grounds. Sheeting and bracing shall be left in place only as required by the Plans, Specifications, and Special Provisions or ordered by the Engineer. Otherwise, sheeting and bracing may be removed as the backfilling reaches the level of respective support. Wherever sheeting and bracing is left in place, the upper portions shall be cut and removed to an elevation of three feet (3') or more below the established surface grade or as the Engineer may direct.

All costs of furnishing, placing and removing sheeting, 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 sheeting, shoring, or bracing materials are left in place by written order of the Engineer, in the absence of specific requirements of the Contract, payment will be made for those materials by supplemental agreement.

B5 Preparation and Maintenance of Foundations

Foundation preparations shall be conducted as necessary to produce a stable foundation and provide continuous and uniform pipe bearing between bell holes. The initial excavating or backfilling 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. Final subgrade preparations shall be such as to produce a finished grade at the centerline of the pipe that is within three hundredths of a foot (0.03') of a straight line between pipe joints and to provide bell excavation at each joint as will permit proper joining of pipe and fittings.

In excavations made below grade to remove rock or unstable materials, the backfilling to grade shall be made with available suitable materials unless placement of Granular Foundation or Bedding material is specified or is ordered by the Engineer. Placement of the backfill shall be in relatively uniform layers not exceeding eight inches (8") in loose thickness. Each layer of backfill shall be compacted thoroughly, by means of approved mechanical compaction equipment, as will produce uniform pipe support throughout the full pipe length and facilitate proper shaping of the pipe bed.

It shall be the Contractor's responsibility to notify the Engineer of changing soil conditions which may be of poor bearing capacity and when organic soils are encountered. Where utilities are placed on unstable soils without notification of the Engineer, the Contractor shall be responsible for all repairs and correction of the installation without further compensation.

Care shall be taken during 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 without additional compensation to the Contractor. The finished subgrade shall be maintained free of water and shall not be disturbed during pipe lowering operations except as necessary to remove pipe slings. The discharge of trench dewatering pumps shall be directed to natural drainage channels or storm water drains. Draining trench water into sanitary sewers or combined sewers will not be permitted.

The Contractor shall install and operate a dewatering system of wells or points to maintain pipe trenches free of water whenever necessary or as directed by the Engineer. Unless otherwise specified in the Plans, Specifications, and Special Provisions such work shall be considered incidental.

All costs of excavating below grade and placing foundation or bedding aggregates as required shall be included in the bid prices for pipe items to the extent that the need for such work is indicated in the Contract provisions and the Proposal does not provide for payment under separate Contract Items. Any excavation below grade and any foundation or bedding aggregates required by order of the Engineer in the absence of Contract requirements will be compensated for separately.

If examination by the Engineer reveals that the need for placement of foundation aggregate was caused by the Contractor's manipulation of the soils in the presence of excessive moisture or lack of proper dewatering, the cost of the corrective measures shall be borne by the Contractor.

B6 Contaminated Materials and Regulated Wastes

If during the course of the Project, the Contractor unexpectedly encounters any of the following conditions indicating the possible presence of contaminated soil, contaminated water, or regulated waste, the Contractor shall immediately stop work in the vicinity, and notify the Engineer.

At the direction of the Engineer, a documented inspection and evaluation will be conducted prior to the resumption of work. The Contractor shall not resume work in the suspected area without authorization by the Engineer.

Indicators of contaminated soil, groundwater or surface water include, but are not limited to the following:

- (1) Odor including gasoline, diesel, creosote (odor of railroad ties), mothballs, or another chemical odor.
- (2) Soil stained green or black (but not because of organic content), or with a dark, oily appearance, or any unusual soil color or texture.
- (3) A rainbow color (sheen) on surface water or soil.

Indicators of regulated wastes include, but are not limited to the following:

- (1) Cans, bottles, glass, scrap metal, wood (indicators of solid waste and a potential dump site).
- (2) Concrete and asphalt rubble (indicators of demolition waste).
- (3) Roofing materials, shingles, siding, vermiculite, floor tiles, transite or any fibrous material (indicators of demolition waste that could contain asbestos, lead or other chemicals).
- (4) Culverts or other pipes with tar-like coating, insulation or transite (indicators of asbestos).
- (5) Ash (ash from burning of regulated materials may contain lead, asbestos or other chemicals).
- (6) Sandblast residue (could contain lead).
- (7) Treated wood including, but not limited to products referred to as green treat, brown treat and creosote (treated wood disposal is regulated).
- (8) Chemical containers such as storage tanks, drums, filters and other containers (possible sources of chemical contaminants).
- (9) Old basements with intact floor tiles or insulation (could contain asbestos), sumps (could contain chemical waste), waste traps (could contain oily wastes) and cesspools (could contain chemical or oily wastes).

Discovery of contaminated soil, contaminated water, or regulated waste on State right of way, State property, and State funded projects shall be handled in accordance with guidance procedures of the MNDOT Office of Environmental Stewardship (OES) and the MPCA requirements for materials handling, disposal, re-use and remediation.

Discovery of contaminated soil, contaminated water, or regulated waste on projects or properties that are not under the ownership or financed by the State shall be handled in accordance with guidance procedures of the MPCA requirements for materials handling, disposal, re-use and remediation.

C Trenchless Pipe Installation

The Contractor shall inspect and verify soil conditions as necessary in order to determine the type of construction to employ. Natural and/or manmade obstructions may be encountered in the soil. These contract documents do not warrant the nature or condition of the soils, and do not warrant that natural or manmade obstructions will not be encountered, nor guarantee the extent to which rocks, boulders, or other obstructions, regardless of size, may be encountered during boring operations. The Contractor shall not be entitled to additional compensation for any natural or manmade obstructions encountered during trenchless construction.

The Contractor shall be responsible for protecting all existing utilities within the construction limits.

C1 Jacking/Boring

The terms "auger", "boring", "jack", "jacking", and "tunneling" in the proposal, specifications, and plans refers only to trenchless construction.

The minimum diameter of the casing pipe shall be four inches (4") greater than the outside diameter of the bell of the carrier pipe.

The Contractor shall prevent excavated materials from flowing back into the excavation during the trenchless construction. This shall include the use of a shield conforming to the size and shape of the casing that will prevent materials from flowing into the leading edge of the casing. The machine used shall be capable of controlling line and grade and shall conform to the size and shape of the casing pipe.

No jacking/augering of pipe will be allowed below the water table unless the water table has been lowered sufficiently to keep the water below the pipe being installed. The use of water under pressure (jetting) or puddling will not be permitted to facilitate jacking/augering operations.

If any installation is augered, the head shall be approved by the Engineer and the auger shall be located six inches (6") behind the lead edge of the casing or carrier pipe.

The jacking system shall be provided with an integral grout pipe and casing pipe. A one-inch (1") grout pipe shall be tack welded to the front edge of the first length of casing pipe. The grout pipe shall be extended with the casing pipe, but not fastened to the casing pipe during the remaining jacking operations. After the pipes are through to the receiving pit, the grout pipe shall be cut free from the casing pipe. The grout pipe shall be pulled back through the embankment applying positive piston pressure on the grout along the outside of the casing pipe throughout the pulling operation. A cement slurry grout mix with as little water as possible shall be used. Bentonite shall not be used to fill voids. The Engineer shall approve grout and backfill material prior to placement of any material.

Deviation from the pipe grade, as provided by the Engineer, in excess of five tenths of a percent (0.50%) may be cause for removal and relaying of the pipe by the Contractor with no additional compensation allowed therefore.

If a void develops, the jacking or boring operation shall be stopped immediately and the void shall be filled by an approved method.

The Contractor shall take the following precautions when boring:

Extend casing through entire distance bored.

Check grade and alignment after each casing section is installed.

Coordinate operations to provide continuous support to surrounding earth materials.

Excavation shall be carried on in such a manner as to provide adequate support to surface structures and roads above and adjacent to the boring and not create any hazards to overhead traffic and other activities.

These contract documents do not guarantee the extent to which rocks, boulders, or other obstructions, regardless of size, may be encountered during boring operations. No extra compensation will be made for removal of rocks, boulders or other natural or manmade obstructions encountered during trenchless construction or excavation.

All voids caused by boring shall be filled by pressure grouting. The grout material shall consist of sand cement slurry of at least two (2) sacks of cement per cubic yard and a minimum of water to assure satisfactory placement. All slurry shall be pre-approved by the Engineer prior to use by the Contractor.

The Contractor shall take the following precautions when jacking:

The jacking machine shall be capable of controlling line and grade.

Progressively push carrier pipe through completed casing.

Strap two (2) wooden saddle blocks to each pipe length to provide support at regular intervals.

Center carrier pipe in casing at all times.

Seal each end of the casing with a concrete block and mortar bulkhead with PVC filler and vent pipes at opposite ends.

Fill the annular space between casing and carrier pipe with dry blown sand. Space shall be considered filled when dry sand blows out of the vent pipe at the opposite end of casing pipe.

Seal the filler and vent pipes after the sand has been deposited.

The location, size, and configuration of all jacking pits shall be subject to approval of the Engineer.

C2 Directional Boring

Direction boring/drilling installation shall be accomplished where required on the Plans or in the Special Provisions to minimize disturbance of existing surface improvements. The installer shall have a minimum of five (5) years of experience in this method of construction and have successfully installed at least ten thousand feet (10,000') of eight inch (8") or larger diameter pipe to specified grades. The field supervisor employed by the Contractor shall have at least five (5) years of experience and shall be at the site at all times during the boring/drilling installation.

The Contractor shall submit boring/drilling pit locations to the Engineer before beginning construction. Boring pits may be located within roadway right-of-way and easements. Any other boring pit locations that may be desired by the Contractor for boring or other uses shall be the responsibility of the Contractor to attain authorization, including use of private property.

Unless otherwise provided in the Special Provisions, the Contractor shall be compensated for the restoration work only within the areas at the connection points, or other locations as may be approved by the Engineer. The Contractor shall be responsible for repairs, without compensation, for any other repair areas, including pit/boring points and areas above the drilled pipe where drilling fluid pressure may have caused heaving or damage to pavement and other surfaces.

The drilling equipment shall be capable of placing the pipe as shown on the plans. The installation shall be by a steerable drilling tool capable of installing continuous runs of pipe between appurtenances such as valves, manholes, etc., without intermediate pits. The guidance system shall be capable of installing pipe within one and one-half inch (1 ½") of the plan vertical dimensions and two inches (2") of the plan horizontal dimensions. The Contractor shall remove and reinstall pipes which vary in depth and alignment from these tolerances.

Pull back forces shall not exceed the allowable pulling forces for the pipe being installed. Drilling fluid shall be a mixture of water and bentonite clay and shall be suitable for existing soil conditions. Disposal of excess fluid and spoils shall be the responsibility of the Contractor.

D Placement of Insulation

Rigid insulation board shall be placed within the pipe encasement zone, six inches (6") above the pipe.

Insulation boards shall be placed with the long dimension parallel to the centerline of the pipe. Boards shall be placed in a single layer with tight joints. No continuous joints or seams shall be placed directly over the pipe. If two (2) or more layers of insulation boards are used, each layer shall be placed to cover the joints of the layer immediately below.

The Contractor shall exercise caution to ensure that all joints between boards are tight during placement and backfilling with only extruded ends placed end to end or edge to edge.

Backfill material shall be placed in such a manner that construction equipment does not operate directly on the insulation and compacted with equipment which exerts a contact pressure of less than eighty (80) psi.

E Pipeline Backfilling Operations

All pipeline excavations shall be backfilled to restore preexisting conditions as the minimum requirement, and fulfill all supplementary requirements indicated in the Plans, Specifications, and Special Provisions. 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. All operations shall be pursued diligently, with proper and adequate equipment, to assure acceptable results.

The backfilling shall be accomplished with the use of Suitable Materials selected from the excavated materials to the extent available and practical. Should the materials available within the trench section be unsuitable or insufficient, the required additional materials shall be furnished from outside sources as provided in the Special Provisions, or as arranged otherwise through supplemental agreement.

Backfill material selection shall be such as to make the best and fullest utilization of what is available, taking into consideration particular needs of different backfill zones. Material containing stone, rock, or chunks of any sort shall only be utilized where and to the extent there will be no detrimental effects. Placement of backfill material containing stones, boulders, chunks, greater than eight inches (8") in any dimension shall not be allowed.

All flexible pipe shall be bedded in accordance with ASTM Specification D2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications". Where existing soils do not meet the requirements of bedding and encasement materials, the Contractor shall furnish the required granular materials. Placement and compaction of bedding and encasement materials around the pipe shall be considered incidental to the installation of the pipe.

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. Above the cover zone material, the use of heavy roller type compaction equipment shall be limited to safe pipe loading.

Backfill materials shall be carefully placed in uniform loose thickness layers up to twelve inches (12") thick spread over the full width and length of the trench section to provide simultaneous support on both sides of the pipeline. Granular backfill may be placed in layers up to twelve inches (12") above an elevation one foot (1') above the top of the pipe.

Each layer of backfill material shall be compacted effectively, by approved mechanical or hand methods, until there is no further visual evidence of increased consolidation or the density of the compacted layer conforms to the density requirements specified in the Special Provisions. Compaction of each layer shall be completed acceptably before placing material for a succeeding layer thereon. The manner of placement, compaction equipment, or procedure effectiveness shall be subject to approval of the Engineer.

All surplus or waste materials remaining after completion of the backfilling operations shall be disposed of in an acceptable manner within twenty-four (24) hours after completing the backfill work on each particular pipeline section. Disposal at locations 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, without delay.

Compaction of backfill within Roadbed areas shall meet the density requirements of MnDOT Specification 2106.3.G1. Compaction of backfill in all other areas shall be as required in the Special Provisions.

Until expiration of the guarantee period, 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, regardless of location. All additional materials required shall be furnished without cost to the Owner.

Any settlement of road surfaces placed under this Contract and that are within the guarantee period that are in excess of one inch (1"), as measured by a ten foot (10') straight edge-shall be considered failure of the mechanical compaction. The Contractor shall be required to repair such settlement without cost to the Owner.

F Restoration of Surface Improvements

Wherever any surface improvements such as pavement, curbing, pedestrian walks, fencing, or turf have been removed, damaged or otherwise disturbed by the Contractor's operations, they shall be repaired or replaced to the Engineer's satisfaction, as will restore the improvement in kind and structure to the preexisting condition. Each item of restoration work shall be done as soon as practicable after completion of installation and backfilling operations on each section of pipeline.

In the absence of specific payment provisions, as separate Contract Items, the restoration work shall be compensated for as part of the work required under those Contract Items which necessitated the destruction and replacement or repair, and there will be no separate payment. If separate pay items are provided for restoration work, only that portion of the repair or reconstruction which was necessitated by the Contract work will be measured for payment. Any improvements removed or damaged unnecessarily or undermined shall be replaced or repaired at the Contractor's expense.

G Maintenance and Final Cleanup

All subgrade surfaces shall be maintained acceptably until the start of surfacing construction or restoration work, and until the work has been finally accepted. Additional materials shall be provided and placed as needed to compensate for trench settlement and to serve as temporary construction pending completion of the final surface improvements.

Final disposal of debris, waste materials, and other remains or consequences of construction, shall be accomplished intermittently as new construction items are completed and shall not be left to await final completion of all work. Cleanup operations shall be considered an incidental part of the work covered under the Contract Items.

If disposal operations and other cleanup work are not conducted properly as the construction progresses, the Engineer may withhold partial payments until such work is satisfactorily performed or the Engineer may deduct the estimated cost of its performance from the partial estimate value.

2600.4 METHOD OF MEASUREMENT

All items will be measured separately according to design designation as indicated in the Pay Item name and as may be detailed and defined in the Plans, Specifications, or Special Provisions. 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.

A Rock Excavation

Rock Excavation shall be measured by volume in cubic yards. Depth shall be measured from the top of the rock to a point six inches below the outside barrel of the pipe and width shall be the inside diameter of the pipe plus twenty-four inches (24") (12" from each side). The minimum width of measurement shall be four feet (4').

B Granular Materials

Granular materials furnished and placed as special foundation, bedding, encasement, or backfill construction will be measured by weight or volume of material furnished by the Contractor from outside sources and placed within the limits defined. Unless otherwise specified, volume will be determined by vehicular measure (loose volume) at the point of delivery. Measurements will not include any materials required to be placed as a component part of other Contract Items as may be specified.

C Geotextile Fabric

Where geotextile fabric is used for improving pipe foundation, it shall be measured by the square yard of material installed.

D Insulation

Rigid board insulation shall be measured on a square yard basis installed to the specified thickness noted on the Plans, Specifications, and Special Provisions and shall include all materials, equipment, and labor required for placement.

2600.5 BASIS OF PAYMENT

All costs of excavating to foundation grade, preparing the foundation, placing and compacting backfill materials, restoring surface improvements, and other work necessary for prosecution and completion of the work as specified, shall be included for payment as part of the pipe and pipe appurtenance items without any direct compensation being made.

In the absence of special payment provisions, all costs of restoring surface improvements as required, disposal of surplus or waste materials, maintenance and repair of completed work, and final cleanup operations shall be incidental to the Contract Items under which the costs are incurred.

Granular materials furnished for foundation, bedding, cover, or backfill placement as specified in connection with pipe or structure items will only be paid for as separate Contract Items to the extent that the Proposal contains specific Pay Items. Otherwise the furnishing and placing of granular materials as specified shall be incidental to the pipe or structure item without any direct compensation being made.

Materials utilized for filling annular spaces due to jacking/boring and drilling fluids for directional boring shall be incidental to the installation of the casing and pipe installed.

Contaminated Materials and Regulated Wastes not anticipated in the plans, specifications and special provisions and unexpectedly discovered during construction shall be compensated for as negotiated by supplemental agreement.

Contaminated Materials and Regulated Wastes specifically identified for payment in the plans, specifications, and special provisions, will be paid for under separate Contract Items provided in the Proposal.

SECTION 2611 – STANDARD SPECIFICATIONS FOR WATERMAIN AND SERVICE LINE INSTALLATION

2611.1 DESCRIPTION

This work shall consist of the construction of watermain and building service pipelines utilizing plant fabricated pipe and other appurtenant materials, installed for conveyance of potable water. The work includes the relocation or adjustment of existing facilities as may be specified in the Plans, Specifications and Special Provisions.

The use of the term "Plans, Specifications, and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation "Standard Specifications for Construction", and all supplements and amendments thereto, published prior to the date of advertisement for bids.

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

The following American Water Works Association (AWWA) Specifications and American Society for Testing and Materials (ASTM) Standards have been referenced in this Specification:

AWWA C104 Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
AWWA C105 Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110 Standard for Ductile-Iron and Gray-Iron Fittings
AWWA C111 Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115 Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C116 Standard for Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA C150 Standard for Thickness Design of Ductile-Iron Pipe
AWWA C151 Standard for Ductile-Iron Pipe, Centrifugally Cast
AWWA C153 Standard for Ductile-Iron Compact Fittings
AWWA C301 Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type
AWWA C304 Standard for Design of Prestressed Concrete Cylinder Pipe
AWWA C500 Standard for Metal-Seated Gate Valves for Water Supply Service
AWWA C502 Standard for Dry-Barrel Fire Hydrants
AWWA C504 Standard for Rubber-Seated Butterfly Valves
AWWA C509 Standard for Resilient-Seated Gate Valves for Water Supply Service
AWWA C515 Standard for Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
AWWA C550 Standard for Protective Interior Coatings for Valves and Hydrants
AWWA C600 Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C605 Standard for Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings
AWWA C651 Standard for Disinfecting Water Mains
AWWA C800 Standard for Underground Service Line Valves and Fittings
AWWA C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm)

AWWA C901 Standard for Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service
 AWWA C904 Standard for Crosslinked Polyethylene (PEX) Pressure Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm) for Water Service
 AWWA C906 Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 65 In. (100 mm Through 1,650 mm), for Waterworks
 AWWA C907 Standard for Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. Through 12 In. (100mm Through 300 mm) for Water, Wastewater, and Reclaimed Water Services
 AWWA M23 Manual for P.V.C Pipe Design and Installation
 AWWA M55 Manual for P.E. Pipe Design and Installation
 ASTM A48 Standard Specification for Gray Iron Castings
 ASTM A536 Standard Specification for Ductile Iron Castings
 ASTM B88 Standard Specification for Seamless Copper Water Tube
 ASTM C270 Standard Specification for Mortar for Unit Masonry
 ASTM C478 Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
 ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
 ASTM D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
 ASTM D1784 Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 ASTM D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
 ASTM D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)
 ASTM D2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
 ASTM D2467 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
 ASTM D3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Controlled Outside Diameter
 ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
 ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
 ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
 ASTM F594 Standard Specification for Stainless Steel Nuts
 ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
 ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
 ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Hot and Cold-Water Distribution Systems

Service installations shall include either Branch Service Lines or Tapped Service Lines in accordance with the standards set forth herein.

Tapped Service installations shall include all water service lines less than three inches (3") nominal inside diameter pipe. The component parts of a tap service installation shall include a corporation stop coupling complete with watermain tap and saddle where required; a curb stop coupling complete with service box; and service piping extending from the corporation stop to the curb stop coupling and beyond to the property line or to the limits as established by the Engineer.

Branch Service installations shall include all water service lines of three inches (3") nominal inside diameter pipe and larger. The component parts of a branch service installation shall include a tapping sleeve and valve or a tee connection and valve complete with valve box, and piping extending from the watermain connection, to the property line or to the limits as specified by the Engineer.

All references to "structure" shall include any man-made object that is not otherwise exempted by special terminology or definition.

2611.2 MATERIALS

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

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

At the request of the Engineer, the Contractor shall submit, in writing, a list of materials and suppliers for approval.

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

A Water Pipe Materials

All pipe furnished for watermain and branch line installations shall be of the type, kind, size, and class indicated for each particular line segment as shown in the Plan 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.

A1 Ductile Iron Pipe and Ductile Iron and Gray Iron Fittings

The pipe furnished shall be Ductile Iron pipe and pipe fittings furnished shall be of the Ductile Iron or Gray Iron type as specified for each particular use of installation. When Gray Iron is specified, either type may be furnished. Gray Iron may not be substituted for Ductile Iron unless specifically authorized in the Special Provisions.

Ductile iron pipe shall conform to the requirements of AWWA C115 or C151 for potable water, and thickness design shall conform to AWWA C150. In addition, the pipe shall comply with the following supplementary provisions:

- (1) Fittings shall conform to the requirements of AWWA C110 (Gray Iron and Ductile Iron Fittings) or AWWA C153 (Ductile Iron Compact Fittings) for the joint type specified.
- (2) Unless otherwise specified all pipe and fittings shall be furnished with cement mortar lining meeting the requirements of AWWA C104 for standard thickness lining. All exterior surfaces of the pipe and fittings shall have an asphaltic coating at least one mil thick. Spotty or thin seal coating, or poor coating adhesion, shall be cause for rejection.

Fittings specified to be furnished with fusion bonded epoxy external coating and/or interior lining shall conform to the requirements of AWWA C550 and C116/A21.16, with 6-8 mil nominal thickness.

Fittings and pipe specified to be furnished with zinc coating shall meet the requirements of ISO 8179-1 or ISO 8179-2. Pipe and fittings shall be coated with the manufacturer compatible asphaltic coating

- (3) Rubber gasket joints for Ductile Iron Pressure Pipe and fittings shall conform to AWWA C111.
- (4) The nuts and bolts shall be constructed of corrosion resistant, high-strength, low-alloy steel with a ceramic filled, baked on fluorocarbon resin. The nuts and bolts shall be in compliance with ANSI/AWWA C111/A21.11.
- (5) Conductivity shall be maintained through pipe and fittings with an external copper jumper wire or specialty gaskets which are capable of meeting conductive requirements. Wedge type connectors will not be allowed.

A2 Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

Polyvinyl chloride (PVC) pressure pipe shall be manufactured with compounds that meet or exceed cell classification 12454 as defined in ASTM D1784 and shall conform to the requirements of AWWA C900 and Fusible C900, for the nominal size, grade, and pressure class indicated on the Plans, Specifications, and Special Provisions. Fittings shall be the same pressure class as the pipe and injection molded PVC fittings shall conform to AWWA C907. PVC pressure pipe and fittings shall have a pressure class of two hundred (200) psi or greater, unless otherwise provided in the special provisions. The pipe shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D543. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast-iron pipe equivalent outside diameters.

A3 Polyethylene (PE) Pressure Pipe and Fittings

Polyethylene pressure pipe and fittings shall be manufactured with compounds that meet or exceed cell classification 44557C/E as defined in ASTM D3350 and shall conform to the requirements of AWWA C-901(for 0.75" to 3" diameters) and AWWA C906 (for 4" to 65"

diameters) for the size, grade and pressure class indicated on the plans, specifications and special provisions. Polyethylene pipe and fittings shall be PE 4710 and pressure class of two hundred (200) psi or greater, unless otherwise provided in the special provisions. Polyethylene compounds used in potable water applications shall also be classified as CC3 per ASTM D3350. The pipe and fittings shall be manufactured from the same resin type, grade, and cell classification. Unless otherwise specified, the dimensions and tolerances of the pipe barrel shall conform to Ductile Iron Pipe equivalent outside diameters (DIPS) for pipe diameters greater than three inches (3"). The method of joining material shall be by the Thermal Butt Heat Fusion Method in accordance with ASTM D3261.

The minimum "quick-burst" strength of the fittings shall not be less than that of the pipe with which the fitting is to be used.

B Fire Hydrants

Fire hydrants shall be of the type, size, and construction specified in the Plans and shall conform to the applicable requirements of AWWA C502.

Unless otherwise specified in the Plans, Specifications, and Special Provisions, hydrants shall be furnished in conformance with the following supplementary requirements:

- (1) Hydrants shall have a five inch (5") (nominal diameter) main valve opening of the type that opens against water pressure.
- (2) Hydrant barrels shall be two (2) piece, non-jacket type, with flanged joint above finished grade line and with mechanical joint connection at the hub end for joining a six inch (6") ductile iron branch pipe.
- (3) Hydrant operating rod shall be equipped with a breakable joint coinciding with the flange joint above the grade line.
- (4) Hydrant bury length shall be measured from the bottom of the branch pipe connection to the finished ground line at the hydrant.
- (5) Hydrants shall have two (2) outlet nozzles for two and one-half inch (2-1/2") (I.D.) hose connection and one outlet nozzle for four-inch (4") (I.D.) steamer connection. All outlet nozzle threads shall be National Standard Fire-Hose Coupling Screw Threads (NFPA 1963).
- (6) Hydrant operating mechanisms shall be provided with "O" ring seals preventing entrance of moisture and shall be lubricated through an opening in the operating nut or bonnet.
- (7) Hydrants shall be provided with outlets for drainage in the base or barrel, or between the base and barrel, unless the Special Provisions require that drain outlets be omitted or plugged.
- (8) The hydrant operating nut shall be rotated counterclockwise to open.
- (9) Detailed drawings, catalog information, and maintenance data shall be furnished as requested by the Engineer.

- (10) Hydrant body bolts shall be corrosion resistant, stainless steel conforming to the requirements of ASTM F593 and F594, alloy group 1, 2, 3, suitable for exterior use above and below ground. Bolts shall conform to manufacturer recommendation for tensile strength and torque.

C Valves and Valve Housing

C1 Valve Housings

Valve housings shall be of ductile or cast iron, High Density Polyethylene or masonry construction as specified in the Plans, Specifications, and Special Provisions for the particular valve size or installation. Masonry manhole or vault type units shall be constructed in accordance with the provisions of MnDOT Specification 2506. Precast Concrete Manholes shall conform to ASTM C478 suitable for HS 20 traffic loading for all units located in driving areas. Ductile or cast-iron valve boxes and all castings for manhole or vault type units shall conform to the requirements of MnDOT Specification 3321.

C2 Gate Valves

Gate Valves shall conform to all applicable requirements of AWWA C500 or AWWA C509 or AWWA C515, together with such supplementary requirements as may be covered in the Plans, Specifications, and Special Provisions. Unless otherwise specified gate valves shall comply with the following supplementary requirements:

- (1) Gate valves meeting the requirements of AWWA C500 shall be two-faced, double disc type, with parallel seats. Gate valves meeting the requirements of AWWA C509 and C515 shall be single disc type with resilient seat bonded or mechanically attached to either the gate or valve body, and the wedge shall be ductile iron fully encapsulated with EPDM rubber, shall be symmetrical and seal equally well with flow in either direction without misalignment. All valves shall be provided with a two-inch square operating nut opening counterclockwise and mechanical joint ends.
- (2) All gate valves shall be non-rising stem (NRS) type furnished with O-Ring stem seals.
- (3) All gate valves sixteen inches (16") or larger in size shall be arranged for operation in the horizontal position and shall be equipped with bypass valves.
- (4) All gears on gate valves shall be cut tooth steel gears, housed in heavy ductile or cast iron extended type grease cases of approved design.
- (5) All gate valves shall have an open indicating arrow, the manufacturer's name, pressure rating and year of manufacture cast on the valve bodies.
- (6) All internal and external surfaces of the valve body and bonnet shall have an epoxy coating, complying with ANSI/AWWA C550.
- (7) All gate valves shall have stainless steel body bolts unless otherwise specified.

C3 Butterfly Valves

Butterfly valves shall be manufactured in conformance with all applicable requirements of AWWA C504 for 150 p.s.i. working pressure minimum, together with such supplementary requirements as may be covered in the Plans, Specifications, and Special Provisions. Unless otherwise specified, the butterfly valves furnished shall comply with the following supplementary requirements.

- (1) The butterfly valves shall be short body of ductile or cast iron with mechanical joint ends.
- (2) The butterfly valves shall be rubber seated with ductile or cast disc, non-rising stem type furnished with O-ring stem seals.
- (3) The butterfly valves shall be equipped with a two-inch square operating nut opening counterclockwise.
- (4) The butterfly valves shall be designed for direct burial installation.
- (5) All butterfly valves shall have an open indicating arrow, the manufacturer's name, pressure rating and year of manufacture on the valve bodies.
- (6) All internal and external surfaces of the valve body and bonnet shall have an epoxy coating, complying with ANSI/AWWA C550.
- (7) All butterfly valves shall have stainless steel body bolts unless otherwise specified.

D Water Service Pipe and Fittings

Water service pipe of 3 inches or larger inside diameter shall conform to the requirements as set forth under the provisions of 2611.2.

Water service pipe of less than three inch (3") inside diameter shall conform to the requirements of ASTM B88 for Seamless Copper Water Tube, Type K, Soft Annealed temper; Polyethylene Pipe as per AWWA C901 and ASTM D3350, or Polyvinyl Chloride Pipe and fittings as per a ASTM D1785, D2241, D2466, D2467 and D2740, or Cross-linked Polyethylene (PEX) pipe as per ASTM F876, ASTM F877, and AWWA C904, NSF/ANSI Standard 61 for potable water distribution, as specified on the Proposal or in the Special Provisions. Water service piping supplied shall include markings indicating the type, pressure class, testing certification, and use for potable water systems.

Corporation stops, saddles, curb stops, and curb stop service boxes shall conform to the requirements of AWWA C800 and as detailed in the Plans, Specifications, and Special Provisions or approved designations.

Saddles for Polyethylene Pipe shall conform to the requirements of AWWA C800 and shall be thermal fusion polyethylene type; ductile iron with dual stainless steel straps, spring washers, bolts and washers; or stainless steel sleeve type, with stainless steel bolts, nuts, and spring washers. Stainless steel bolts, nuts, and washers. Spring washers shall be manufactured from type 304 stainless steel, special "spring grade". Saddles shall include threaded outlet tapping sleeves and Nitrile Butadiene Rubber (NBR) gaskets.

All fittings for copper tubing shall be cast brass, having uniformity in wall thickness and strength, and shall be free of defects affecting serviceability. All copper pipe fittings shall be flared or compression type. All threads for underground service line fittings shall conform to the requirements of AWWA C800. Each fitting shall be permanently and plainly marked with the name or trademark of the manufacturer. Fittings for thermoplastic pipe types shall be of the same material and pressure class as the piping.

Curb stop service boxes shall be gray iron conforming to the requirements of ASTM A 48 for Class 20 or higher tensile strength and shall have at least twelve inches (12") of vertical adjustment for the cover depth specified in the Plans, Specifications, and Special Provisions.

E Polyethylene Encasement Material

Polyethylene encasement material shall conform to the requirements of AWWA C105 for tube type installation and 8 mil nominal film thickness.

F Mechanical Joint Restraints

Mechanical joint restraints shall be ductile iron conforming to the requirements of ASTM A536 and AWWA C600. Joint restraints shall be Lug or Grip Ring type, and be designed to withstand the design pressures indicated in the Plans, Specifications, and Special Provisions.

Mechanical joint restraints shall be fusion bonded epoxy coated meeting the requirements of AWWA C116.

All nuts, bolts, and tie rod type restraints shall be stainless steel, corrosion-resistant coating, or coated with an owner approved rustproofing material.

G Mortar

Mortar for use in masonry construction shall meet the requirements of MNDOT 2506.2 B.2 and ASTM C270.

H Concrete

Concrete used for cast-in-place masonry construction shall be produced and furnished in accordance with the provisions of MnDOT Specification 2461 for the mix design indicated in the Plans, Specifications, or Special Provisions. The requirements for Grade B concrete shall be met where a higher grade is not specified. Type 3, air-entrained, concrete shall be furnished and used in all structures having weather exposure.

I Tracer Wire for Non-Conductive Pipe

Tracer wire for use with all thermoplastic pipe types shall be Underwriters Laboratories (UL) listed for use in direct burial applications, color coated per APWA uniform color code for the specific utility being marked. Tracer wire shall be a minimum 12 AWG copper clad steel rated to 30 volts, insulation shall be High Molecular Weight Polyethylene (HMWPE) meeting ASTM D1248, with designation identified on the outside of the wire casing.

Tracer wire shall meet the following additional criteria for the construction method specified:

Open Trench - Trace wire shall be High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.

Directional Drilling/Boring - Trace wire shall be Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness.

Pipe Bursting/Slip Lining - Trace wire shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load, with minimum 50 mil HDPE insulation thickness.

Connectors for tracer wire shall meet the following:

All mainline trace wires must be interconnected at tees and crosses, joined using a single 3-way or 4-way lockable connector for tees and crosses, respectively.

Lockable connectors shall be for direct bury application and shall be dielectric silicon filled to seal out moisture and corrosion.

2611.3 CONSTRUCTION REQUIREMENTS

A Installation of Pipe and Fittings

Installation of ductile iron watermain and their appurtenances shall conform to the requirements of AWWA C600, the Plans, Specifications and Special Provisions.

Installation of Polyvinyl Chloride (PVC) pipe and their appurtenances shall conform to the requirements of AWWA C605, and the bedding and backfill conditions specified by the Manufacturer, Plans, Specifications, and Special Provisions.

Installation of Polyethylene Pipe and their appurtenances shall conform to the requirements of AWWA M55 and to the bedding and backfill conditions specified by the Manufacturer, Plans, Specifications, and Special Provisions.

No existing valves or hydrants shall be operated by individuals other than personnel from the City Public Works Department. Only under emergency conditions or after specific authorization is given by the City Public Works Department shall the Contractor operate valves or hydrants.

Installation of pipe and fittings shall also conform to the following general guidelines:

A1 Inspection and Handling

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.

During the process of unloading delivered materials, all pipe and accessories shall be inspected by the Contractor for damage. The Contractor shall notify the Engineer of all material found to have cracks, flaws or other defects. The Engineer shall inspect the damaged material and have the right to reject any materials found to be unsatisfactory. The Contractor shall promptly remove all rejected material from the site.

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.

During pipe laying operations, each pipe section and shall be inspected by the Contractor. 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, coating blisters, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair.

A2 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 foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench, and they shall be kept clean. The watermain 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.

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 encasement and backfill materials.

When pipe laying is not in progress, 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 plugs shall remain in-place until the trench is pumped completely dry.

When connecting to existing stubs, the Contractor shall prevent dirt or debris from entering the existing pipe.

A3 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. Pipe shall be cut with approved mechanical tools. 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 pipe from a straight line either in the vertical or horizontal plane to avoid obstructions, plumb stems, or produce a long radius curve when permitted, the amount of deflection allowed at each joint shall not exceed the limits to maintain a satisfactory joint seal in conformance with AWWA C600 for ductile iron pipe mechanical and push-on joints, AWWA C605 for PVC pipe and AWWA M55 for PE pipe. The maximum angular deflection at any joint for other pipe materials and joints shall not exceed the manufacturer's recommendations. If the specified alignment requires angular deflections greater than recommended or allowed, the Contractor shall provide appropriate bends or shorter pipes such that the maximum angular deflection is not exceeded.

A4 Blocking and Anchoring of 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 or tie rods, in accordance with the requirements of the Plans, Specifications, and Special Provisions.

In the absence of other specified requirements for reaction backing or restraining devices, the following provisions shall apply:

- (1) All horizontal bends exceeding twenty (20) degrees deflection, and all caps, plugs, and branch tees shall be provided with concrete buttress blocking.
- (2) All vertical bends exceeding twenty (20) degrees deflection shall be provided with concrete buttress blocking at the low points and with metal tie rod or strapping restraints at the high points.
- (3) Offset bends made with standard offset fittings need not be strapped or buttressed.
- (4) Hardwood blocking shall not be used.

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 Grade B concrete in conformance with MnDOT Specification Section 2461. Buttress dimensions shall be a minimum of twelve inches (12") in thickness, and the minimum area, in square feet shall be as follows:

PIPE SIZE	TEE OR PLUG	1/4 BEND	1/8 BEND	1/32 BEND 1/16 BEND
6"	2.9	3.1	1.6	0.8
8"	3.7	5.3	2.9	1.4
10"	5.7	8.1	4.4	2.2
12"	8.1	13.4	6.6	3.2
16"	15.1	21.4	11.6	5.9
20"	23.2	30.2	18.1	9.3
24"	33.6	48.5	26.1	13.3

Contractors are instructed to size concrete buttress blocking on fittings and dead ends where the blocking must withstand the pressure of larger main line fittings equipped with reducers, for the larger sized main line thrust and not for smaller fitting size only. This is of particular importance on tees and crosses where the main size is reduced on the run from large to small size by use of reducers.

All metal parts of tie rod or strap type restraints shall be galvanized or coated with other approved asphaltic type rustproofing.

All necessary fittings, bands, tie rods, nuts, and washers, and all labor and excavation required for installation of reaction restraints shall be incidental to the installation of the pipe, unless a specific payment item is provided in the bid proposal.

A5 Polyethylene Encasement of Pipeline

Wherever so required by the Plans, Specifications, or Special Provisions the pipeline, including valves, fittings, and appurtenances, shall be fully encased in polyethylene film meeting the requirements of these Specifications. The film shall be furnished in tube form for installation on pipe and all pipe-shaped appurtenances such as bends, reducers, off-sets, etc. Sheet film shall be provided and used for encasing all odd-shaped appurtenances such as valves, tees, crosses, etc.

The polyethylene tubing shall be installed on the pipe prior to being lowered into the trench. Tubing length shall be sufficient to provide a minimum overlap at all joints of one foot or more. Overlap may be accomplished with a separate sleeve tube placed over one end of the pipe prior to connecting another section of pipe, or by bunching extra overlap material at the pipe ends in accordion fashion. After completing the pipe jointing and positioning the overlap material, the overlap shall be secured in place with plastic adhesive tape wrapped circumferentially around the pipe not less than three (3) turns.

After encasement, the circumferential slack in the tubing film shall be folded over at the top of the pipe to provide a snug fit along the barrel of the pipe. The fold shall be held in place with plastic adhesive tape applied at intervals of approximately three feet (3') along the pipe length. Also, any rips, punctures, or other damage to the tubing shall be repaired as they are detected. These repairs shall be made with adhesive tape and overlapping patches cut from sheet or tubing material.

At odd-shaped appurtenances such as gate valves, the tubing shall overlap the joint and be secured with tape, after which the appurtenant piece shall be wrapped with a flat film sheet or split length of tubing by passing the sheet under the appurtenance and bringing it up around the body. Seams shall be made by bringing the edges together, folding over twice, and taping down. Wherever encasement is terminated, it shall extend for at least two feet (2') beyond the joint area.

Openings in the tubing for branches, service taps, air valves and similar appurtenances shall be made by cutting an X-shaped slit and temporarily folding back the film. After installing the appurtenance, the cut tabs shall be secured with tape and the encasement shall be completed as necessary for an odd-shaped appurtenance.

Unless otherwise specified in the Plans, Specifications, and Special Provisions, hydrants encased in polyethylene tubing shall have plugged drain outlets.

B Connection and Assembly of Joints

Where rubber gasket 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.

B1 Ductile Iron Pressure Pipe and Fitting Joints

B1a Push-On Joints

The circular rubber gasket shall be kept in a warm, flexible condition at all times, and for purposes of placement shall be flexed inward and inserted in the gasket recess of the bell 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 using suitable pry-bar or jack type equipment. Spigot ends which do not have depth marks shall be marked before assembly to ensure full insertion. The use of the bucket on the excavation equipment to force the pipe into the socket shall not be permitted.

B1b Mechanical Joints

The last eight inches (8") of the outside spigot surface and the inside bell surface of each pipe and appurtenance joint shall be painted with a thin film of approved gasket lubricant 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 kept in a warm, flexible condition at all times, and for purposes of placement shall be painted with a thin film of approved gasket lubricant and be placed on the spigot end with the thick edge toward the gland

After the spigot end is inserted into the socket to full depth and centered, the gasket shall be pressed into place within the bell 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 inch bolts; 75 to 90 for 3/4 inch bolts; 100 to 120 for 1 inch bolts; and 120 to 150 for 1-1/4 inch bolts. After tightening, all exposed parts of the bolts and nuts shall be completely coated with an approved asphaltic type rust preventive material.

B1c Flanged Joints

Flanged joints shall be installed only in above grade or exposed locations and shall conform to the requirements of AWWA C115, the Plans, Specifications and Special Provisions. Flanged joints shall have full face gaskets.

B2 Polyvinyl Chloride Pipe Joints

B2a Push-On Joints

The circular rubber gasket shall be bonded to the inner wall of the gasket recess of the bell socket. Insertion of pipe spigot into the bell socket shall conform to manufacturer recommended insertion depth.

B2b Fusion Joints

The method of joining shall be specified and conform with AWWA C605. Joining by pipe fusion shall be performed by "qualified" fusion technicians, as documented by the manufacturer. Each joint fusion shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. Appropriately sized and outfitted fusion machines that have been approved by the manufacturer shall be used for the fusion process.

B3 Polyethylene Pipe Joints

The joining of polyethylene pipe joints shall conform to the requirements of AWWA M55, shall be made by the Thermal Butt Heat Fusion Method, Mechanical Flange Adaptor Method, Mechanical Joint Adaptor Method and Mechanical Transition Fittings. Mechanical joints shall include stainless steel pipe stiffeners. Compression fittings are not allowed for pipe diameters greater than two inches (2") in diameter.

B4 Tracer Wire for Non-conductive Pipe

Tracer wire shall be installed along the length of all non-conductive mainline pipes, laterals, and services with vertical riser to the surface, at gate valve boxes, hydrants, curb boxes, and/or utility location boxes as required by the Special Provisions. Tracer wire shall be taped, clamped or affixed to the pipe in another manner as approved by the Engineer. Splicing tracer wire shall be in a manner to prevent any uninsulated wire exposure.

A twelve-inch (12") tracer wire loop shall be provided on each side of a spliced connection.

Tracer wire lengths greater than 500 linear feet without service laterals or hydrants are to include an approved grade level/in-ground access box, located at the edge of the road right-of-way and outside of the roadway.

Tracer wire shall be grounded at all terminal ends (stubs, plugs).

C Water Service Installations

Water service facilities consisting of Tap Service Lines and Branch Service Lines, complete with all required appurtenances, shall be installed as required by in the Plans, Specifications, and Special Provisions, 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 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. Tap locations shall be recorded in reference to survey line stationing. Curb stops shall be tied to definable land marks such as building corners, lot corner markers, hydrants, gate valves, etc. Pipe terminals at the property line shall be marked to the ground surface with a suitable wood timber four by four inch (4"x4"), eight feet (8') long set vertically into the ground with the top two feet (2') painted blue. Approved record keeping forms will be furnished by the Engineer and the completed records shall be submitted by the Contractor upon completion of the work.

Water service lines shall be subject to the same requirements as prescribed for the main pipeline installation.

Water service lines shall be installed to provide a minimum of six inches (6") of clearance shall be maintained in crossing over or under other structures. 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.

C1 Tee Branch Service Lines

Tee branch service piping shall be of the type, size, and wall thickness specified. The pipe and appurtenances shall have rubber gasketed push-on or mechanical joints. Tee branch service lines shall be provided as required by the Plans.

Installation of tee branch service facilities shall be in accordance with all applicable requirements of these specifications as pertain to the mainline installations.

C2 Tapped Service Lines

Service piping shall be of the size and type specified. Unless otherwise specified, minimum pipe size for tap service installations shall be one inch (1") nominal inside diameter. Larger size pipe may be specified for commercial and industrial uses or for some domestic service as specifically identified.

Installation of service facilities shall be in accordance with all applicable requirements of these specifications as pertain to the mainline installations, subject to the exceptions and supplementary provisions set forth hereinafter.

Installation of tapped service lines shall be performed while the mainline watermain is at system operating pressure. Dry tapping watermain pipe will not be allowed.

Unless otherwise indicated, service piping may be laid directly on any solid foundation soil that is 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.

Tapped service piping of three quarters inch (3/4") to and including one and one quarter inches (1-1/4") in diameter shall be installed in one piece without intermediate joint couplings between the corporation stop and the curb stop. Service pipe of one and one half inches (1-1/2") in diameter and larger shall be furnished in standard roll lengths to eliminate any intermediate joints. When full roll lengths are less than the service length the rolls may be joined with approved couplings.

Unless otherwise specified, connection of tapped service lines to the watermain shall be made at an angle of not more than twenty-two (22) degrees from the horizontal. A double wrap of Teflon tape shall be placed on the corporation stop threads prior to installation in the main.

Unless otherwise indicated, tap service lines shall be installed on a straight line at right angles to the watermain or property line as directed by the Engineer. In the absence of specific requirements, the service line shall be terminated at the property line, where it shall be connected to an existing line or, in the case of undeveloped property, it shall be capped, plugged, or peened as approved by the Engineer.

The flaring of new copper tubing ends shall be accomplished only with the use of the proper size and type of tools as designed for the purpose. Tubing shall be cut squarely and all edge 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 jointing compounds.

The service pipe and curb stop coupling depth shall be such as to maintain not less than the specified minimum cover. The service box shall be connected to or centered over the curb stop and be firmly supported on concrete blocking as required by the Plans, Specifications, and Special Provisions. Clearance shall be provided so the service box does not rest on the water pipe. Service boxes shall be installed plumb.

The service boxes shall be brought to proper surface grade when the final ground surface has been established.

D Setting Valves, Hydrants, Fittings and Specials

Valves, hydrants, fittings, and specials shall be provided and installed as required by the Plans, Specifications, and Special Provisions with the exact locations and setting as directed by the Engineer, and with each installation 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 Plans, Specifications, and Special Provisions or as otherwise ordered by the Engineer.

Hydrants shall be installed plumb, with the height and orientation of nozzles as shown in the Plans or as directed by the Engineer. Unless otherwise specified, the hydrants shall be connected to the mainline pipe with six-inch (6") diameter pipe, controlled by an independent valve.

When a hydrant with an open drain outlet is set in clay or other impervious soil, a drainage pit of at least one cubic yard shall be excavated below and around the hydrant base and the pit shall be filled with Foundation Material to a level six inches (6") above the drain outlet. MnDOT 3733 geotextile Type 5, or other material approved by the Engineer, shall be carefully placed over the rock to prevent backfill material from entering voids in the rock drain. Hydrants located where the groundwater table is above the drain outlet shall have the outlet drain hole plugged or the drain tube cut off to prevent draining, and shall be equipped with a tag stating, "Pump After Use".

Valve boxes shall be centered over the valve wrench nut and be installed plumb, with the box cover flush with the surface of the finished pavement or at such other level as may be directed.

Valve box adaptors for use to stabilize the valve box in a centered position over the valve wrench nut shall include a rubber gasket between the adaptor plate and valve body. The adaptor shall be epoxy coated conforming to the requirements for fittings in section 2611.2A1, or as otherwise allowed by the plans, specifications and special provisions. Gate valve box adaptors shall be incidental to the valve box unless otherwise provided in the bid proposal.

Masonry valve pit structures, for valves with exposed gearing or operating mechanisms, shall be constructed in accordance with the details shown in the Plans and with the applicable provisions of these Specifications.

Drainage blow-offs, air vents, and other special appurtenances shall be provided and installed as required by the Plans, Specifications, and Special Provisions.

All dead ends shall be closed with approved plugs or caps and shall be equipped with suitable blow-off facilities.

E Disinfection of Watermains

Before being placed in service, the completed water main shall be disinfected. Disinfection materials and procedures, and the collection and testing of water samples, shall be in accordance with the provisions of AWWA C651. After the final flushing of watermain, the water shall be tested for bacteriologic quality and found to meet the standards prescribed by the Minnesota Department of Health.

Where an existing watermain is cut for the installation of any fitting, the pipe and fittings proposed to be installed shall be disinfected prior to installation as follows:

- (1) The interior of the pipe and fittings shall be cleaned of all dirt and foreign material.
- (2) The interior of the pipe and fittings shall be thoroughly swabbed or sprayed with a one percent (1%) minimum hypochlorite solution.

Unless otherwise indicated in the Plans, Specifications, and Special Provisions, the Contractor shall furnish all materials and perform the disinfecting, flushing, and testing as necessary for meeting the water quality requirements.

The flushing operations and the form of chlorine and method of application to be used shall be subject to approval by the Engineer.

F Electrical Conductivity Test

The Contractor shall perform a conductivity test within one week after completion of pressure testing of the main on all watermain to ensure continuous conductivity for locating watermain. Sufficient conductivity shall be provided to allow for the location of watermain, services, hydrant leads, and laterals for mainline segments at least one thousand two hundred (1,200) linear feet in length

G Hydrostatic Testing of Watermains

After the pipe has been laid, including fittings and valves and blocking, all newly-laid pipe or any section between valves thereof, unless directed otherwise by the Engineer, shall be subject to hydrostatic pressure of one hundred fifty (150) pounds per square inch. The duration of each such test shall be at least two (2) hours.

Each section of pipe to be tested shall be filled with water and all air expelled at the highest point. The required taps to expel air or to fill the watermain shall be supplied and installed by the Contractor, shall be three quarters inch (3/4") and shall include an approved service saddle when required.

The test apparatus shall be applied at the lowest elevation on the section to be tested. The apparatus shall be connected to the main at a service tap or special tap location.

The pressure gauge shall be a standard pressure gauge. The dial shall register from 0 - 200 psi and have a dial size of four and one half inches (4-1/2") with one (1) psi increments.

The hydrostatic test pressure requirement for an acceptable test shall be a maximum pressure drop of two (2) psi during the last hour of the two (2) hour pressure test. The test pressure shall not drop more than five (5) psi for the duration of the test.

If this test requirement cannot be met, the Contractor shall investigate the cause, make corrections, and retest until the pressure drop requirement can be met.

Only if several consecutive tests indicate a consistent pressure drop and only after the Contractor has made numerous attempts to resolve the problem, acceptable to the Engineer, may the Contractor request in writing and the Engineer consider the use of the leakage test. The leakage test may be performed by the Contractor to determine the magnitude of the leak, however, meeting the leakage allowance shall not automatically be considered acceptance, in lieu of the pressure test, for the section being tested. Final acceptance shall be at the discretion of the Engineer.

When allowed, the leakage test shall be performed in accordance with AWWA C600.

H Operational Inspection

At the completion of the project and in the presence of the Engineer and the Contractor, representatives of the Owner shall operate all valves, hydrants, and water services to ascertain that the entire facility is in good working order; that all valve boxes are centered and valves are opened; that all hydrants operate and drain properly; that all curb boxes are plumb and centered; and that water is available at all curb stops.

2611.4 METHOD OF MEASUREMENT

All items will be measured separately according to design designation as indicated in the Pay Item name and as may be detailed and defined in the Plans, Specifications, or Special Provisions. Pipe will generally be designated by size (inside diameter or span), strength class, kind or type, and laying condition. Payment shall include all component parts thereof as described or required to complete the unit, but excluding any item covered by a separate pay item. Lineal measurement of piping will include the running length of any special fittings (tees, wyes, bends, gates, etc.) installed within the line of measure between specified terminal points.

A Water Pipe

Mainline pipe and service pipe of each kind and size will be measured separately 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 or hydrants, intersecting centers of tee or wye branch service connections, and center of corporation stop or curb stop couplings.

B Valves

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

C Corporation Stops

Corporation stops of each size and type will be measured separately by the number of units installed, including the watermain tap and saddle.

D Curb Stops

Curb stops of each size and type will be measured separately by the number of units installed, including the required curb box.

E Hydrants

Hydrants will be measured by the number of units installed.

F Air Vents

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

G Polyethylene Encasement

Polyethylene encasement of pipe will be measured by the linear foot of pipe encased of each specified size.

H Ductile and Gray Iron Fittings

Ductile Iron and Gray Iron fittings shall be measured by the pound without joint accessories or on per each basis as specified on the Proposal or in the Special Provisions. Joint accessories including tie rods, joint restraints, nuts and bolts shall be incidental to the watermain unless otherwise provided on the Proposal or in the Special Provisions.

The standard weight of Ductile Iron and Gray Iron fittings, for payment basis, shall be as published in AWWA C153 and C110, respectively.

I Polyvinyl Chloride or Polyethylene

Polyvinyl Chloride or Polyethylene fittings shall be measured on an each basis as specified and shown on the Proposal or in the Special Provisions.

J Access Structures

Access structures, such as valve boxes, service boxes, manholes and vaults, will be measured for payment only when and to the extent that the Proposal contains specific items therefore. Otherwise, the required structures are included for payment as part of the pipe appurtenance (Gate Valve, Curb Stop, Air Vent, etc.) item which is served. When applicable, measurement will be by the number of individual units installed of each type and design.

2611.5 BASIS OF PAYMENT

Payment for construction of water distribution facilities will be made as detailed in the method of measurement and as shown on the Bid Proposal or detailed in the Special Provisions. Payment shall include all costs of furnishing and installing the complete facility as required by the Plans, Specifications, and Special Provisions.

Payment shall be made for Watermain Pipe, Service Pipe, and Tapped Service Pipe, of each size and kind at the appropriate Contract prices per linear foot installed. All costs of pipeline disinfection, leakage testing, pipe jointing materials, dead end plugs and caps, making connections to existing facilities, blocking and anchorage materials, and other work necessary for proper installation of pipe as specified shall be included for payment as part of the pipe item, without any direct compensation being made therefore unless specific pay items are included on the Proposal.

Payment shall be made for Valves, Corporation Stops, Curb Stops, Hydrants, Air Vents, Polyethylene Encasement, Insulation, and other specially identified appurtenant items, at the appropriate Contract prices per unit of measure for each size and type or kind installed.

Access structures such as Valve Boxes, Service Boxes, Manholes, and Vaults will be paid for as separate items only when separate pay items are included on the Proposal.

Payment for rearrangement of in-place facilities or vertical offset of proposed facilities shall be made under specially named items at the appropriate Contract prices per unit of measure and shall be compensation in full for all costs of performing the work as specified.

All costs of excavating to foundation grade, preparing the foundation, placing and compacting backfill materials, restoring surface improvements, and other work necessary for prosecution and completion of the work as specified, shall be included for payment as part of the pipe and pipe appurtenance items without any direct compensation being made therefore, unless specific pay items are included on the Proposal.

Watermain connections shall be paid per each connection to new watermain. All necessary labor, materials, and work required to make the connection shall be included in the price per each as provided in the bid proposal.

Installation of tracer wire for thermoplastic and other non-conductive pipe materials shall be considered incidental with no direct compensation made thereto, except where noted otherwise.

SECTION 2621 – STANDARD SPECIFICATIONS FOR SANITARY SEWER AND STORM SEWER INSTALLATION

2621.1 DESCRIPTION

This work shall consist of the construction of pipe sewers utilizing plant fabricated pipe and other appurtenant materials, installed for conveyance of sewage, industrial wastes, or storm water. The work includes construction of manhole and catch basin structures and other related items as specified.

The use of the term "Plans, Specifications and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation "Standard Specifications for Construction", and all supplements and amendments thereto published prior to the date of advertisement for bids.

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

The following specifications have been referenced in this Specification:

AASHTO M294 Standard Specification for Corrugated Polyethylene Pipe, 300-mm to 1500-mm (12-in. to 60-in.) Diameter

ASTM A48 Standard Specification for Gray Iron Castings

ASTM A74 Standard Specification for Cast Iron Soil Pipe and Fittings

ASTM A798 Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications

ASTM C12 Standard Practice for Installing Vitrified Clay Pipe Lines

ASTM C76 Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

ASTM C270 Standard Specification for Mortar for Unit Masonry

ASTM C301 Standard Test Methods for Vitrified Clay Pipe

ASTM C361 Standard Specification for Reinforced Concrete Low Head Pressure Pipe

ASTM C425 Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings

ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

ASTM C478 Standard Specification for Circular Precast Reinforced Concrete Manhole Sections

ASTM C564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings

ASTM C700 Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated

ASTM C969 Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

ASTM C1479 Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations

ASTM D543 Standard Practice for Evaluating the Resistance of Plastics to Chemical Reagents

ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications

ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
 ASTM D3262 Standard Specification for "Fiberglass" (Glass Fiber Reinforced Thermosetting Resin) Sewer Pipe
 ASTM D3839 Standard Guide for Underground Installation of "Fiberglass" (Glass Fiber Reinforced Thermosetting Resin) Pipe
 ASTM D4161 Standard Specification for Fiberglass (Glass Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
 ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
 ASTM F679 Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
 ASTM F949 Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
 ASTM F1417 Standard Practice for Installation Acceptance of Plastic Non pressure Sewer Lines Using Low Pressure Air
 ASTM F2764 Standard Specification for 6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
 ASTM F3219 Standard Specification for 3 to 30 in. (75 To 750 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Fittings
 AWWA C104 Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
 AWWA C110 Standard for Ductile-Iron and Gray-Iron Fittings
 AWWA C111 Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 AWWA C115 Standard for Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
 AWWA C116 Standard for Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
 AWWA C150 Standard for Thickness Design of Ductile-Iron Pipe
 AWWA C151 Standard for Ductile-Iron Pipe, Centrifugally Cast
 AWWA C153 Standard for Ductile-Iron Compact Fittings
 AWWA C550 Standard for Protective Interior Coatings for Valves and Hydrants

2621.2 MATERIALS

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 materials 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 Plans, Specifications, or Special Provisions.

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

At the request of the Engineer, the Contractor shall submit in writing a list of materials and suppliers for approval. Suppliers shall submit a Certificate of Compliance that the materials furnished have been tested and are in compliance with the specifications.

A Sewer Pipe and Service Line Materials

All pipe furnished for main sewer and service line installations shall be as indicated for each particular line segment as shown in the Plans 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 products specifically manufactured for this purpose and subject to approval by the Engineer.

A1 Vitrified Clay Pipe and Fittings

Vitrified clay extra strength pipe and fittings shall conform to the requirements of ASTM C700 for the size and type and class specified, subject to the following supplementary provisions:

- (1) Unless otherwise specified, the pipe and fittings shall be non-perforated, full circular type, either glazed or unglazed.
- (2) All pipe and fittings manufactured with bell-and-spigot ends shall be furnished with factory fabricated compression joints conforming to the requirements of ASTM C425.
- (3) In lieu of the bell-and-spigot jointing requirements, the pipe and fittings may be furnished with plain ends, in which case the jointing shall be by means of compression couplings conforming to the requirements of ASTM C425, Type B.
- (4) All clay pipe fittings (wyes, tees, bends, plugs, etc.) shall be of the same pipe class and joint design as the pipe to which they are to be attached.

A2 Ductile Iron Pipe and Ductile Iron and Gray Iron and Fittings

The pipe furnished shall be Ductile Iron pipe and pipe fittings furnished shall be of the Ductile Iron or Gray Iron type as specified for each particular use of installation. When Gray Iron is specified, either type may be furnished. Gray Iron may not be substituted for Ductile Iron unless specifically authorized in the Special Provisions.

Ductile iron pipe shall conform to the requirements of AWWA C115 or C151 for water, and thickness design shall conform to AWWA C150. In addition, the pipe shall comply with the following supplementary provisions:

- (1) Fittings shall conform to the requirements of AWWA C110 (Gray Iron and Ductile Iron Fittings) or AWWA C153 (Ductile Iron Compact Fittings) for the joint type specified.
- (2) Unless otherwise specified all pipe and fittings shall be furnished with cement mortar lining meeting the requirements of AWWA C104 for standard thickness lining. All exterior surfaces of the pipe and fittings shall have an asphaltic coating at least one mil thick. Spotty or thin seal coating, or poor coating adhesion, shall be cause for rejection.

Fittings specified to be furnished with fusion bonded epoxy external coating and/or interior lining shall conform to the requirements of AWWA C550 and C116/A21.16, with 6-8 mil nominal thickness.

Fittings and pipe specified to be furnished with zinc coating shall meet the requirements of ISO 8179-1 and ISO 8179-2. Pipe and fittings shall be coated with the manufacturer compatible asphaltic coating. Zinc coatings for pipe and fittings in corrosive environments shall be wrapped with polyethylene encasement material.

- (3) Rubber gasket joints for Ductile Iron Pressure Pipe and fittings shall conform to AWWA C111.
- (4) The nuts and bolts shall be constructed of corrosion resistant, high-strength, low-alloy steel with a ceramic filled, baked on fluorocarbon resin. The nuts and bolts shall be in compliance with ANSI/AWWA C111/A21.11.
- (5) Conductivity, when required by the Special Provisions, shall be maintained through pipe and fittings with an external copper jumper wire or specialty gaskets which are capable of meeting conductive requirements. Wedge type connectors will not be allowed.

A3 Reinforced Concrete Pipe and Fittings

Reinforced concrete (RC) pipe, fittings and specials shall conform to the requirements of MnDOT 2501, 2503, 3236, 3726, and ASTM C76 (Reinforced Concrete Pipe) with rubber O-ring or profile joints for the type, size, and strength class specified, subject to the following supplementary provisions:

- (1) All branch fittings such as tees, wyes, etc. shall be cast as integral parts of the pipe. All fittings and specials shall be of the same strength class as the pipe to which they are attached.
- (2) Joints shall meet the requirements of ASTM C361, and ASTM C443.
- (3) Lift holes will not be permitted unless specifically authorized in the Plans, Specifications, and Special Provisions

A4 Corrugated Steel Pipe and Fittings

Corrugated Steel (CS) Pipe and fittings shall conform to the requirements of MnDOT 2501, 2503, and 3226 (CS) Pipe for the application, type, size and sheet thickness specified. Joints for joining CS Pipe shall be the band type, soil-tight or bell/spigot type soil-tight and watertight, and watertight, with preformed gasket seals meeting MnDOT 3726. Fittings and bands for joining pipe sections shall be of the same material and thicknesses as the mainline pipe.

Specialty coatings for the pipe shall be as indicated in the Plans, Specifications, and Special Provisions.

A5 Polyvinyl Chloride Pipe and Fittings

Smooth walled polyvinyl chloride pipe and fittings shall conform to the requirements of ASTM D3034 and ASTM F679 for the size, standard dimension ratio (SDR), and strength requirements indicated on the Plans, Specifications, and Special Provisions. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D543.

Pipe fittings shall be of the same class and grade as specified for the pipe, unless otherwise specified in the special provisions.

Unless otherwise specified, all pipe and fittings shall be SDR 35 and connections shall be push-on with elastomeric gasket joints which are bonded to the inner wall of the gasket recess of the bell socket.

PVC pipe and fittings for pressure sewer and forcemains shall meet the requirements of 2611.2 A3 for watermain class pipe.

Corrugated polyvinyl chloride pipe and fittings with smooth interior shall conform to the requirements of ASTM F949 for the size and wall thickness indicated on the Plans, Specifications, and Special Provisions. Unless otherwise specified, all pipe and fittings shall be push-on with snug fit elastomeric joints meeting tightness requirements of ASTM D3212 and ASTM F477.

A6 Cast Iron Soil Pipe

Unless otherwise specified in the Plans, Specifications, and Special Provisions, cast iron soil pipe shall be service weight pipe meeting the requirements of ASTM A74 and the Plans, Specifications, and Special Provisions. Unless otherwise specified, pipe joints shall be push-on, sealed with elastomeric gaskets, meeting the requirements of ASTM C564.

A7 Acrylonitrile-Butadiene-Styrene Pipe

Acrylonitrile-Butadiene-Styrene (ABS) solid wall pipe and fittings shall conform to the requirements of ASTM D2751 (Withdrawn 2014) and shall be gasket seal joints, assembled as recommended by the pipe manufacturer. Unless otherwise specified, all pipe and fittings shall be push-on with snug fit elastomeric joints meeting tightness requirements of ASTM D3212 and ASTM F477. Solvent cemented joints, assembled as recommended by the pipe manufacturer, shall be provided only where specifically indicated in the Plans, Specifications, and Special Provisions.

A8 Corrugated Polyethylene Pipe

Dual-Wall and Triple-Wall Corrugated Polyethylene Pipe (PE/HDPE) for gravity sewers shall conform to the requirements of AASHTO M294 for storm sewer pipe sizes twelve inch (12") through sixty inch (60"). Joints shall be bell and spigot push-on type, soil-tight and watertight joints in accordance with ASTM D3212 and ASTM F477. Pipe manufacture, watertight joint testing, and installation shall conform to MnDOT 2501, 2503, 3247, ASTM C969, and as indicated in the Plans, Specifications, and Special Provisions.

A9 Solid Wall High Density Polyethylene Pipe

Solid wall HDPE for pressure and gravity sewer pipes shall meet the requirements of 2611.2A3.

A10 Fiberglass Reinforced Pipe

Fiberglass Reinforced Pipe (FRP/GRP) for gravity sewers shall meet requirements of ASTM D3262 for Glass-Fiber-Reinforced Thermosetting Resin pipe, such as reinforced thermosetting-resin pipe (RTRP) and reinforced polymer mortar pipe (RPMP; natural polymers not included) for use in gravity-flow systems. The pipe shall be manufactured with polyester resin systems with a proven history of performance in this application.

The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.

Sand used to manufacture the pipe and fittings shall be minimum ninety eight percent (98%) silica sand with a maximum moisture content of two tenths of a percent (0.2%).

Pipe resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally effect the performance of the products.

Gaskets shall be supplied by approved gasket manufacturers and be suitable for the service intended. Minimum pressure rating of gaskets shall be two hundred fifty (250) psi.

Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets made of EPDM rubber compound to provide watertight joints meeting the requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize fiberglass, gasket-sealed closure couplings.

Fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Properly protected standard ductile iron, fusion-bonded epoxy-coated steel and stainless steel fittings are allowed unless otherwise stated in the Special Provisions.

The actual outside diameter (eighteen inch (18") to forty eight inch (48")) of the pipes shall be in accordance with ASTM D3262. Other pipe diameter OD's shall be per manufacturer's literature.

Pipe shall be supplied in nominal lengths of twenty feet (20') except where noted otherwise on the drawings. Actual laying length shall be nominal $\pm 1/4$ inches. At least ninety percent (90%) of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.

Pipe ends shall be square to the longitudinal pipe axis with a maximum tolerance of one-eighth inch (1/8").

Pipe shall be marked identifying each pipe with the name of manufacturer, plant location, code date of manufacturer, nominal pipe size, pipe stiffness designation and ASTM D3262.

Service lateral connections (wye, tee, bend) to the sanitary sewer shall be as recommended by the main line sewer pipe manufacturer recommendation.

A11 Polypropylene Pipe

Corrugated Polypropylene Pipe (PP) for gravity sewers shall conform to ASTM F2881. Pipe joints shall be bell and spigot push-on type, soil-tight and watertight joints in accordance with ASTM D3212 and ASTM F477, and shall conform to the requirements of AASHTO M330 dual wall Type "S" pipe for storm sewer pipe sizes twelve inch (12") through sixty inch (60"). Pipe manufacture, watertight joint testing, and installation shall conform to current MnDOT requirements, ASTM F1417, and as indicated in the Plans, Specifications, and Special Provisions.

A12 Tracer Wire for Non-conductive Pipe

Tracer wire for use with all thermoplastic pipe types shall be Underwriters Laboratories (UL) listed for use in direct burial applications, color coated per APWA uniform color code for the specific utility being marked. Tracer wire shall be a minimum 12 AWG copper clad steel rated to 30 volts, insulation shall be High Molecular Weight Polyethylene (HMWPE) meeting ASTM D1248, with designation identified on the outside of the wire casing.

Tracer wire shall meet the following additional criteria for the construction method specified:

Open Trench - Trace wire shall be High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.

Directional Drilling/Boring - Trace wire shall be Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness.

Pipe Bursting/Slip Lining - Trace wire shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load, with minimum 50 ml HDPE insulation thickness.

Connectors for tracer wire shall meet the following:

All mainline trace wires must be interconnected at tees and crosses, joined using a single 3-way or 4-way lockable connector for tees and crosses, respectively.

Lockable connectors shall be for direct bury application, and shall be dielectric silicon filled to seal out moisture and corrosion.

B Metal Sewer Castings

Metal castings for sewer structures such as manhole frames and covers, catch basin frames, grates and curb boxes, shall conform to the requirements of ASTM A48 (Gray Iron Castings), subject to the following supplementary provisions:

- (1) Casting assemblies or dimensions, details, weights, and class shall be as indicated in the detailed drawings for the design designation specified. Unless otherwise specified, the castings shall be Class 30 or better.
- (2) Lid-to-frame surfaces on round casting assemblies shall be machine milled to provide true bearing around the entire circumference.
- (3) Casting weight shall be not less than ninety five percent (95%) of theoretical weight for a unit cast to exact dimensions, based on four hundred forty two (442) pounds per cubic foot.
- (4) A Certificate of Compliance shall be furnished with each shipment of castings stating that the materials furnished have been tested and are in compliance with the specification requirements.
- (5) Unless otherwise specified, sanitary sewer manholes shall have self-sealing lids and concealed pick holes.

C Precast Concrete Manhole and Catch Basin Sections

Precast concrete riser sections and appurtenant units (grade rings, top and base slabs, special sections, etc.) used in the construction of manhole and catch basin structures shall conform with the requirements of ASTM C478, MnDOT 2506 and the following supplementary provisions:

- (1) The precast sections and appurtenant units shall conform to all requirements as shown on the detailed drawings.
- (2) Joints of manhole riser sections shall be tongue and groove with rubber "O" ring or profile gaskets conforming to the requirements of ASTM C443..

- (3) Sanitary sewer inlet and outlet pipes shall be joined to the manhole with a gasketed, flexible, watertight connection, watertight boot, or any watertight connection arrangement approved by the Engineer that allows differential settlement of the pipe and manhole wall to take place.
- (4) Air-entrained concrete shall be used in the production of all wet-cast units. Air content shall be maintained within the range of five (5) to eight (8) percent (%).
- (5) A Certificate of Compliance shall be furnished with each shipment of precast manhole and catch basin sections stating that the materials furnished have been tested and are in compliance with the specification requirements.
- (6) Lift holes will not be permitted in precast manholes.

D Mortar

Mortar for use in masonry construction shall meet the requirements of MNDOT 2506.B.2 and ASTM C270.

E Concrete

Concrete used for cast-in-place masonry construction shall be produced and furnished in accordance with the provisions of MnDOT Specification 2461, Table 2461-6, for the mix design indicated in the Plans, Specifications, or Special Provisions. Type 3, air-entrained, concrete shall be furnished and used in all structures having weather exposure.

2621.3 CONSTRUCTION REQUIREMENTS

A Installation of Pipe and Fittings

The Contractor shall take all necessary precautions to handle and install all pipe and appurtenances as recommended by the manufacturer, Engineer, Plans, Specifications, and the Special Provisions.

Installation of PVC pipe and fittings for pressure sewer and forcemains shall meet the requirements of 2611.3 for watermain class pipe.

A1 Inspection and Handling

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. During the process of unloading, all pipe and accessories shall be inspected by the Contractor for damage. The Contractor shall notify the Engineer of all material found to have cracks, flaws or other defects. The Engineer shall inspect the damaged materials and have the right to reject any materials found to be unsatisfactory. The Contractor shall promptly remove all rejected material from the site. All materials shall be handled carefully, as will prevent damage to protective coatings, linings, and joint fillings; preclude contamination of interior areas; and avoid jolting contact, dropping, or dumping.

All work and materials are subject to tests by the Owner at such frequency as may be determined by the Engineer.

While suspended and before being lowered into laying position, each pipe section and appurtenant unit shall be inspected by the Contractor to detect damage or unsound conditions that may need corrective action or be cause for rejection. 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, coating blisters, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair as needed.

A2 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 grade and alignment without unnecessary deviation or hindrance.

All foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench and they shall be kept clean. 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 into the trench.

Unless otherwise permitted by the Engineer, bell and spigot pipe shall be laid with the bell ends facing upgrade and the laying shall start on the downgrade end and proceed upgrade. 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.

Connection of pipe to existing lines or previously constructed manholes or catch basins shall be accomplished as shown in the Plans or as otherwise approved by the Engineer. Where necessary to make satisfactory closure or produce the required curvature, grade or alignment, deflections at joints shall not exceed that which will assure watertight joints and shall comply with the pipe manufacturer recommendations.

Entrance of foreign matter into pipeline openings shall be prevented at all times to the extent that suitable plugs or covering can be kept in place over the openings without interfering with the installation operations.

Installation of thermoplastic pipe shall conform to ASTM D2321; FRP/GRP pipe to ASTM D3839, and the manufacturers' recommendations; ASTM A798 for CS pipe, and ASTM C1479 for RC pipe.

A3 Connection and Assembly of Joints

All pipe and fitting joints shall fit tightly and be fully closed. Spigot ends shall be marked as necessary to indicate the point of complete closure. All joints shall be soil tight and watertight in all sanitary sewer and storm sewer pipe.

A4 Bulkheading Open Pipe Ends

All pipe and fitting ends left open for future connection shall be bulkheaded by approved methods prior to backfilling. Unless otherwise specified or approved, all openings of twenty four inches (24") in diameter or less shall be closed off with prefabricated plugs or caps and all openings larger than twenty four inches (24") in diameter shall be closed off with masonry bulkheads.

Prefabricated plugs and caps shall be of the same material as the pipe material, or an approved alternate material, and they shall be installed with watertight seal as required for the pipeline joints. Masonry bulkheads shall be constructed with clay or concrete brick to a wall thickness of eight inches (8").

Bulkheads installed for temporary service during construction may be constructed with two inch (2") timber planking securely fastened together and adequately braced, as an alternate to the masonry construction.

A5 Tracer Wire

Tracer wire shall be installed along the length of all non-conductive mainline pipe, laterals, and services with vertical riser to the surface, at manholes, catch basins, stubs, laterals, services, and/or utility location boxes as required by the Special Provisions. Tracer wire shall be taped, clamped or affixed to the pipe in another manner as approved by the Engineer.

Splicing tracer wire shall be by mechanical split bolt type or a crimp type compression fitting fully encased in approved electrical insulation putty. A twelve inch (12") tracer wire loop shall be provided on each side of a spliced connection.

Tracer wire lengths greater than 500 linear feet are to include an approved grade level/in-ground access box, located at the edge of the road right-of-way and outside of the roadway.

Tracer wire shall be grounded at all terminal ends (stubs, plugs).

B Appurtenance Installations

Appurtenance items such as aprons, trash guards, gates and castings shall be installed where and as required by the Plans and in accordance with such standard detail drawings or supplementary requirements as may be specified.

Casting assemblies installed on manhole or catch basin structures shall be set in a full mortar bed and be adjusted to the specified elevation without the use of shims or blocking.

Sewer aprons shall be subject to all applicable requirements for installation of pipe. All aprons and outfall end sections shall have the last three (3) sections tied. Two (2) tie bolt fasteners shall be placed in each of the last three joints, one on each side of top center at the sixty (60) degree point (from vertical). Tie bolt diameter shall be: 5/8 inch for 12" to and including 27" pipe; 3/4 inch for 30" to and including 66" pipe; 1 inch for 72" to and including 144" pipe. The tie bolts shall be of a design approved by the Engineer.

C Sewer Service Installations

Main sewer service connections and building service sewer pipe shall be installed as provided for in the Contract and as may be directed by the Engineer. The sewer service connections and pipe lines shall be installed in conformance with all applicable requirements of the main sewer installation and as more specifically provided for herein.

The Engineer, with the assistance of the Contractor, shall keep accurate records of all service installations as to type, location, elevation, point of connection and termination, etc. This service record shall be maintained jointly by the Contractor and Engineer on forms provided by the Engineer. The service installations shall not be backfilled until all required information has been obtained and recorded.

The main sewer service connection shall consist of installing a Branch Tee or Wye section in the main sewer line at designated locations or providing an insert type Saddle Tee or Wye fitting in a pipe cut-out where specified. Orientation of service connection fitting shall be as shown in the standard drawings unless otherwise directed by the Engineer.

Where the depth of cover over the main sewer invert is greater than fifteen (15) feet (or such other maximum as may be indicated), the service connection shall be extended upward by means of a Service Riser Section.

Unless otherwise specified, service pipe shall be installed at right angles to the main sewer and at a straight line grade to the property line. The standard and minimum grades shall be a uniform rise of one inch (1") in four feet (4') (two percent (2%)) for sanitary service lines and one inch (1") in eight feet (8') (one percent (1%)) for storm sewer service lines. These minimum grades may be reduced (by not more than one-half (1/2) pitch) where the Engineer so approves in the case of restrictive elevation differences.

Building service pipe lines shall generally be kept as deep as required to serve the building elevation and maintain the specified minimum pipe grades. Pipe bends shall be provided as necessary to bring the service lines to proper location and grade. Pipe bends shall not exceed twenty-two and one half (22-1/2) degrees without approval of the Engineer.

Unless otherwise indicated, service pipe installation shall terminate at property line or as designated on the Plans, with a gasketed plug placed in the end, at which point the Contractor shall furnish and set a four inch by four inch (4" x 4") wooden timber six feet (6') to eight feet (8') in length embedded four feet (4') below grade, or approved steel post to mark the exact end of pipe. The timber or post shall be set vertically, with the top two feet (2') painted green.

Wherever service line connections to the main sewer are permitted or required to be made by the open cut-out method in the absence of a built-in Tee or Wye fitting, the connection shall be made by using an approved type of Saddle Tee or Wye fitting. The pipe cut-out shall be made with an approved type coring machine or by other approved methods producing a uniform, smooth circular cut-out as required for proper fit. The cut-out discs shall be retrieved and shall not be allowed to remain within the main sewer pipe. The Saddle Tee shall be securely fastened to the main sewer pipe by means of epoxy resin or other approved adhesive. The entire connection fitting shall be encased in concrete to a minimum thickness of six inches (6") and as may be shown in the standard drawings.

Wherever service line connections to the main sewer are required to be made by means of built-in Branch Tee or Wye fittings, the Contractor shall, in the absence of such fitting, remove a section of the main sewer pipe and replace it with the required Branch Tee or Wye section connected by means of an approved sleeve coupling.

Sanitary sewer service lines shall not be connected to a manhole at an elevation more than twenty-four inches (24") above the crown of the outgoing sewer. Where the elevation difference is greater than twenty-four inches (24"), the connection shall be made by means of an Outside Drop Connection in accordance with the details shown in the standard drawings.

All pipe and fitting openings at temporary terminal points shall be fitted with suitable plugs or shall be bulkheaded as required for the main sewer pipe.

D Manhole and Catch Basin Structures

Manholes, catch basins, and other special access structures shall be constructed at designated locations as required by the Plans and in accordance with any standard detail drawings or special design requirements given therefor.

Unless otherwise specified or approved, storm sewer manholes and catch basins shall be constructed on a precast or cast-in-place concrete base and the barrel riser sections, and cone section shall all be of precast concrete. Sanitary sewer manholes shall be constructed with precast concrete integral base with pre-formed invert barrel section and with watertight boots at all pipe locations. All units shall be properly fitted and sealed to form a completely watertight structure. Manholes and catch basin structures shall be fabricated to provide a twelve-inch (12") or sixteen inch (16") barrel section immediately below the cone or top slab whenever possible. Barrel and cone height shall be such as to permit placement of at least two (2) and not more than six (6) standard two-inch (2") precast concrete or high density polyethylene adjusting immediately below the casting assembly. Sanitary manhole adjustment rings and casting flange shall be fitted with specified method/materials as indicated in the Special Provisions to reduce inflow and infiltration. Storm sewer manhole and drainage structure adjustment rings and casting flange shall be wrapped with a Type 2 Geotextile fabric meeting MnDOT 3733.

Unless otherwise specified or approved, manholes and catch basins shall have an inside barrel diameter at the bottom of forty-eight inches (48") minimum and the inside diameter at the top of the cone section and all adjusting rings shall be of the same size and shape as the casting frame. Casting assemblies shall be as specified in the Plans

Concrete cast-in-place base shall be poured on undisturbed or firmly compacted foundation material which shall be trimmed to proper elevation. The bottom riser section shall be set in fresh concrete or mortar and all other riser section joints of the tongue and groove design shall be sealed with rubber gaskets. The concrete base under an outside drop connection shall be monolithic with the manhole base.

Wherever special designs so require or permit, and as may be approved by the Engineer, a precast concrete base may be used or the structure may be constructed with solid sewer brick or block units or with cast-in-place concrete. Any combination of cast-in-place concrete and brick or block mortar construction will be allowed and may be required where it is impossible to complete the construction with standard precast manhole sections.

All storm sewer manhole and catch basin structure doghouses shall be completely filled with mortar, concrete masonry, or concrete to completely seal the pipes into the structure wall. When formed inverts are specified, the inside bottom of each manhole and catch basin shall be shaped with fresh concrete to form free flow invert troughs.

When connecting to an existing sanitary sewer manhole without an existing opening for sewer pipe, the Contractor shall be required to core-drill an opening of the correct size and elevation for the proposed sanitary sewer facility. The Contractor shall set the connecting pipe through the full thickness of the wall flush with the inner face of the wall. Connection to the structure shall be made with a watertight joint, by means of a rubberized boot. The Contractor shall ensure the flow line of the manhole is constructed in a manner to provide steady flow from the new sanitary line to the existing sanitary line. The flow line and the core-drilled hole are to be grouted smooth. The Contractor shall install a plug in the connecting pipe once the connection is complete and construction has advanced to the next manhole to prevent rainwater or sediment from entering the existing system. The plug shall be removed once all the proposed sanitary sewer mains on the project have been installed, tested, inspected, and approved.

E Sanitary Sewer Leakage Testing

All sanitary sewer lines, including service connections, shall be substantially watertight and shall be tested for excessive leakage upon completion and before connections are made to the service by Others. Each test section of the sewer shall be subjected to exfiltration testing, either by hydrostatic or air test method as described below and at the Contractor's option. The requirements set forth for maximum leakage shall be met as a condition for acceptance of the sewer section represented by the test.

If the ground water level is greater than three feet above the invert elevation of the upper manhole and the Engineer so approves, infiltration testing may be allowed in lieu of the exfiltration testing, in which case the allowable leakage shall be the same as would be allowed for the Hydrostatic Test.

All testing shall be performed by the Contractor without any direct compensation being made therefore, and the Contractor shall furnish all necessary equipment and materials, including plugs and standpipes as required.

E1 Air Test Method

E1a Gravity Sewers

All gravity sanitary sewer lines, including service connections, shall be substantially watertight and shall be tested for excessive leakage upon completion and before connections are made to the service by Others. Each test section of the sewer shall be subjected to exfiltration testing by the ASTM F1417 (low pressure air) test method regardless of pipe material.

The requirements set forth for maximum leakage shall be met as a condition for acceptance of the sewer section represented by the test. All testing shall be performed by the Contractor without any direct compensation being made therefore, and the Contractor shall furnish all necessary equipment and materials, including plugs and standpipes as required.

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 to the plugged line until the internal air pressure reaches three and one half (3.5) psi greater than the average back pressure of any ground water pressure that may submerge the pipe. At least two (2) 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 to detect plug leakage. If plugs are found to leak, air shall be bled off, the plugs shall be retightened, and the air shall be reintroduced into the line.

The sewer section under test will be accepted as having passed the air leakage test when the rate of air loss as measured by pressure drop, does not exceed a specified amount in a specified time. Pressure drop may be determined by using the table below, or calculated by use of the formulas provided below.

TABLE
Minimum Specified Time Required for a 0.5 psig Pressure Drop for Size and Length of Pipe Indicated for Q = 0.0015 CFM/SF

Pipe Diameter (Inches)	Minimum Time (Min:Sec)	Length for Min. Time (Feet)	Time for increased Length (Sec)	Specification Time for Length (L) Shown (Min:Sec)								
				100 Ft.	150 Ft.	200 Ft.	250 Ft.	300 Ft.	350 Ft.	400 Ft.	450 Ft.	
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	28:11	30:32	34:54	39:16	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	51:17
*27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:18	50:30	57:42	64:54	64:54
*30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:131	80:07	80:07
*33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	96:57
*36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	115:23

*NOTE - Consult with pipe and appurtenance manufacturer for maximum test pressure for pipe size greater than twenty four inches (24") in diameter.

FORMULA

The formula below calculates the specified minimum time required for a **1.00 psig pressure drop** from a starting pressure of 3.5 psig to a final pressure of 2.5 psig using a leakage rate of 0.0015 cubic feet/minute/square foot of internal surface.

Calculate all test times by the following formula:

$$T = 0.085 DK/Q$$

where:

T = shortest time allowed for the **air pressure to drop 1.0 psig**, sec.

K = 0.000419 DL but not less than 1.0,

Q = leak rate = 0.0015 CFM/SF,

D = measured average inside diameter of sewer pipe, in., and

L = length of test section, ft.

E2 Hydrostatic Test Method

E2a Gravity Sewers

After bulkheading the test section, the pipe shall be subjected to a hydrostatic pressure produced by a head of water at a depth of three feet (3') above the invert elevation of the sewer at the upstream manhole of the test section. In areas where ground water exists, this head of water shall be three feet (3') above the existing water table.

The water head shall be maintained for a period of one (1) hour during which time it will be presumed that full absorption of the pipe body has taken place, and thereafter for an extended period of one (1) hour the water head shall be maintained as the test period. During the test period, the measured water loss within the test section, including service stubs, shall not exceed an infiltration / exfiltration rate of thirty five (35) gallons / inch diameter / mile / day.

If measurements indicate exfiltration within a test action section is not greater than the allowable maximum, the section will be accepted as passing the test.

E2b Pressure Sewers

For sewers designated as pressure pipe sewers, the sewer shall be subjected to hydrostatic testing under 2611.3G Hydrostatic Testing of Watermains, except the hydrostatic testing pressure shall be two (2) times the maximum design operating pressure, but not less than one hundred (100) psig and the duration of the test shall be one hour.

E3 Test Failure and Remedy

In the event of test failure on any test section, testing shall be continued until all leakage has been detected and corrected to meet the requirements. All repair work shall be subject to approval of the Engineer. Introduction of sealant substances by means of the test water will not be permitted.

Unsatisfactory repairs or test results may result in an order to remove and replace pipe as the Engineer considers necessary for test conformance. All repair and replacement work shall be at the Contractor's expense.

F Deflection Test

Deflection tests shall be performed on all plastic gravity sewer pipes. The test shall be conducted after the sewer trench has been backfilled to the desired finished grade and has been in place for thirty (30) days.

The deflection test shall be performed by pulling a rigid ball or nine-point mandrel in accordance with MnDOT 2503.3 C.4. Direct measurement of the pipe diameter to determine deflection is not allowed. The ball or mandrel shall have a minimum diameter equal to ninety five percent (95%) of the actual inside diameter of the pipe. The maximum allowable deflection shall not exceed five percent (5%) of the pipe's internal diameter. The line will be considered acceptable if the mandrel can progress through the line without binding. The time of the test, method of testing, and the equipment to be used for the test shall be subject to the approval of the Engineer.

All testing shall be performed by the Contractor at his expense without any direct compensation being made therefore, and he shall furnish all necessary equipment and materials required.

F1 Test Failure and Remedy

In the event of test failure on any test section, the section shall be replaced, with all repair work subject to approval of the Engineer. The replaced section shall be retested for leakage and deflection in conformance with the specifications contained herein. All repairs, replacement, and retesting shall be at the Contractor's expense.

G Televising

Sewer line televising may be required by the Engineer, at the cost of the Contractor, if visual inspection, leakage testing, or deflection testing indicate the sewer has not been constructed in accordance with these specifications and the requirements of the Plans, Specifications, and Special Provisions.

2621.4 METHOD OF MEASUREMENT

All items will be measured separately according to design designation as indicated in the Pay Item name and as may be detailed and defined in the Plans, Specifications, or Special Provisions.

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. Linear measurement of piping will include the running length of any special fittings (tees, wyes, elbows, gates, etc.) installed within the line of measure between specified terminal points.

A Sewer Pipe

Sewer pipe of each design designation will be measured by length in linear feet along the line of pipe. Terminal points of measurement will be the pipe end at free outlets; the point of connection with in-place pipe; the center of manholes or catch basins; the point of centerline intersections at branch fittings; or the point of juncture with other appurtenances or units as defined.

Separation of quantities according to "depth zone classification", when so designated in the Pay Item, will be determined by depth of pipe invert below the ground surface profile.

B Manholes

Manholes of each design designation will be measured by number of each constructed complete-in-place, including the base and castings as required, but excluding any excess depth greater than eight feet (8') measured from top of manhole cover to invert elevation of lowest pipe.

Excess manhole depth of each design designation will be measured by the linear foot difference in depth between the eight feet (8') allowed as standard and the actual increased depth as constructed.

C Catch Basins

Catch basins of each design designation will be measured by number of each constructed complete-in-place, including the base and castings as required, but excluding any excess depth greater than five feet (5') measured from top of grate (low point) to invert elevation of lowest outlet pipe.

Excess catch basin depth of each design designation will be measured by the linear foot difference in depth between the five feet (5') allowed as standard and the actual increased depth as constructed.

D Outside Drop Connection

Outside drop connections of each design will be measured by linear foot constructed complete-in-place, and shall include granular encasement, fittings, any special piping required, including coring holes and watertight boots for existing manholes for the drop connection. Measurement shall be made vertically from the invert of the lower outside drop invert to the upper outside drop invert.

E Service Connection

Service Connections of each design will be measured by number of each constructed complete-in-place as specified.

F Service Pipe

Service pipe of each design will be measured separately by length in linear feet, horizontally along the line of installation, between the service end and the point of juncture with the main pipe connection fitting.

G Special Pipe Fittings

Special pipe fittings (wyes, tees, bends, etc.) of each design designation will be measured by number of each installed complete-in-place as specified, but excluding any such fittings required to be installed as a component part of any other Work Unit.

H Appurtenant Items

Appurtenant items such as aprons, trash guards, gates and other prefabricated units or assemblies as identified by Pay Item name will be measured separately by number of each installed complete-in-place as specified.

2621.5 BASIS OF PAYMENT

Payment for sewer pipe and service pipe items at the Contract prices per linear foot of pipe of each design shall be compensation in full for all costs of providing a complete-in-place pipeline, including excavation, foundation preparation, backfilling, leakage testing, restoration of surface improvements, disposal of surplus or waste materials, final cleanup, and such other work as may be specified, but excluding the construction of other structures or special sections and the placement of special fittings, appurtenances or materials specifically designated for payment under other Contract Items.

Payment for manhole, catch basin, outside drop connection, service connection, and other structures as specified, at the Contract prices per structure, shall be compensation in full for all costs of constructing each unit complete-in-place as specified, including all required castings, special fittings, base or encasement, and appurtenant materials as specified for the complete structure or section, but excluding such additional work as may be designated for payment under other Contract Items.

Where the specified standard manhole, catch basin, or outside drop connection depths are exceeded, the excess depth of each design will be paid for separately as linear footage items and payment at the Contract prices therefor shall be compensation in full for all costs of providing the extra depth.

Special pipe fittings such as wyes, tees and bends will be paid for as separate Contract Items to the extent they are required to be installed in the sewer pipe and service pipe lines and not as a component part of a complete-in-place structure (outside drop connections, service connections, etc.)

Appurtenant items such as aprons, trash guards, drainage gates, and other prefabricated units or assemblies and specials as designated will be paid for as separate Contract Items to the extent they are not included as a component part of any complete-in-place structure.

SECTION 2631 CIPPS – STANDARD SPECIFICATIONS FOR SEWER PIPE REHABILITATION WITH CURED IN-PLACE PIPE SYSTEMS (CIPPS)

2631.1 CIPPS DESCRIPTION

A General

This work shall consist of the rehabilitation of pipelines and conduits by the installation of a resin-impregnated flexible tube Cured-In-Place Pipe System (CIPPS). The rehabilitation of pipelines shall be constructed by the installation of a resin-impregnated flexible tube which, when cured, shall be continuous and tight-fitting throughout the entire length of the original pipe. The CIPP shall extend the full length of the original pipe and provide a structurally sound, joint less and watertight new pipe within the existing pipe. The Contractor is responsible for proper, accurate and complete installation of the CIPP using the system selected by the Contractor.

Neither the CIPP system, nor its installation, shall cause adverse effects to any downstream facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products that may affect downstream structures, pups, pipe, equipment and wastewater treatment facilities. The Contractor shall notify the Engineer and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local waste discharge requirements. The Contractor shall cleanup, restore existing surface conditions and structures, and repair any of the CIPP system determined to be defective. The Contractor shall conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses, and residents.

The use of the term "Plans, Specifications, and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation "Standard Specifications for Construction", and all supplements and amendments thereto, published prior to the date of advertisement for bids.

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

The following specifications have been referenced in this Specification:

- ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
- ASTM F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
- ASTM D543 Standard Practice for Evaluating the Resistance of Plastics to Chemical Reagents
- ASTM D638 Standard Test Method for Tensile Properties of Plastics
- ASTM D790 Standard Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials
- ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by displacement.
- ASTM D2122 Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic Cured-in- Place (GRP-CIPP) Using the UV-Light Curing Method

ASTM D2122 Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM D2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

ASTM D5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Piping Systems

B Qualifications

The Contractor shall be responsible for all aspects of the design of the liner pipe. The Contractor shall guarantee that the installed liner is capable of sustaining outside loads, resist chemical attack that normally occurs in sanitary and storm sewer systems, and will maintain hydraulic characteristics over a fifty (50) year design life.

Unless provided otherwise in the plans or Special Provisions, the existing sewer pipe shall be considered to be in a fully deteriorated condition, is not structurally sound, and cannot support soil and live loads. The cured-in-place pipe shall be designed to support hydraulic, soil, and live loads.

The sewer products are intended to have a fifty (50) year or greater design life, and in order to minimize the Owner's risk, only proven products with substantial successful long term track records will be approved.

B1 Manufactured Products and Installation

Contractors must meet all of the following criteria:

- a. For a Product to be considered acceptable, a minimum of 100,000 linear feet or two hundred fifty (250) manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to the satisfaction of the Engineer. In addition, at least 50,000 linear feet of the product shall have been in successful service within the State for a minimum of five (5) years.
- b. The Contractor's personnel must satisfy all insurance, financial, and bonding requirements of the Owner, and must have had at least 5 (five) years active experience in the commercial installation of the product bid. In addition, the Contractor's personnel must have successfully installed at least 100,000 feet of the same product bid. The Field Supervisor/Foreman shall have a minimum five (5) years as a foreman/superintendent for a cured-in-place lining crew (installing actual product included with this bid/proposal), and a minimum of 100,000 lineal feet of cured-in-place lining, diameters up to and including twenty-four inches (24") installed under his/her supervision. Such experience shall include the actual product, by trade name, Contractor proposes to install. Acceptable documentation of these minimum installations must be submitted to the Engineer.

- c. Sewer rehabilitation products submitted for approval must provide Third Party Test Results supporting the long-term performance and structural strength of the product and such data shall be satisfactory to the Engineer. Test samples shall be prepared so as to simulate installation methods and trauma of the product. No product will be approved without independent third party testing verification.

2631.2 CIPPS MATERIALS

A General

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 materials 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 Plans, Specifications, or Special Provisions.

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

All materials shipped to the project site shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein. Materials shall be shipped, stored, and handled in a manner consistent with written recommendations of the CIPP manufacturer to avoid damage. Damage includes but is not limited to, gouging, abrasion, flattening, cutting, puncturing, and ultra-violet (UV) degradation. All damaged materials shall be promptly removed from the project site at no cost to the Owner. On site material storage locations shall be approved by the Engineer.

A1 CIPPS Fabric Tube

The CIPPS fabric "Tube" shall consist of one or more layers of absorbent non-woven felt fabric, felt/fiberglass or fiberglass and meet the requirements of ASTM F 1216, ASTM F 1743, ASTM D5813 & ASTM F2019. The fabric Tube shall be capable of absorbing and carrying resins, manufactured to withstand installation pressures and curing temperatures, have sufficient strength to bridge missing pipe segments, and stretch to fit irregular pipe sections.

The fabric Tubes shall have a uniform thickness that when compressed at installation pressures will equal the specified nominal tube thickness.

The wet-out fabric tube shall have a uniform thickness and excess resin distribution that when compressed at installation pressures will meet or exceed the design thickness after cure.

The fabric tube shall be manufactured to a size and length that when installed will tightly fit the internal circumference and length of the original pipe. Allowance shall be made for circumferential stretching during installation. The tube shall be properly sized to the diameter of the existing pipe and the length to be rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends. The Contractor shall determine the minimum tube length necessary to effectively span the designated run between manholes. The Contractor shall verify the lengths in the field prior to ordering and prior to impregnation of the tube with resin, to ensure that the tube will have sufficient length to extend the entire length of the run. The

Contractor shall also measure the inside diameter of the existing pipelines in the field prior to ordering liner so that the liner can be installed in a tight-fitted condition. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be allowed.

The minimum length of the fabric tube shall be that deemed necessary by the installer to effectively span the distance from the starting manhole to the terminating manhole or access point, plus that amount required to run-in and run-out for the installation process.

The outside and/or inside layer of the fabric tube (before inversion/pull-in, as applicable) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate, if applicable, vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wet-out) procedure.

No material shall be included in the fabric tube that may cause de-lamination in the cured CIPP. No dry or unsaturated layers shall be acceptable upon visual inspection as evident by color contrast between the felt fabric and the activated resin containing a colorant. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No materials shall be included in the tube that is subject to delamination in the CIPPS.

The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made. The hue of the color shall be dark enough to distinguish a contrast between the fully resin saturated felt fabric and dry or resin lean areas.

Seams in the fabric tube, if applicable, shall meet the requirements of ASTM D5813. The outside of the fabric tube shall be marked every five feet (5') with the name of the manufacturer or CIPP system, manufacturing lot and production footage.

The nominal fabric tube wall thickness shall be constructed to the nearest 0.5 mm increment, rounded up from the design thickness for that section of installed CIPP. Wall thickness transitions, in 0.5 mm increments or greater as appropriate, may be fabricated into the fabric tube between installation entrance and exit access points. The quantity of resin used in the impregnation shall be sufficient to fill all of the felt voids for the nominal felt thickness.

The resin shall be a corrosion resistant polyester or vinyl ester resin and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216, ASTM F1743 or F2019, the physical properties herein, and those, which are to be utilized in the design of the CIPP for this application. The resin shall produce CIPP which will comply with or exceed the structural and chemical resistance requirements of this specification.

A2 CIPPS Structural Requirements

The physical properties and characteristics of the finished liner will vary considerably, depending on the types and mixing proportions of the materials used, and the degree of cure executed. It shall be the responsibility of the Contractor to control these variables and to provide a CIPP system which meets or exceeds the minimum properties specified herein:

- (1) The CIPP shall be designed as per ASTM standards. The CIPP design shall assume no bonding to the original pipe wall.
- (2) The design engineer shall set the long term (fifty (50) year extrapolated) Creep Retention Factor at thirty three percent (33%) of the initial design flexural modulus as determined by ASTM D-790 test method. This value shall be used unless the Contractor submits long term test data (ASTM D2990) to substantiate a higher retention factor.
- (3) The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two (2) layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.

Minimum Physical Properties: The cured pipe material (CIPP) shall, at a minimum, meet or exceed the structural properties, as listed in the table below.

Property	Test Method	Cured Composite Per ASTM F1216	Cured Composite Per Design
Flexural Modulus of Elasticity (Short Term)	ASTM D790	250,000 Psi	Contractor Value
Flexural Strength (Short Term)	ASTM D790	4,500 Psi	Contractor Value

The required structural CIPP wall thickness shall be based as a minimum, on the physical properties listed above and in accordance with the Design Equations in the appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	2.0 (1.5 For Pipes 36" Or Larger)
Creep Retention Factor	33%
Ovality	2% Or As Measured By Field Inspection
Constrained Soil Modulus	Per AASHTO LRFD Section 12 And AWWA Manual M45
Groundwater Depth	As Specified Or Indicated On The Plans
Soil Depth (Above The Crown)	As Specified Or Indicated On The Plans
Live Load	H20 Highway
Soil Load (Assumed)	120 Lb/Cu. Ft.
Minimum Service Life	50 Years

The Contractor shall submit, prior to installation of the lining materials, certification of compliance with these specifications and/or the requirements of the pre-approved CIPP system. Certified material test results shall be included that confirm that all materials conform to these specifications. Materials not complying with these requirements will be rejected.

CIPP Short-Liners or segmental liners shall be of the same materials and meet the structural requirements of the full CIPP Tube liner.

A3 Material Testing Requirements

- (1) Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.
- (2) Hydraulic Capacity - Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.
- (3) CIPP Field Samples - When requested by the Owner, the Contractor shall submit test results from field installations in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in above have been achieved in previous field applications. Samples for this project shall be made and tested as described herein.

2631.3 CIPPS CONSTRUCTION REQUIREMENTS

The Contractor shall clean the interior of the existing host pipe prior to installation of the CIPP liner. All debris and obstructions that will affect the installation and the final CIPP product shall be removed and disposed of. The CIPP liner shall be constructed of materials and methods, that when installed, shall provide a joint less and continuous structurally sound liner able to withstand all imposed static and dynamic loads on a long-term basis.

A Installation of CIPPS

A1 Access

It will be the responsibility of the Owner to locate and designate all manhole access points open and accessible for the work, and provide rights of access to these points. If a street must be closed to traffic because of the orientation of the sewer, the Contractor shall institute the actions necessary to do this for the mutually agreed time period. Traffic Control shall be the responsibility of the Contractor and shall conform to the latest revision of the MMUTCD and other provisions of this specification herein. The Contractor shall keep the roadway open to traffic at all times unless given prior approval by the Engineer.

A2 Water Usage

Water is available from the City at designated locations for cleaning, inversion, and other work items requiring water. Use of an approved double check backflow assembly shall be required. The Contractor shall provide his own approved assembly. The Contractor may use City water but shall inform the Public Works Department of such use and obtain a meter for documenting water usage. No fees will be charged for water.

A3 Cleaning of Sewer Lines

The Contractor shall remove all internal debris from the pipe line that will interfere with the installation and the final product delivery of the CIPP as required in these specifications. Solid debris and deposits shall be removed from the system and disposed of properly by the Contractor. Moving material from manhole section to manhole section shall not be allowed. As applicable the contractor shall either plug or install a flow bypass pumping system to properly clean the pipe lines. The Contractor shall ensure that no debris is transferred downstream during cleaning operations. The Contractor shall use a vacuum vehicle or similar means to remove debris during cleaning operations. Precaution shall be taken, by the Contractor in the use of cleaning equipment to avoid damage to the existing pipe. The repair of any damage, caused by the cleaning equipment, shall be the responsibility of the Contractor. Disposal of the cleaning debris shall be in accordance with local, State and Federal Law and shall be incidental to the CIPPS.

A4 Bypassing Wastewater

The Contractor shall provide a by-pass for the flow of existing mainline and service connection effluent around the section or sections of pipe designated for CIPP installation. Installation of the liner shall not begin until the Contractor has installed a sewage by-pass system and all pumping facilities have been installed and tested under full operating conditions including the bypass of mainline and side sewer flows. Once the lining process has begun, existing sewage flows shall be maintained, until the resin/felt tube composite is fully cured, cooled down, fully televised and the CIPP ends finished. The Contractor shall coordinate sewer bypass and flow interruptions with the Engineer at least fourteen (14) days in advance and with the property owners and businesses at least three (3) business days in advance. The pump and bypass lines shall be of adequate capacity and size to handle peak flows. The Contractor shall submit a detail of the bypass plan and design to the Engineer prior to proceeding with any CIPP installation. Compensation for by-pass pumping and all associated plans and approvals shall be included in the price bid for CIPPS Installation.

A5 Inspection of Pipelines

Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the CIPPS into the pipelines and it shall be noted so that these conditions can be corrected. A video and suitable log shall be kept for later reference by the Owner. The Owner has copies of a video inspection of the sewers to be relined, and these are available for prospective bidders. However, since the deterioration of sewer is an ongoing process, and roots, solids, and deposits can accumulate over time, the Contractor shall base the design of the liner on inspections made immediately prior to installation.

A6 Line Obstructions

It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the inversion process, that was not evident on the pre-bid video and it cannot be removed by conventional sewer cleaning equipment, if directed by the Owner, the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item.

A7 Public Notification

The Contractor shall make every effort to maintain service usage throughout the duration of the project. In the event that a service will be out of service, the maximum amount of time of no service shall be eight (8) hours for any property served by the sewer. A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:

- (1) Written notice to be delivered to each home or business the day prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor they can call to discuss the project or any problem which could arise.
- (2) Personal contact with any home or business, which cannot be reconnected within the time stated in the written notice.
- (3) Notification shall include advisory statements to the resident that:
 - a. To minimize odor problems during the installation of CIPP, residents should be advised to ensure that their sewer traps are in a proper state of repair. In cases of damaged, dry, or non-existent traps, the areas or rooms where floor drains or access to traps are located should be ventilated, if possible, by leaving doors or windows open to the outside during the CIPP installation process.

The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing and curing the CIPP.

A8 Liner Installation

CIPP installation shall be in accordance with the applicable ASTM standards with the following modifications:

- (1) The wet-out tube shall be positioned in the pipeline using the method specified by the manufacturer. Care should be exercised not to damage the tube as a result of installation. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point. If pulled into place, a power winch should be utilized, and care should be exercised not to damage the tube as a result of pull-in friction.

- (2) Prior to installation and as recommended by the manufacturer remote temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner.
- (3) Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or in and output temperatures shall be monitored and logged during the cure cycles. The manufacturer's recommended cure schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Contractor.
- (4) The Contractor shall remove protruding taps to the inside wall of the pipe. In no case shall the pipe be less than ninety five percent (95%) open to flow.

A9 Resin Impregnation

The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used. To insure a through wet-out, the point of vacuum shall be no further than twenty-five feet (25') from the point of initial resin introductions. After vacuum in the tube is established, the vacuum points shall be no further than seventy-five feet (75') from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular to the longitudinal axis of the tube as possible. A roller system shall be used to uniformly distribute tie resin throughout the tube. If the Installer proposes an alternate method of resin impregnation, the method must produce the same results and the method approved by the Engineer.

A10 Cool Down

The Contractor shall cool the CIPP in accordance with the manufacturer's recommendations. Temperatures and curing data shall be monitored and recorded, by the Contractor, throughout the installation process to ensure that each phase of the process is achieved as approved in accordance with the CIPP System manufacturer's recommendations.

Proper curing and handling of CIPP systems shall be done using the following guidelines for discharge of by-products:

Water Curing Method:

Sanitary Sewers

- (1) Release process water to the sewer after per industry standards during/after cool-down.

Storm Sewers and Culverts

- (1) Based upon receiving waterway's assimilative capacity
 - a. Discharge water when cooled to ambient air temperature
 - b. Discharge water once styrene concentration is confirmed to be at or below 25ppm; or,
 - c. Transport process water to nearest wastewater treatment facility

Steam Curing Method:

Sanitary Sewers

- (1) Release condensate water directly to receiving sewer while processing

Storm Sewers and Culverts

- (1) Based upon receiving waterway's assimilative capacity
 - a. Detain condensate in a lined holding pond until it cools to ambient
 - b. Discharge water once styrene concentration is confirmed to be less than 25ppm; or
 - c. Retrieve condensate by pumping it into the steam generation truck's reservoir; or
 - d. Transport condensate to nearest wastewater treatment facility.

A11 Finishing Operations

The installed CIPP shall be continuous over the entire length of a sewer line section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and delamination. The lining shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe. Any defect, which will or could affect the structural integrity or strength of the linings, shall be repaired at the Contractor's expense. The beginning and end of the CIPP shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal. If any of the service connections leak water between the host pipe and the installed liner, the connection mainline interface shall be sealed to provide a watertight connection. If the wall of the CIPP leaks, it shall be repaired or removed and replaced with a watertight pipe as recommended by the manufacture of the CIPP system.

At all points where the liner pipe has been exposed (such as service connection fittings, or other points where the old pipe must be removed), the liner pipe and fittings shall be encased in cement-stabilized sand or other high density material as specified by the Engineer to prevent deflection due to difference in subsidence. After the encasement material is in place and accepted by the Engineer, backfill is placed and compacted to require finish grade in accordance with the specifications. Particular care should be taken to ensure compaction of earth beneath the lateral/service pipe in order to reduce subsidence and resultant bending at the lateral connection at the sewer main.

A12 Manhole Connections

A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP shall be applied at manhole walls in accordance with the CIPP System manufacturer's recommendations.

A13 Reconnections of Existing Services

Services shall be identified by the Contractor prior to lining work. After the pipe has been reconstructed and tested, the service connections shall be reconnected. It is the Contractor's responsibility to make sure that all service connections are reconnected, unless otherwise directed by the Engineer. A CCTV camera and remote cutting tool shall be used for internal reconnections. The machined opening shall be at least ninety five percent (95%) of the service connection opening and the bottom of both openings must match. The opening shall not be more than one hundred percent (100%) of the service connection opening.

The edges of the opening shall not have pipe fragments or liner fragments, which may obstruct flow or snag debris. In the event that service reinstatements result in openings that are greater than one hundred percent (100%) of the service connection opening, the Contractor shall install a CIPP type repair, sufficiently in size to completely cover the over-cut service connection. No additional compensation will be paid for the repair of over-cut service connections. Discs of pipe material resulting from service tap cutting shall be collected at the next manhole downstream of the pipe rehabilitation operation prior to leaving the site. Discs shall not be allowed to pass through the system.

A14 CIPP Short-Liner

The CIPP short-liner shall meet the requirements of the full length CIPP liner and the following:

- (1) The Short-Liner shall be inserted into the existing sewer line with a power winch and steel cable attached to the end of the liner by use of an appropriate pulling head. Length of the liner to be inserted at any one time shall be governed by the length of the section in need of repair or the maximum length of the installation equipment considering the size and condition of the sewer.
- (2) A mobile installation unit shall be brought to the site ready to process the liner. The installation unit shall contain heat generating equipment, CCTV facility and other auxiliary miscellaneous equipment necessary for controlling processing of the Short-Liner pipe. The equipment shall be positioned next to the point of entry with minimum obstruction to the other side activities and shall be operated by trained personnel only.
- (3) The pressure shall be increased to compensate for the heating-cooling transition and it shall be maintained until the temperature at the lowest critical point is 100° F (38° C). This shall constitute completion of the Short-Liner pipe processing. The pipe within the pipe shall be tight fitting and adapted to the existing sewer pipe.

B TESTING AND INSPECTION

B1 Testing

CIPP samples shall be prepared and tested in accordance with ASTM F1216, Section 8.1, using either method proposed. Leakage testing of the CIPP shall be accomplished during cure while under a positive head. CIPP products in which the pipe wall is cured while not in direct contact with the pressurizing fluid (e.g., a removable bladder) must be tested by an alternative method approved by the Engineer.

B2 Inspection

Visual inspection of the CIPP shall be in accordance with ASTM F1216, Section 8.4. The relined pipe shall be continuous without joints through the entire pipe length. The liner shall be free of all visible defects except those resulting from pre-lined conditions which the Contractor has noted prior to lining. There shall be no pits, pinholes, cracks, or crazing, and the surface shall be smooth and free of waviness throughout the pipe. Any defects shall be repaired by the Contractor with no expense to the Owner. Where leakage is observed through the wall of the pipe, the contractor shall institute additional testing including but not limited to air testing, localized testing and any other testing that will verify the leak proof integrity of the installed CIPP to the satisfaction of the Owner.

B3 Televising

Prior to final acceptance of any sanitary sewer relining including short-liners, the Contractor shall inspect by means of remote closed circuit television equipment the entire segment of sanitary sewer, manhole-to manhole. Sewer shall be cleaned prior to inspection. A video of the inspection shall be furnished to the City. The following conditions shall apply to the sewer acceptance TV inspection:

- (1) The video shall be in a format to be decided by the Owner, that creates high quality picture and sound and shall be recorded in color.
- (2) The TV camera shall be pulled through the sewer at a maximum rate of thirty-five feet (35') per minute.
- (3) The camera shall be pulled downstream in all cases.
- (4) The lens of the camera shall be cleaned at each manhole or when directed by the Owner.
- (5) The recording shall have an on-screen display showing the following:
 - a. Upstream and downstream manhole numbers
 - b. Footage from the upstream manhole
 - c. Inspection date
- (6) Sewers shall not be televised within forty-eight (48) hours of a rainfall event greater than one half inch ($\frac{1}{2}$ ").

2631.4 CIPPS METHOD OF MEASUREMENT

Measurement for CIPP Lining shall be on a linear foot basis, to the nearest whole foot, measured from center of manhole to center of manhole.

2631.5 CIPPS BASIS OF PAYMENT

The proposal form shall cover all work shown on the contract drawings, specifications, and Special Provisions. All costs associated with the work including furnishing of all materials, providing all construction and equipment, and performing all necessary labor, coordination, supervision, and management to fully complete the work, shall be included in the unit or lump sum prices quoted in the proposal form. This work shall include restoration of all surfaces to their original condition or better. Reconnection of all existing services shall be considered incidental to the CIPPS. All work not specifically set forth as a pay item in the proposal form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the amounts and prices submitted in the proposal form.

The following methods of measurement for payment will be used to derive the quantities installed:

(1) Site Protection and Restoration

- a. No separate payment will be made for protection and restoration of roadway surfaces, curb and gutter, landscaping, and other site features unless otherwise specified.

(2) Spot Repair to existing pipe

- a. Bid items have been provided in the proposal for removal and replacement of pipe as Spot or Point Repairs. No additional compensation will be granted for repairs.

(3) Cured-in-Place Pipe System (CIPPS)

- a. Payment shall be made at the unit price as listed on the proposal. All work related to the cleaning, installation and acceptance of the system as a whole shall be considered incidental to CIPPS installation.
- b. Payment for re-instatement of services shall be at the unit price listed on the proposal per each service, and shall be compensation in full for all materials, labor, equipment, and maintenance necessary to complete the work as required by the plans or required by the Engineer.
- c. Payment for Short-Liner installations shall be made at the unit price listed on the proposal and shall be compensation in full for all materials, labor, equipment, and maintenance necessary to complete the work as required by the plans or required by the Engineer.

SECTION 2641 – STANDARD SPECIFICATIONS FOR PIPELINE REHABILITATION BY PIPE BURSTING

2641.1 DESCRIPTION

A General

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation “Standard Specifications for Construction”, and all supplements and amendments thereto, published prior to the date of advertisement for bids.

This specification shall cover the rehabilitation of existing gravity and pressure utility pipelines using pipe bursting methods. Pipe bursting is a process by which the bursting unit fractures the existing pipe while simultaneously installing a new pipe of the same size or larger size pipe in the place of the existing pipe. Existing lateral and service connections are disconnected prior to mainline pipe bursting to reduce lateral pipe/service pipe damage, then reconnected after testing and disinfection of the new pipe as applicable is approved, television inspection of the new pipe is performed, and the installation is completed in accordance with the contract documents.

2641.2 QUALIFICATIONS

The Contractor shall be certified by the Pipe Bursting System Manufacturer as a fully trained installer of the pipe bursting system. The Contractor shall provide certifications of training and proficiency in the use of the equipment. Only the Contractor's employees that are trained and certified shall operate the equipment.

The Contractor shall have a minimum of five (5) years' experience using the pipe-bursting method proposed and shall have installed no less than 50,000 feet by this method.

2641.3 MATERIALS

Pipe materials meet the requirements described in Sections 2611.2 and 2621.2 of these specifications, and as provided in the Special Provisions and the following:

- (1) Sizes of the new pipe insertions shall be such to renew the pipe mainline to greater than the original flow capacity.
- (2) All pipe and fittings shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
- (3) The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- (4) Tensile strength of the pipe shall be in accordance with manufacturer's recommendation for the specified purpose and method of installation.

- (5) Material color shall be as specified with interior of pipe having a light reflective color to allow for viewing for television inspection. The fused pipe joints shall be de-beaded to reduce collection of sediment and allow a camera to pass during inspection.
- (6) The Contractor shall consult with the selected pipe bursting equipment manufacturer regarding recommendations for the installation of pipe materials specified.

2641.4 SUBMITTALS

The Contractor shall submit the following:

- (1) Tests for compliance with this specification shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate from the manufacturer indicating the materials furnished meet the requirements of these specifications.
- (2) Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged.
- (3) Certification of Contractor and assigned personnel training for installing pipe.
- (4) Detailed submittal of the procedures and method proposed by the Contractor to burst the existing pipe and insert the new pipe.
- (5) Television inspection reports and video made of the existing pipe and after new pipe installation.

2641.5 DELIVERY, STORAGE, AND HANDLING

The Contractor shall transport, handle, and store pipe and fittings as recommended by the manufacturer. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Engineer at the Contractor's expense, before proceeding further. Deliver, store and handle other materials as required to prevent damage.

2641.6 LICENSE AGREEMENTS

The Contractor shall submit evidence acceptable to the Owner, such as a certified copy of a license or agreement that it has the authority to use the proposed method from the patent holder and licensed manufacturer. The Contractor agrees to defend, indemnify, and hold harmless the Owner and the Engineer against all claims, suits, and actions or other damages as a result of negligence of any person or property arising out of patent infringement by the Contractor or the Contractor's employee's, agents, the suppliers, or any tier of subcontractors involved in the work.

2641.7 CONSTRUCTION REQUIREMENTS

Before excavation is started, it will be the responsibility of the Contractor to check with the various utility companies and determine the location and depth of the existing utilities in the vicinity of the work area.

Damage to utilities and the resulting repair, temporary service cost, etc., shall be borne by the Contractor. Access pits shall be backfilled in accordance with Section 2600, Trench Excavation and Backfill.

All excavations shall be properly sheeted/shored in accordance with relevant specifications for trench safety systems. Any damage resulting from improperly shored excavations shall be corrected to the satisfaction of the Engineer with no compensation to the Contractor.

All open excavations shall be kept secure at all times by the use of barricades and fencing with appropriate lights and signs, construction tape, covering with steel plates, etc., or as directed by the Engineer.

All lateral and service connections shall be identified, located and excavated prior to the pipe insertion to expedite reconnection. The Contractor shall use excavation methods that will not create a rise or sag at the service or lateral connection for gravity sewers. A rise or sag in the sewer will be repaired by the contractor at no expense to the Owner, in a manner approved by the Engineer.

The location and number of insertion and receiving excavations shall be planned by the Contractor and submitted in writing for approval by the Engineer at least ten (10) days prior to excavation.

One (1) or more receiving pits shall be excavated at the end(s) of the pipe to be replaced or at appropriate points within the length of the existing pipe. Pit shall be centered over the existing pipe. The number of pits for machine and pipe insertion shall be the minimum necessary to most efficiently accomplish the work. The Contractor shall give consideration to the use of excavation required for other purposes such as for sanitary sewer service reconnections and manhole replacement.

Where manholes are used as machine or new pipe insertion pits, the Contractor shall identify such manholes and replace them at no additional cost to the Owner if damaged. Any manhole modification or replacement required shall be considered incidental to the installation of the new pipe. Equipment used to perform the work shall be located away from buildings so as not to create noise impact. Provide a silent engine compartment to reduce machine noise as required to meet local requirements.

The Contractor shall install all pulleys, rollers, bumpers, alignment control devices, and other equipment required to protect existing manholes and pipe components not intended for removal/replacement, and to protect the new pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. If lubrication is used for insertion, the Contractor shall ensure that the lubricant does not backfill existing services. Under no circumstances will the pipe be stressed beyond eighty percent (80%) of its elastic limit as published and recommended by the manufacturer.

Pipe insertion shall be continuous and without interruption from manhole to manhole for sewers, or junction to junction for watermain, except as approved by the Engineer. Upon completion of insertion of the new pipe, and after the relaxation period, the Contractor shall expedite the reconnection of laterals and services so as to minimize any inconvenience to customers. Connection of services shall be in accordance with Sections 2611 and 2621 of these specifications and as provided in the Special Provisions.

The installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than four (4) hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit. Sufficient excess length of new pipe, but not less than four inches (4"), shall be allowed to protrude into manholes. Restraint of pipe ends shall be achieved by means of electrofusion couplings. The electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of electrofusion couplings shall be done in accordance with the manufacturers recommended procedures.

Following the relaxation period, the annular space at the manhole shall be sealed. Sealing shall be made with material approved by the Engineer and shall extend a minimum of eight inches (8") into the manhole wall in such a manner as to form a smooth, uniform, watertight joint.

Fused pipe joints shall be de-beaded to create a smooth flow line. There shall be no ridges or burrs from the fusion method exposed on the interior of the pipe following installation.

Tracer wire shall be installed with the pipe in accordance with 2611 and 2621.

Equipment: The pipe bursting tool shall increase the external dimensions sufficiently, causing breakage of the existing pipe at the same time expanding the surrounding ground. Simultaneously, the new pipe, directly attached to the expander, shall also move forward. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as parameters of what size tool for percentage of upsize allowed.

The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the pipe insertion.

Bypass Pumping: The Contractor, when and where required for sanitary sewer replacement, shall provide diversion for the pipe bursting/replacement process. The pumps and by-pass lines shall be of adequate capacity and size to handle all flows. All costs for by-pass pumping required during installation of the pipe shall be incidental to the installation of the pipe, unless otherwise provided in the Special Provisions.

Temporary Water: The Contractor when and where required for watermain replacement, shall provide all labor, materials, and equipment associated with managing, constructing, and maintaining a temporary potable water distribution system for all existing water users which must be taken out of service for a period exceeding eight (8) hours, or as required at the discretion of the Engineer. All costs to provide temporary water required during installation of the pipe shall be incidental to the installation of the pipe, unless otherwise provided in the Special Provisions.

2641.8 TESTING AND INSPECTION

Testing: Tests for compliance with this specification shall be made as described herein and in accordance with the applicable ASTM Specification. A certificate with this specification shall be furnished, upon request, by the manufacturer for all material furnished under this specification.

Inspection: Video inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit color television. Video inspection shall include the following:

- Two (2) copies of the DVD's in mpeg4 format (post) to be submitted to the Owner before final invoice.
- DVD's are to remain property of the Owner; Contractor to retain second copy.
- All flows tributary to reach of sewer being inspected are to be completely by-passed around the reach during inspection if necessary and required by the Owner.
- Pre-construction video of the existing pipe and post construction video inspection upon completion of reconstruction of each reach of pipe, with the voice description, with stationing of services indicated. Data and stationing to be on video.
- Should any portion of the video inspection be of inadequate quality or coverage, as determined by the Owner the Contractor will have the portion re-inspected and video recorded at no additional expense to the Owner.

2641.9 METHOD OF MEASUREMENT

Measurement for pipe bursting shall be on a linear foot basis, to the nearest whole foot, measured from center of manhole to center of manhole or junction point to junction point as indicated on the plans.

2641.10 BASIS OF PAYMENT

Pipe Bursting: The work performed as prescribed by this item will be paid for by the linear foot at the unit price bid for the pipe bursting/replacement at the specified pipe diameter and location which price shall be full compensation for the installation of the new pipe, furnishing and placing of all materials, labor, tools, equipment, cleaning, and preparation of the existing pipe to receive the new pipe, tracer wire, pipe bedding, backfill material, annulus sealing material and launching pits, and video inspection of final installed pipe, bypass pumping, temporary water distribution, traffic control, sealing at manholes, locating, excavating, disconnecting, testing in accordance with the Contract Documents, and all else incidental thereto for which separate payment is not provided under other Items in the Bid Form.

APPENDIX B
AWWA C153 COMPACT FITTING WEIGHTS

Ductile Iron Mechanical Joint Compact Fittings

Weight in Pounds per AWWA C153

BENDS (MJ-MJ)				
Size	90°	45°	22 1/2°	11 1/4°
4"	25	22	18	16
6"	39	32	31	30
8"	57	46	46	42
10"	89	70	64	58
12"	108	86	80	67
14"	210	160	136	93
16"	264	202	172	148
18"	335	250	255	205
20"	400	305	310	245
24"	565	405	412	315

NOTE:

DO NOT use 90° bends.

Use (2) 45° bends.

TEES (MJ-MJ)										
Size	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
4"	32									
6"	46	56								
8"	60	72	86							
10"	78	90	105	120						
12"	94	110	125	140	160					
14"	172	182	206	228	234	280				
16"		228	248	264	280	316	322			
18"		275	295	315	335	380	405	435		
20"		315	345	370	395	440	465	505	535	
24"		415	445	470	500	550	580	625	660	720

CROSSES (MJ-MJ)										
Size	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
4"	40									
6"	68	75								
8"	90	108	105							
10"	98	118	138	145						
12"	100	140	162	190	213					
14"	162	181	259	223	244	299				
16"		250	289	345	397	333	385			
18"		260	282	308		384		630		
20"		306	341	370	392	451	634	547	605	
24"		403	431	465	494	553	714		809	830

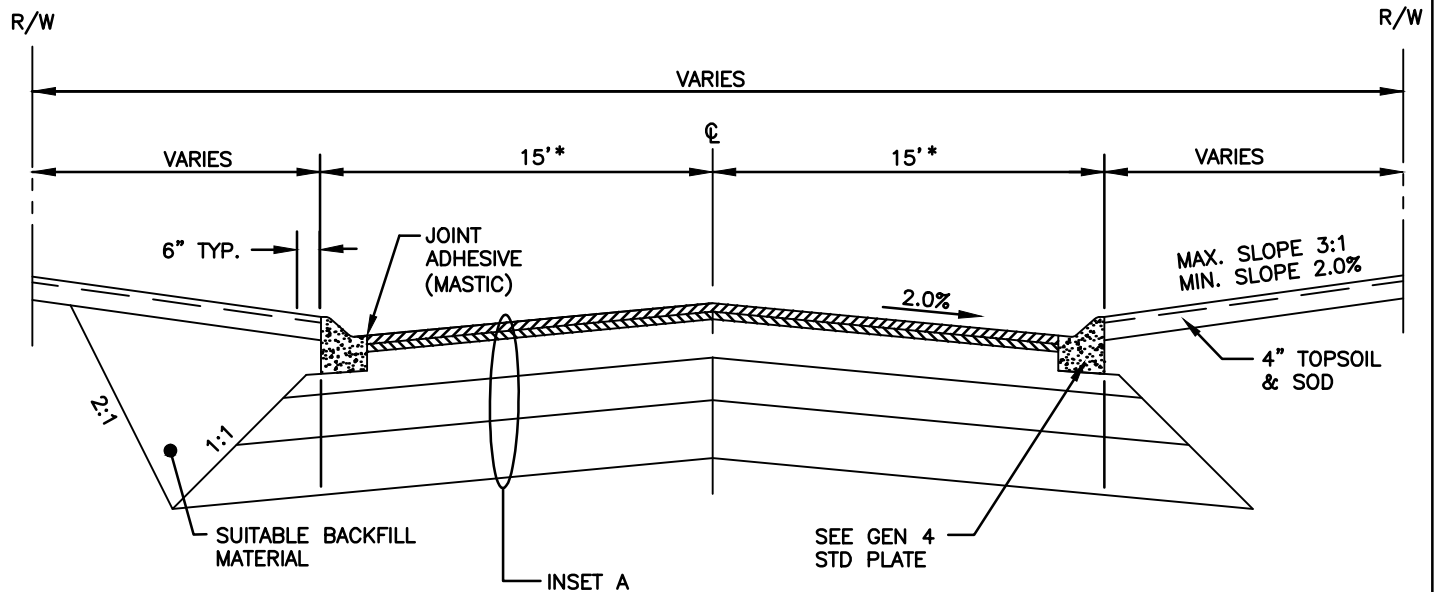
REDUCERS (MJ-MJ)										
Size	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
6"	32									
8"	43	54								
10"	61	64	62							
12"	82	85	82	82						
14"		108	104	100	100					
16"		136	132	128	125	140				
18"		194	196	185	190	190	196			
20"				225	210	208	225	233		
24"					310	315	324	312	315	

SOLID SLEEVES (MJ)		
Size	Short	Long
4"	17	20
6"	28	33
8"	38	46
10"	49	62
12"	56	76
14"	111	140
16"	123	170
18"	160	200
20"	195	255
24"	225	335

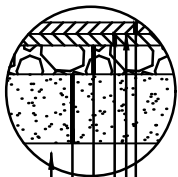
CAPS (MJ) FLAT	
Size	
4"	9
6"	15
8"	22
10"	32
12"	42
14"	66
16"	92
18"	114
20"	125
24"	166

PLUGS (MJ) FLAT	
Size	
4"	10
6"	16
8"	26
10"	36
12"	46
14"	75
16"	95
18"	121
20"	135
24"	175

APPENDIX C
CITY OF LINO LAKES STANDARD DETAIL PLATES

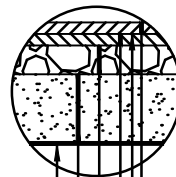


* ROAD WIDTH DIMENSION MEASURED TO FACE OF CURB



1.5" SPEC 2360 TYPE SP 9.5 WEARING COURSE (SPWEA240C)
 SPEC 2357 BITUMINOUS TACK COAT
 3" SPEC 2360 TYPE SP 12.5 NON WEARING COURSE (SPNWB230C)
 8" AGGREGATE BASE, CL 5
 24" SELECT GRANULAR BORROW
 24" APPROVED SUBGRADE **

INSET A
(OPTION 1)



1.5" SPEC 2360 TYPE SP 9.5 WEARING COURSE (SPWEA240C)
 SPEC 2357 BITUMINOUS TACK COAT
 3" SPEC 2360 TYPE SP 12.5 NON WEARING COURSE (SPNWB230C)
 8" AGGREGATE BASE, CL 5
 36" SELECT GRANULAR BORROW
 GEOTEXTILE FABRIC

INSET A
(OPTION 2)

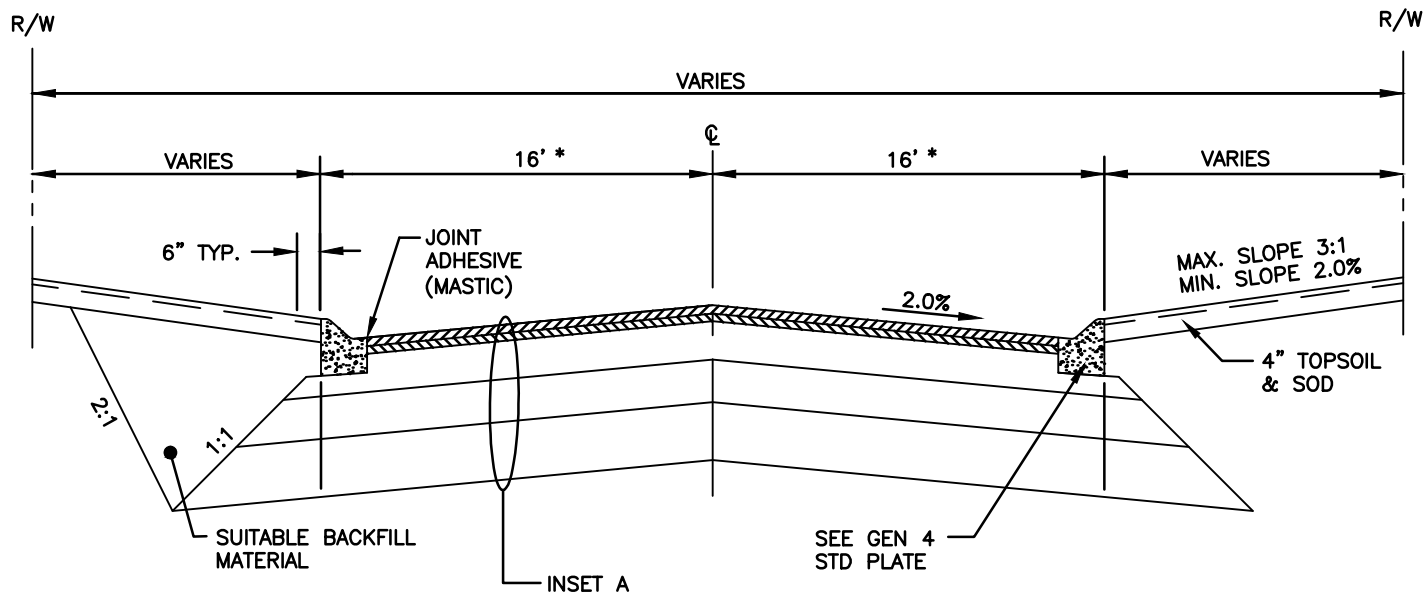
** THIS WORK SHALL INCLUDE OVER TURNING THE SOIL IN WET CONDITIONS TO DRY SUBGRADE MATERIAL AND PASSING ROLL TEST (INCIDENTAL).



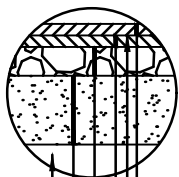
**PUD TYPICAL SECTION
(URBAN STREET)**

JANUARY, 2024

GEN-1 PUD

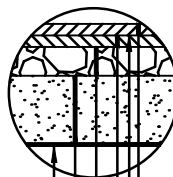


* ROAD WIDTH DIMENSION MEASURED TO BACK OF CURB



- 1.5" SPEC 2360 TYPE SP 9.5 WEARING COURSE (SPWEA240C)
- SPEC 2357 BITUMINOUS TACK COAT
- 3" SPEC 2360 TYPE SP 12.5 NON WEARING COURSE (SPNWB230C)
- 8" AGGREGATE BASE, CL 5
- 24" SELECT GRANULAR BORROW
- 24" APPROVED SUBGRADE **

INSET A
(OPTION 1)



- 1.5" SPEC 2360 TYPE SP 9.5 WEARING COURSE (SPWEA240C)
- SPEC 2357 BITUMINOUS TACK COAT
- 3" SPEC 2360 TYPE SP 12.5 NON WEARING COURSE (SPNWB230C)
- 8" AGGREGATE BASE, CL 5
- 36" SELECT GRANULAR BORROW
- GEOTEXTILE FABRIC

INSET A
(OPTION 2)

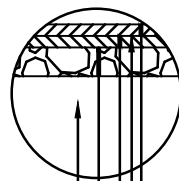
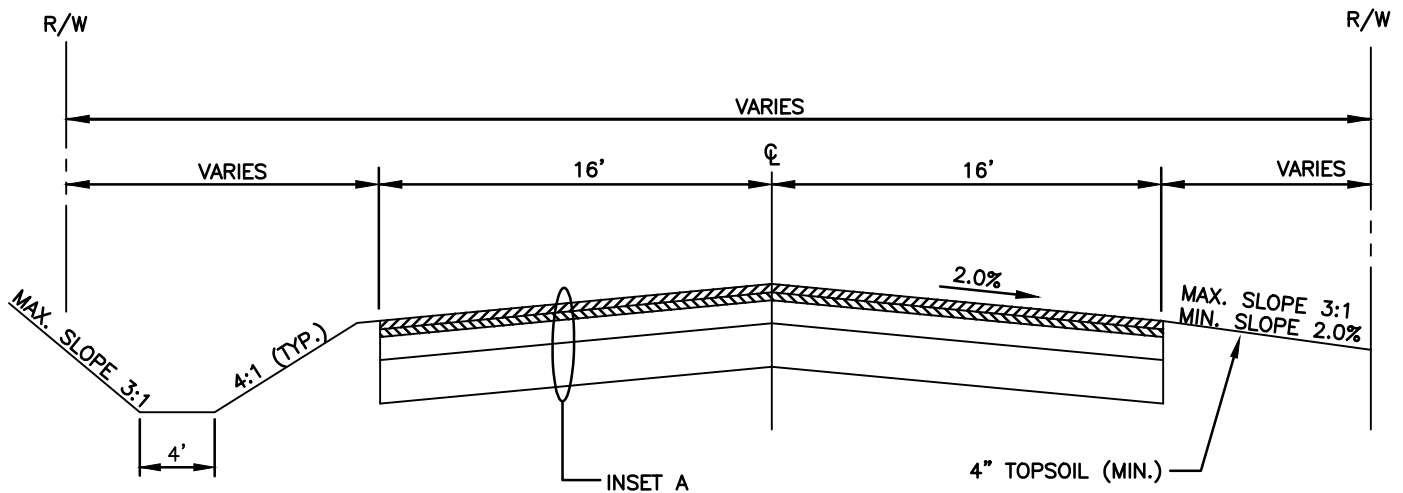
** THIS WORK SHALL INCLUDE OVER TURNING THE SOIL IN WET CONDITIONS TO DRY SUBGRADE MATERIAL AND PASSING ROLL TEST (INCIDENTAL).



TYPICAL SECTION (URBAN STREET)

JANUARY, 2024

GEN-1



- 1.5" 2360 TYPE SP WEARING COURSE
- 2357 BITUMINOUS TACK COAT
- 2" 2360 TYPE SP NON-WEARING COURSE
- 6" AGGREGATE BASE, CL 5
- 24" APPROVED SUBGRADE *

INSET A

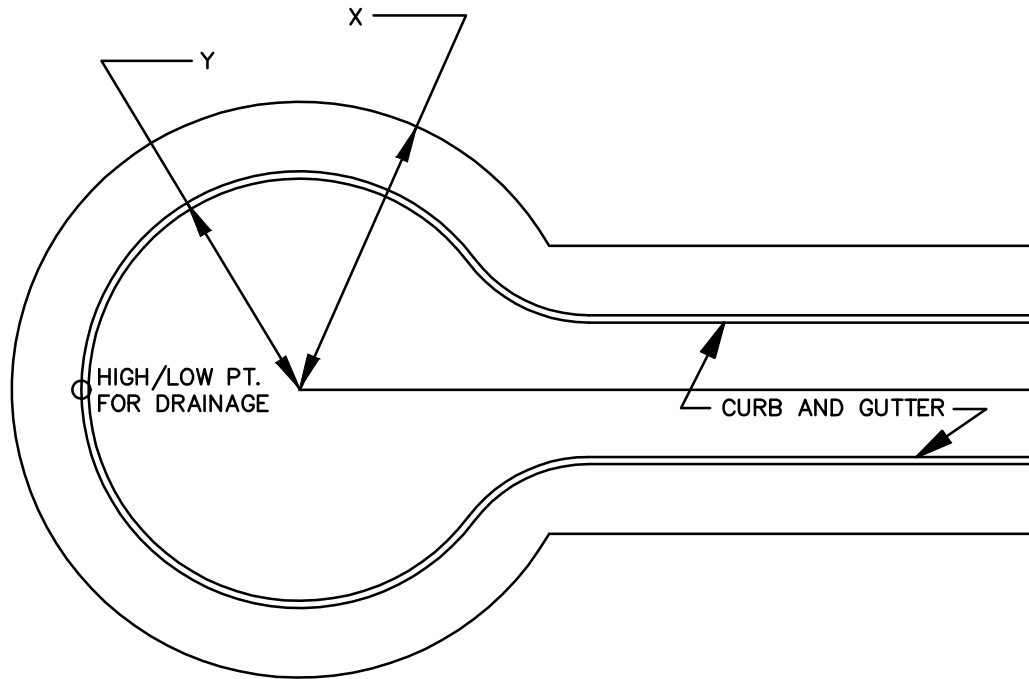
* THIS WORK SHALL INCLUDE OVER TURNING THE SOIL IN WET CONDITIONS TO DRY SUBGRADE MATERIAL (INCIDENTAL).



TYPICAL SECTION
(RURAL STREET)

JANUARY, 2024

GEN-2



STANDARD CUL-DE-SAC

	X	Y*
COM./IND.	60' RAD.	AS DIRECTED BY THE ENGINEER
URBAN	60' RAD.	46' RAD.
RURAL	60' RAD.	46' RAD.

***NOTE:**

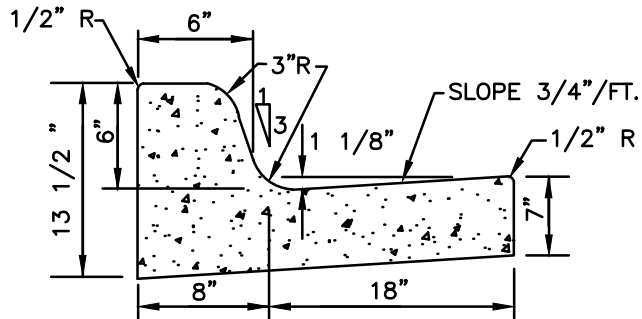
1. ALL DISTANCE FOR STREET WIDTHS ARE MEASURED TO BACK OF CURB.



STANDARD
CUL-DE-SAC

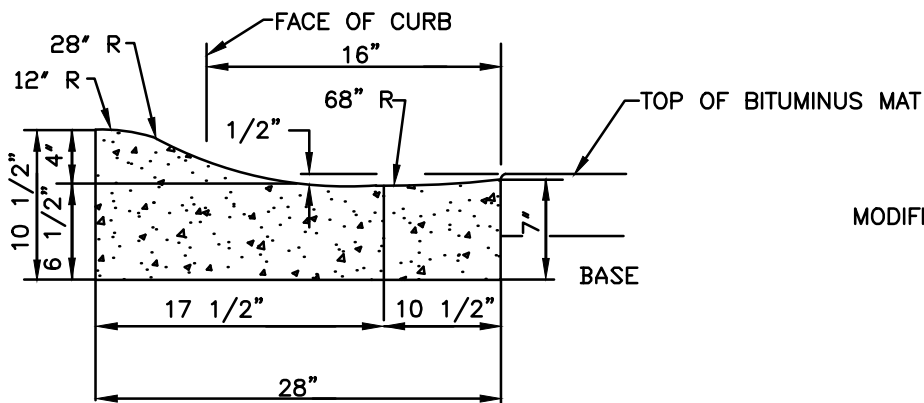
JANUARY, 2024

GEN-3



MnDOT B618

CY CONCRETE PER LIN. FT. = .0582
LIN. FT. PER CY OF CONCRETE = 17.2



MODIFIED 'S' DESIGN

NOTES:

1. MINIMUM OF 3" AGGREGATE BASE, CL 5 UNDER ALL CURB AND GUTTER
2. STAMP W FOR WATER SERVICE AND S FOR SANITARY SERVICE

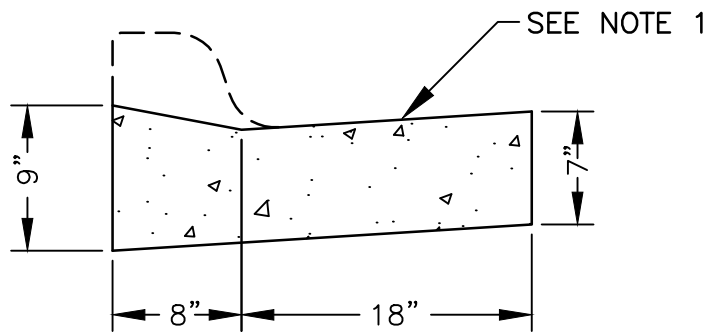
NO SCALE



CONCRETE CURB
AND GUTTER

JANUARY, 2024

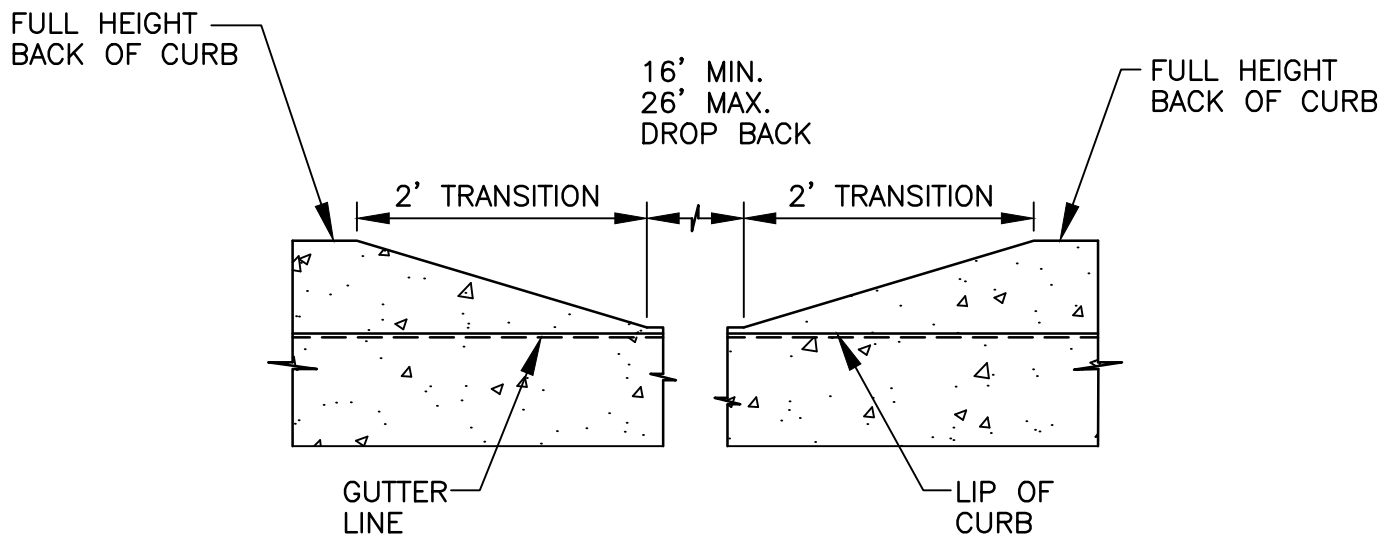
GEN-4



NOTES:

1) SLOPE $\frac{3}{4}$ " PER FOOT NORMAL, UNLESS OTHERWISE SPECIFIED. IF A DIFFERENT GUTTER SLOPE IS PERMITTED, THE GUTTER FORM MAY BE TILTED.

2) DROP CURB BACK AT DRIVEWAY OPENINGS. TRANSITION FROM FULL BACK TO DROP BACK TO BE MADE IN 2'. ROUND ALL SLOPE INTERSECTIONS.



NOTES:

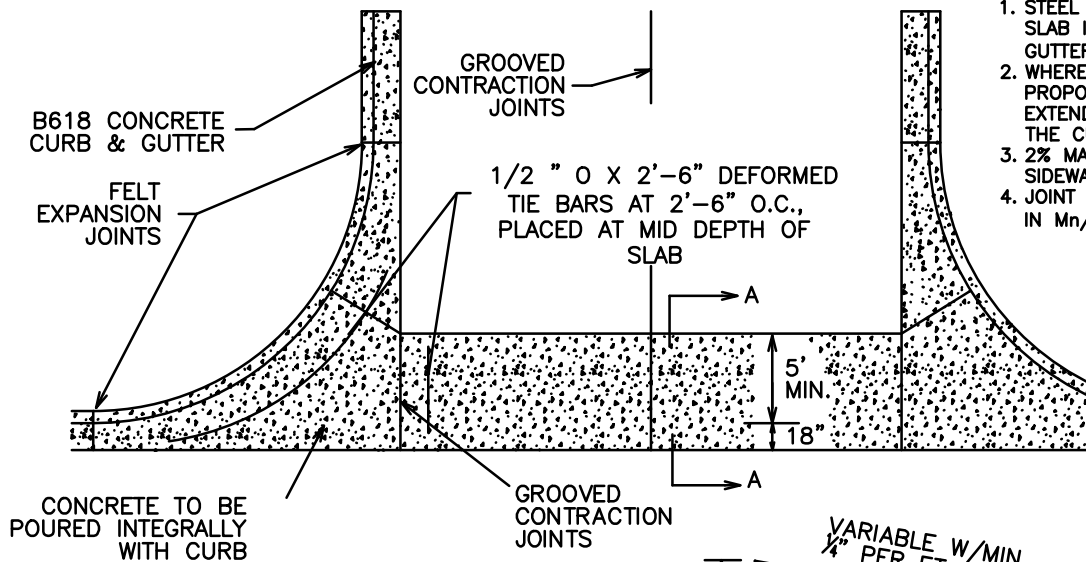
1. DRIVEWAYS WITH GRADE GREATER THAN 10% MUST OBTAIN ENGINEERING DEPT. APPROVAL.
2. DRIVEWAY AREA MUST MEET CODE FOR LOT COVERAGE.
3. NO DRIVEWAY SHALL BE CLOSER THAN 40' FROM END OF CORNER RADII.
4. DRIVEWAY WIDTH IS 28' MAXIMUM FROM RIGHT-OF-WAY LINE TO BACK OF CURB.
5. DRIVEWAYS SHALL BE NO CLOSER THAN 5' FROM THE ADJACENT PROPERTY LINE.
6. A FORD A-1 METER BOX IS REQUIRED FOR ALL CURB STOPS LOCATED WITHIN THE DRIVEWAY.
7. JOINT WIDTH SHALL BE AS SPECIFIED IN Mn/DOT 2521.



RESIDENTIAL DRIVEWAY

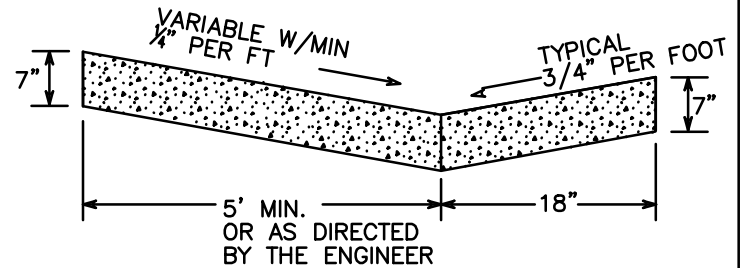
JANUARY, 2024

GEN-5



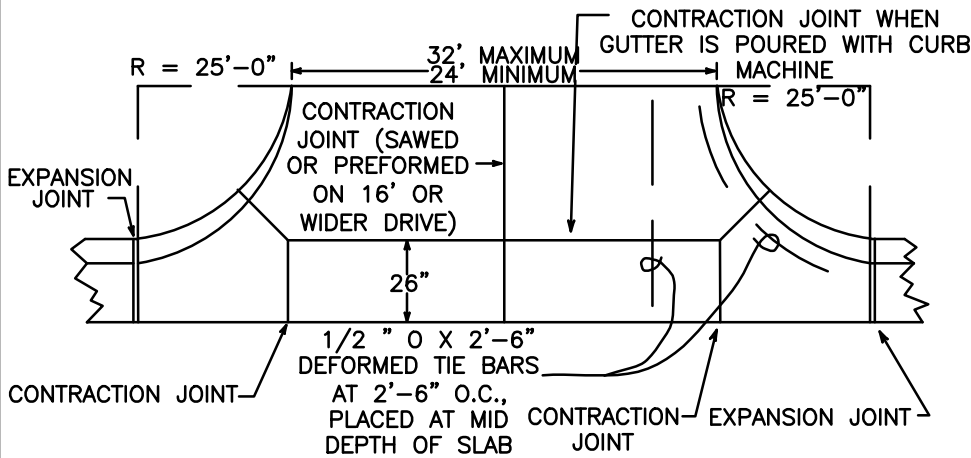
NOTES:

1. STEEL TO BE USED WHEN DRIVEWAY SLAB IS NOT POURED INTEGRAL WITH GUTTER (SEE ABOVE).
2. WHERE SIDEWALKS EXIST OR ARE PROPOSED, THE DRIVEWAY SHALL EXTEND THROUGH THE SIDEWALK WITH THE CURB DROPPED.
3. 2% MAXIMUM CROSS-SLOPE ON SIDEWALKS.
4. JOINT WIDTH SHALL BE AS SPECIFIED IN Mn/DOT 2521.



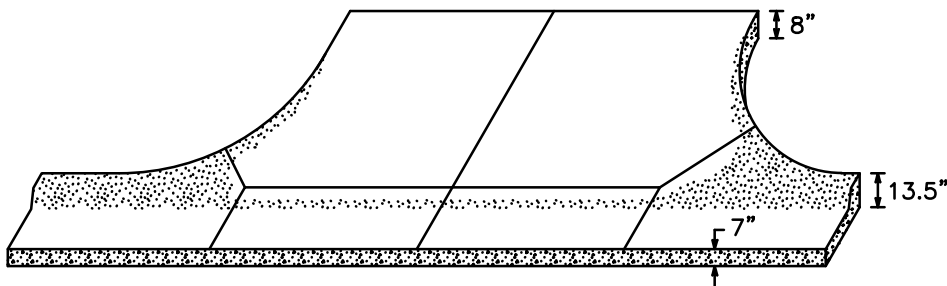
DRIVEWAY WITH CURB

SECTION A-A



NOTES:

1. DRIVEWAYS WITH GRADE GREATER THAN 8% MUST OBTAIN ENGINEERING DEPARTMENT APPROVAL.
2. DRIVEWAY AREA MUST MEET CODE FOR LOT COVERAGE.
3. NO DRIVEWAY SHALL BE CLOSER THAN 40' FROM END OF CORNER RADII.
4. 2% MAX. CROSS-SLOPE ON SIDEWALKS.
5. WHERE SIDEWALKS EXIST OR ARE PROPOSED, THE DRIVEWAY SHALL EXTEND THROUGH THE SIDEWALK.
6. STEEL TO BE USED WHEN DRIVEWAY SLAB IS NOT POURED INTEGRAL WITH GUTTER (SEE PLAN).



DRIVEWAY WITHOUT CURB



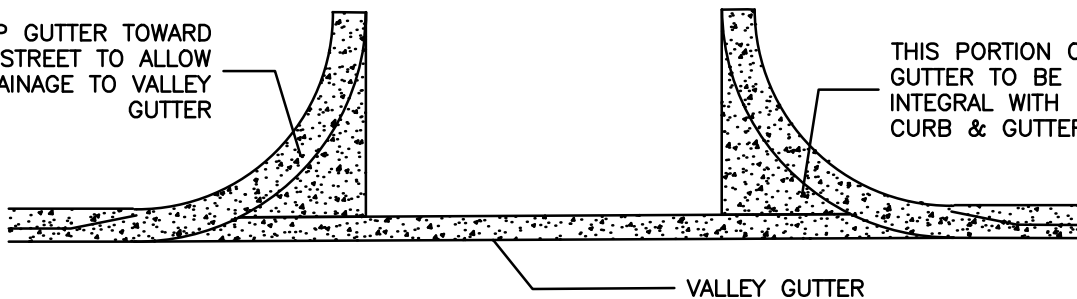
COMMERCIAL/MULTI-FAMILY/
INDUSTRIAL DRIVEWAY

JANUARY, 2024

GEN-6

TIP GUTTER TOWARD
STREET TO ALLOW
DRAINAGE TO VALLEY
GUTTER

THIS PORTION OF VALLEY
GUTTER TO BE POURED
INTEGRAL WITH
CURB & GUTTER

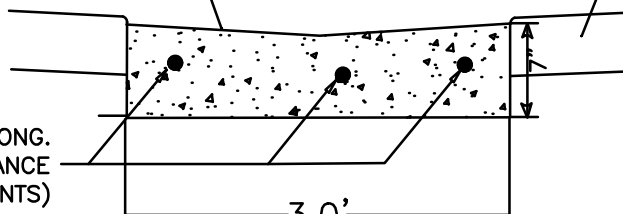


SLOPE $\frac{3}{4}$ " PER FOOT

BITUMINOUS

3-#4 BARS LONG.
WITH 3" CLEARANCE
(BETWEEN JOINTS)

3.0'



NOTES:

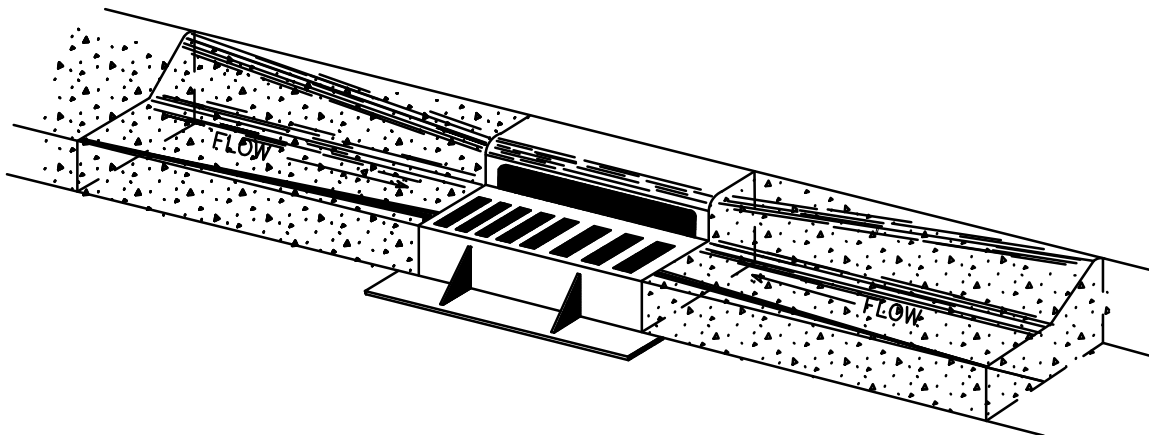
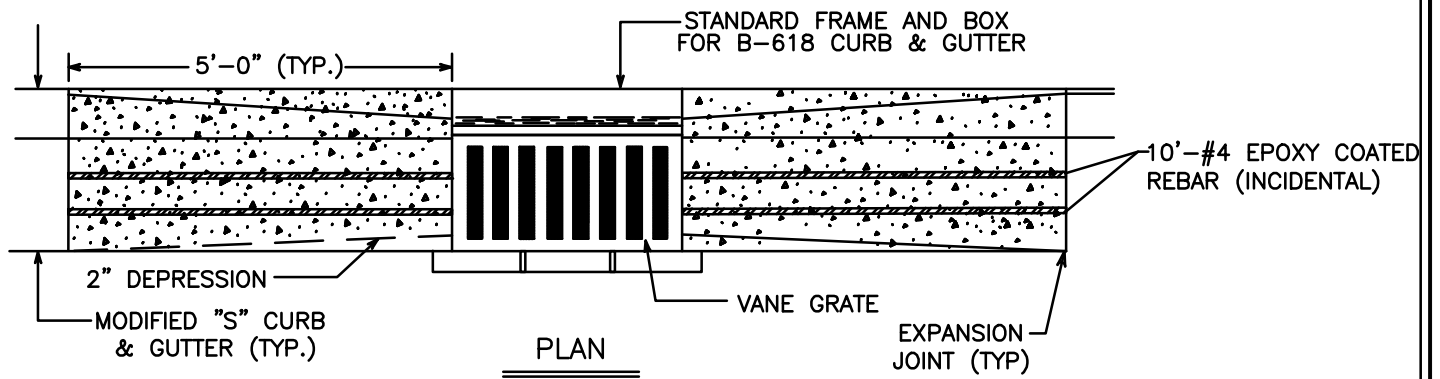
1. SEE PLATE NO. ST-2 FOR CONCRETE CURB AND GUTTER DETAILS.
2. #4 ROD TO BE USED IN VALLEY GUTTER FROM EXPANSION JOINT TO EXPANSION JOINT.
3. PAID AS 7" CONCRETE VALLEY GUTTER.



VALLEY GUTTER

JANUARY, 2024

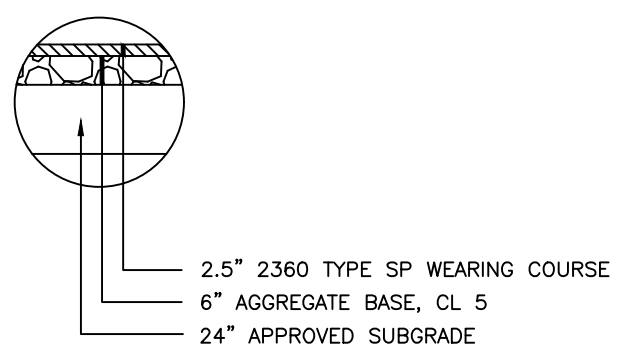
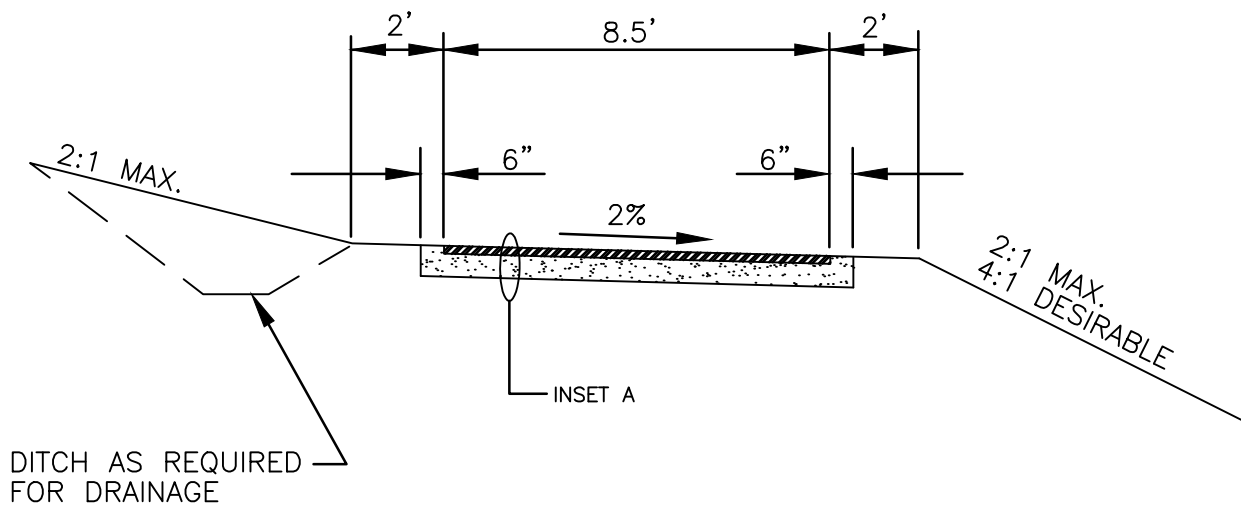
GEN-7



CATCH BASIN INSTALLATION

JANUARY, 2024

GEN-8



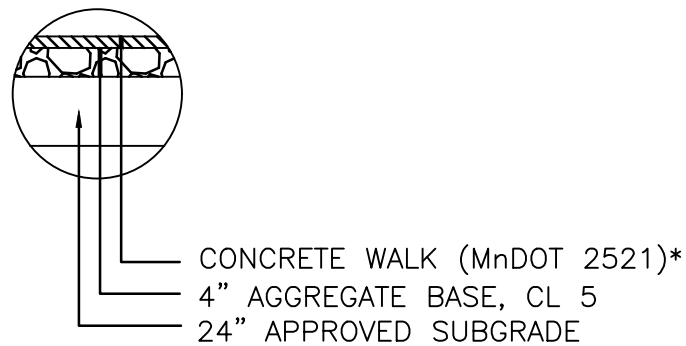
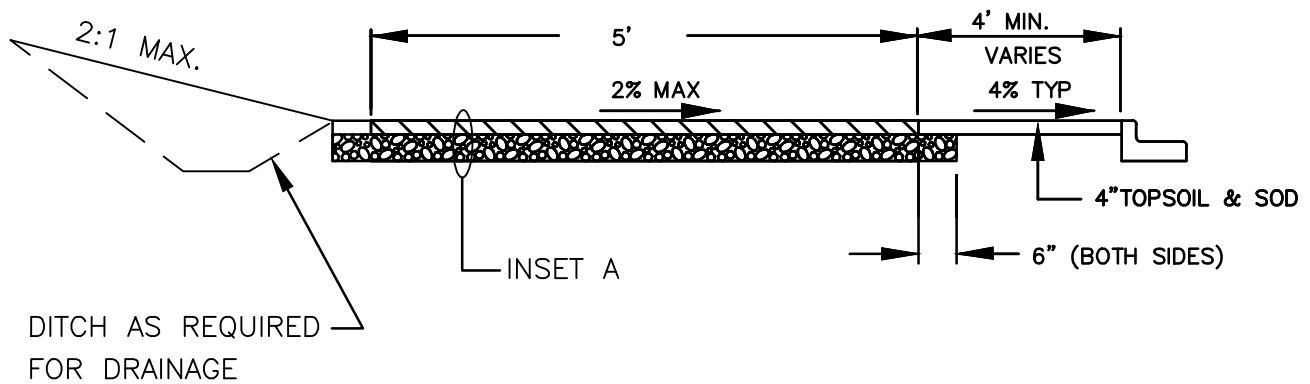
INSET A



BITUMINOUS
TRAIL

JANUARY, 2024

GEN-9



INSET A

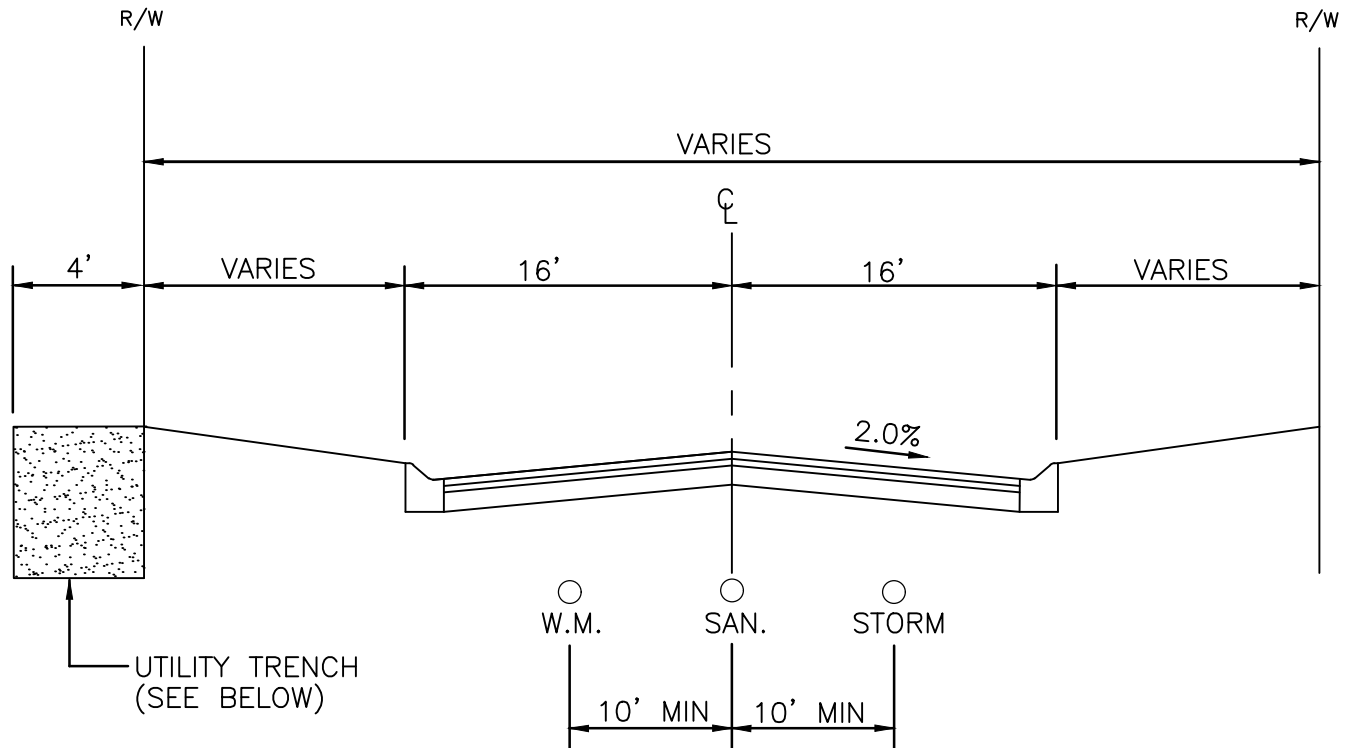
*MINIMUM CONCRETE WALK THICKNESS IS 4". CONCRETE WALK SHALL BE A MINIMUM OF 6" THICK ACROSS ALL DRIVEWAYS, IN AREAS WITH REGULARLY SPACED DRIVEWAYS, OR AS DIRECTED BY THE CITY ENGINEER.



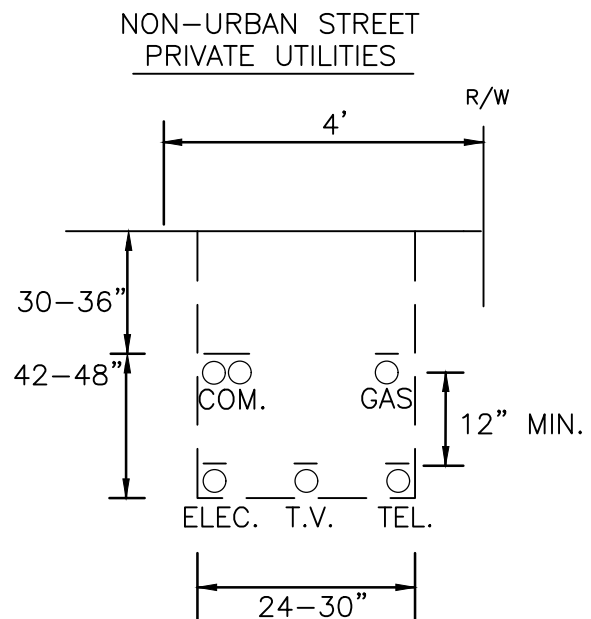
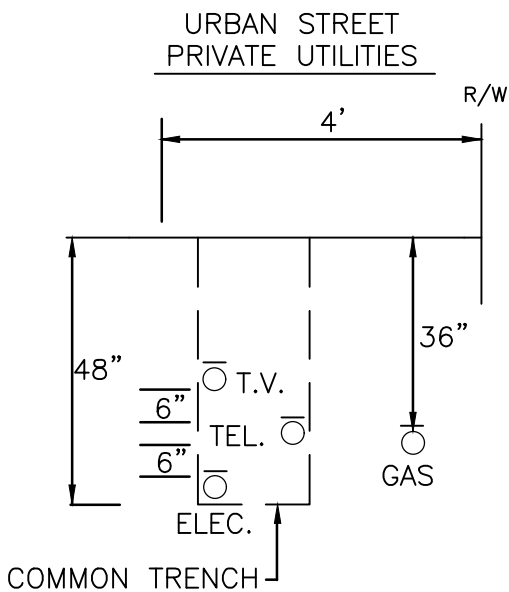
CONCRETE WALK

JANUARY, 2024

GEN-10



NOTE: MINIMUM R/W CROSSING DEPTH 30".



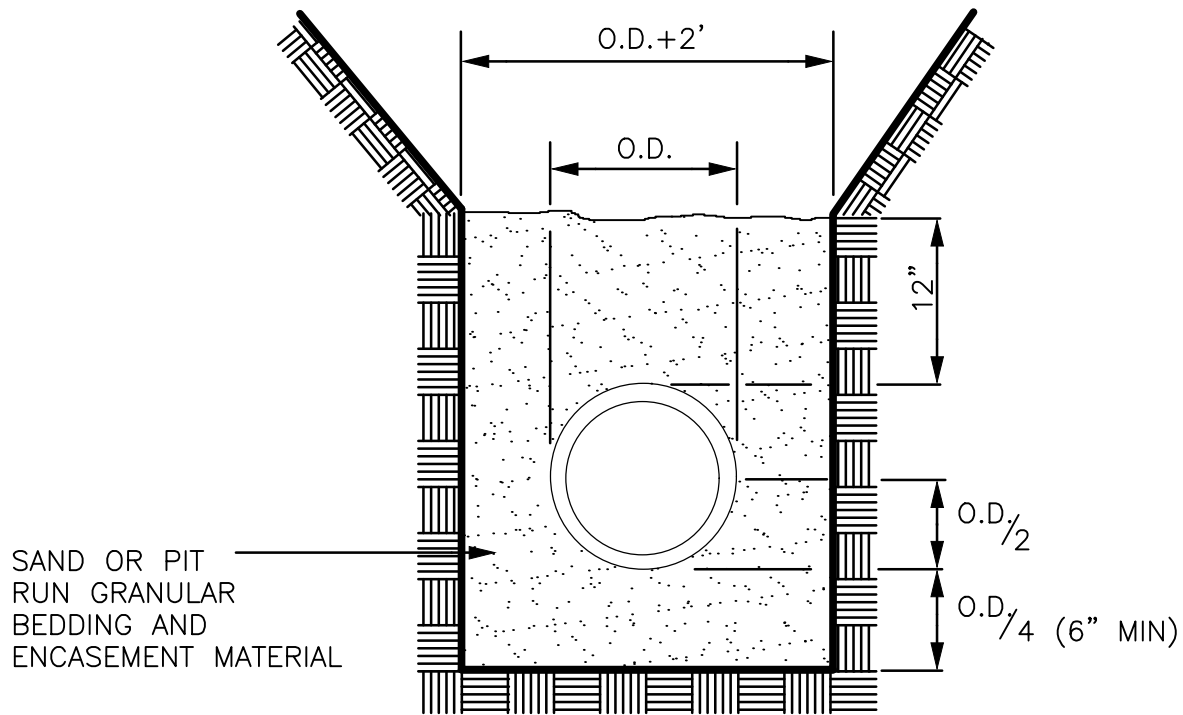
○ = WARNING TAPE OVER UTILITY



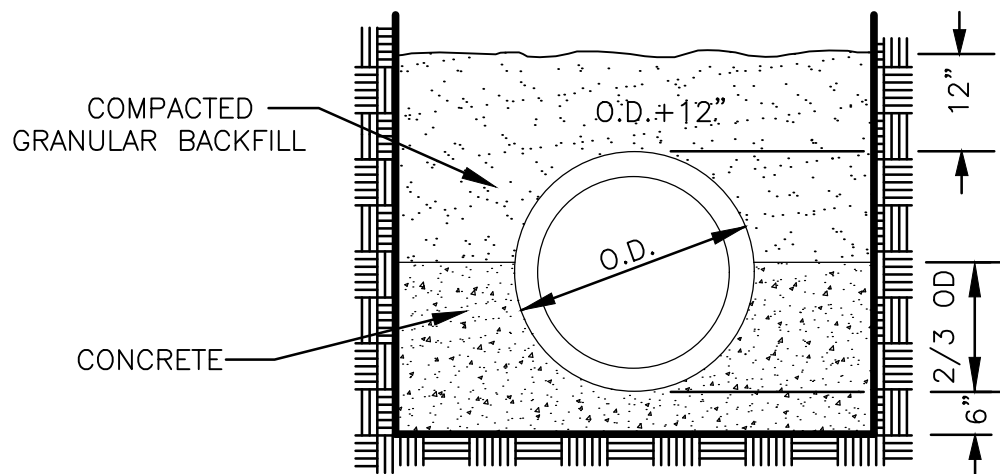
UTILITY LOCATION

JANUARY, 2024

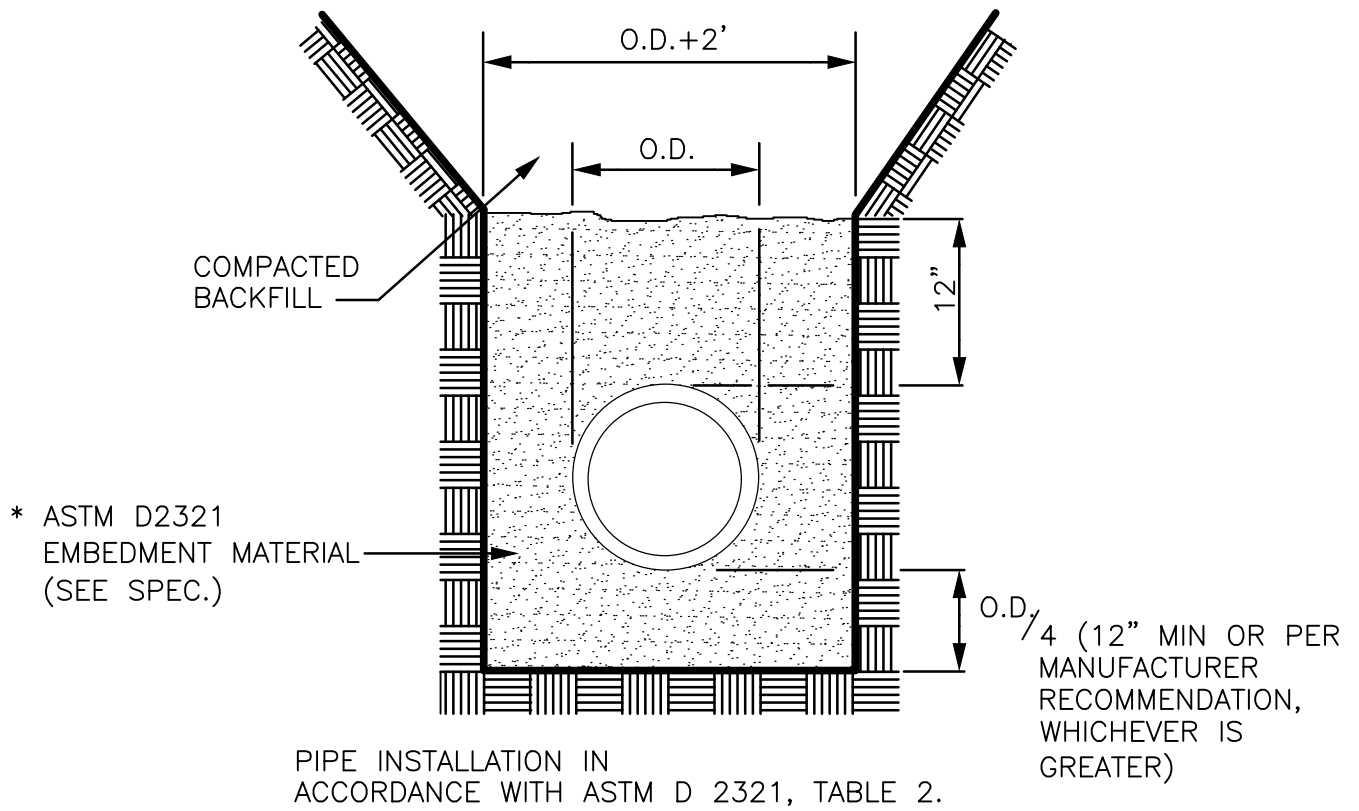
GEN-11



GRANULAR MATERIAL ENCASEMENT



CONCRETE CRADLE



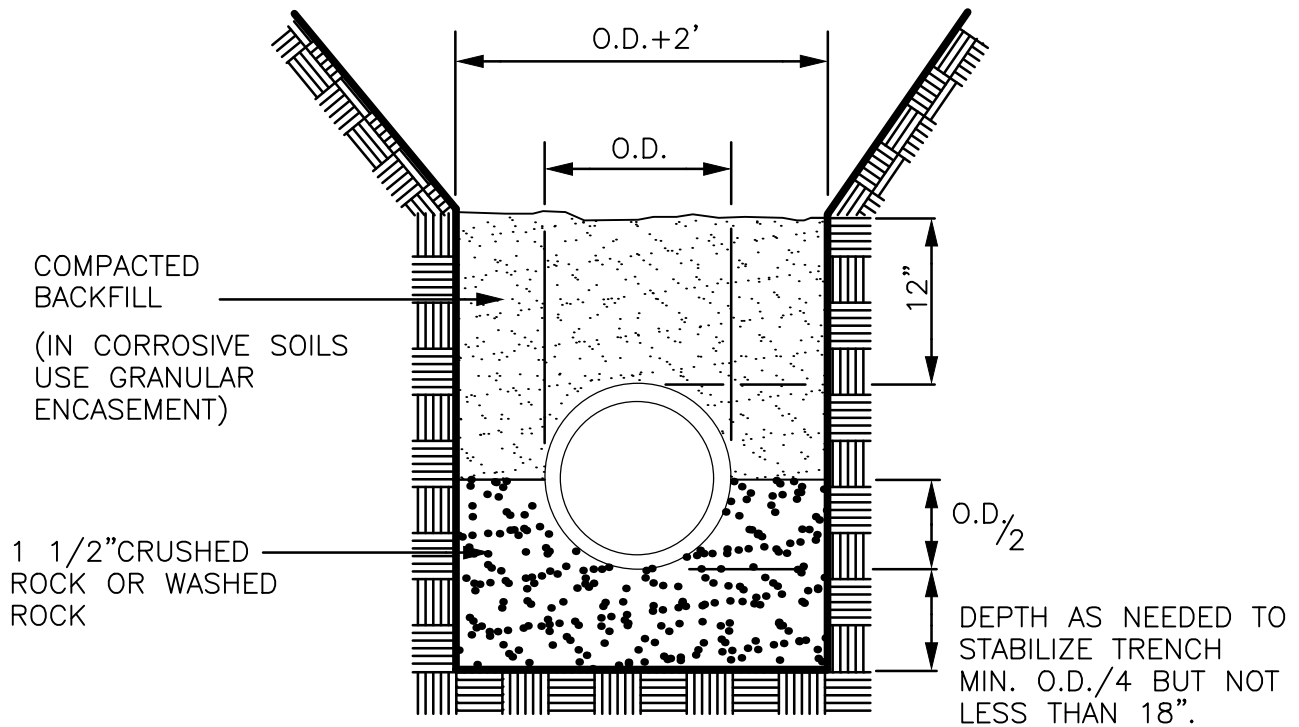
* EMBEDMENT MATERIAL SHALL CONFORM TO ASTM D2321, TABLE 1.



GRANULAR MATERIAL BEDDING METHOD (FOR PVC PIPE)

JANUARY, 2024

GEN-14



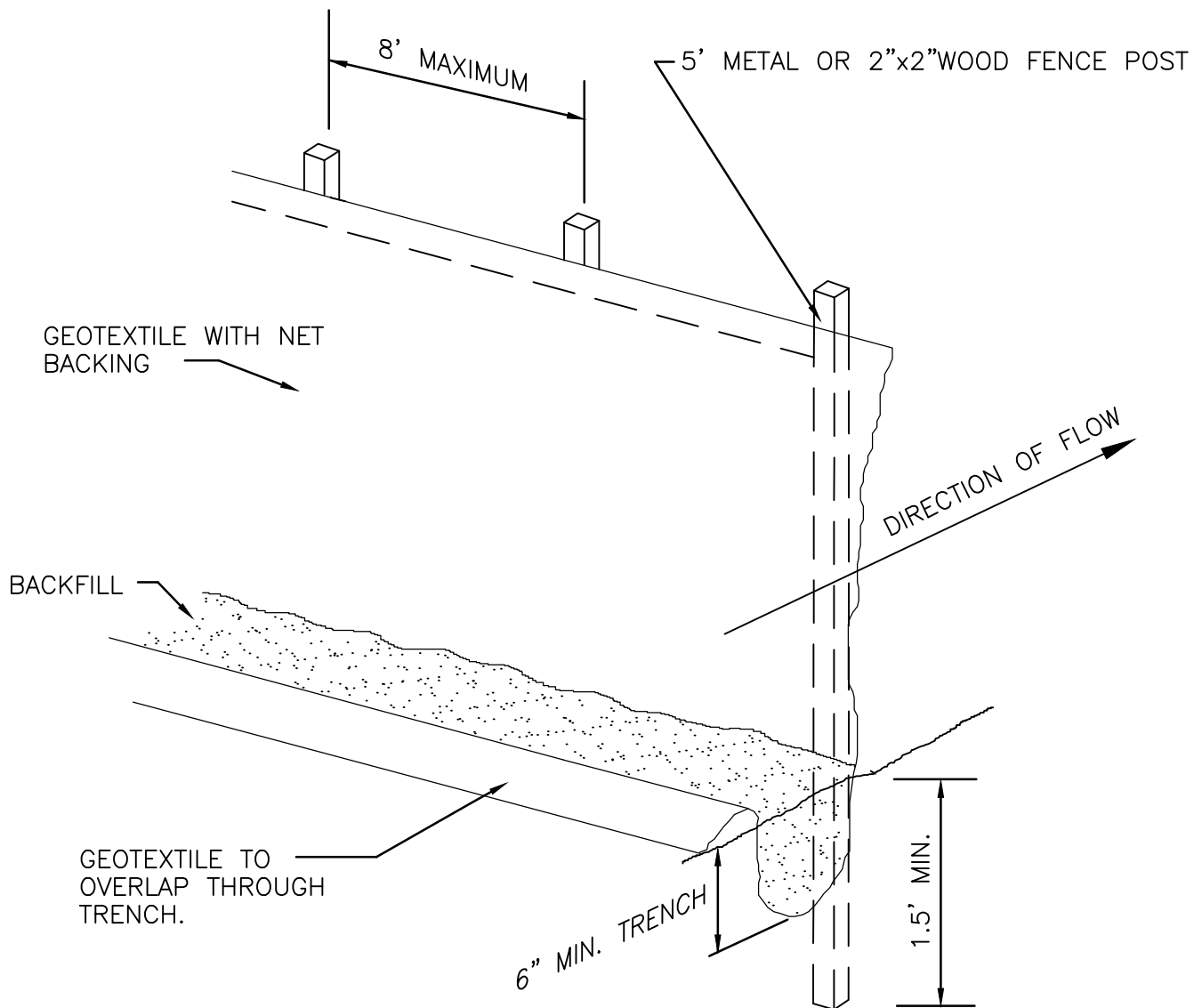
NOTE: STABILIZING OR DEWATERING OF TRENCH IS INCIDENTAL TO THE PIPE INSTALLATION UNLESS A SPECIFIC BID ITEM IS PROVIDED.



SPECIAL FOUNDATION FOR STABILIZING OR DEWATERING OF TRENCH

JANUARY, 2024

GEN-15



NOTES:

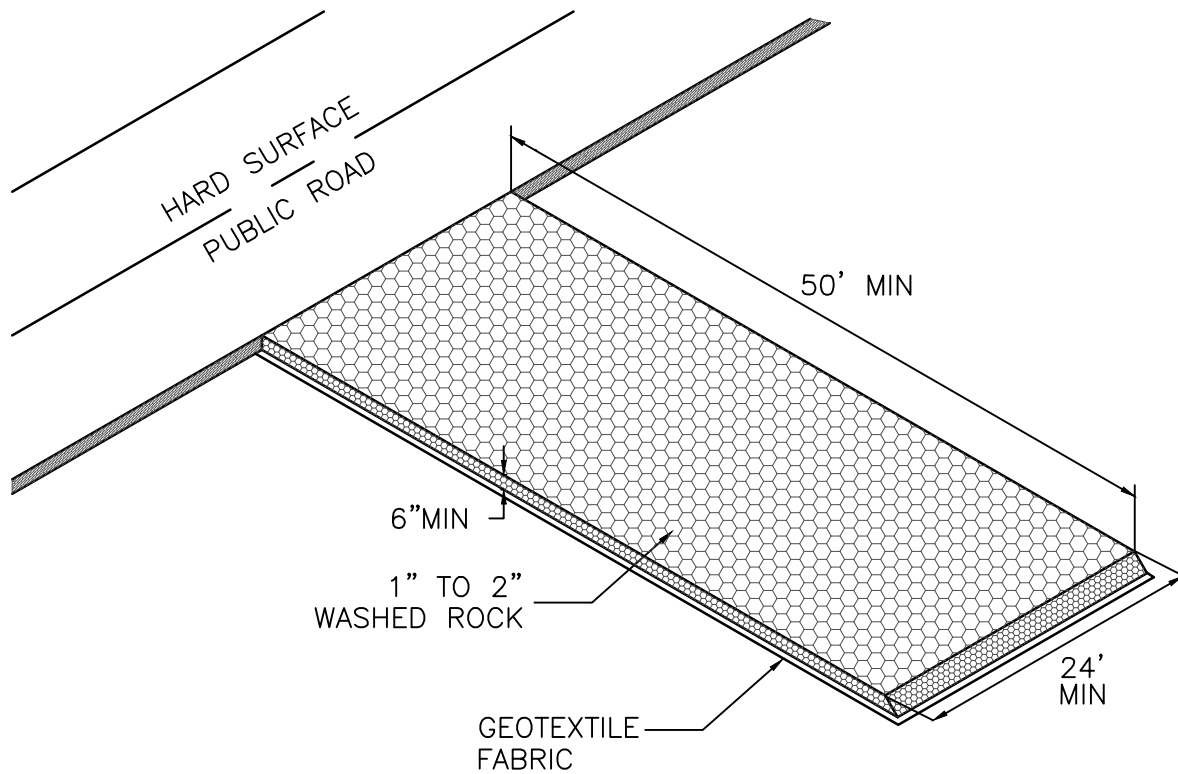
1. SILT FENCE SHALL CONFORM TO MNDOT 3886, (GTF 100 OR EQUAL)
2. FENCING SHALL BE PLACED ALONG CONTOURS OR AS DIRECTED BY ENGINEER.



SILT FENCE

JANUARY, 2024

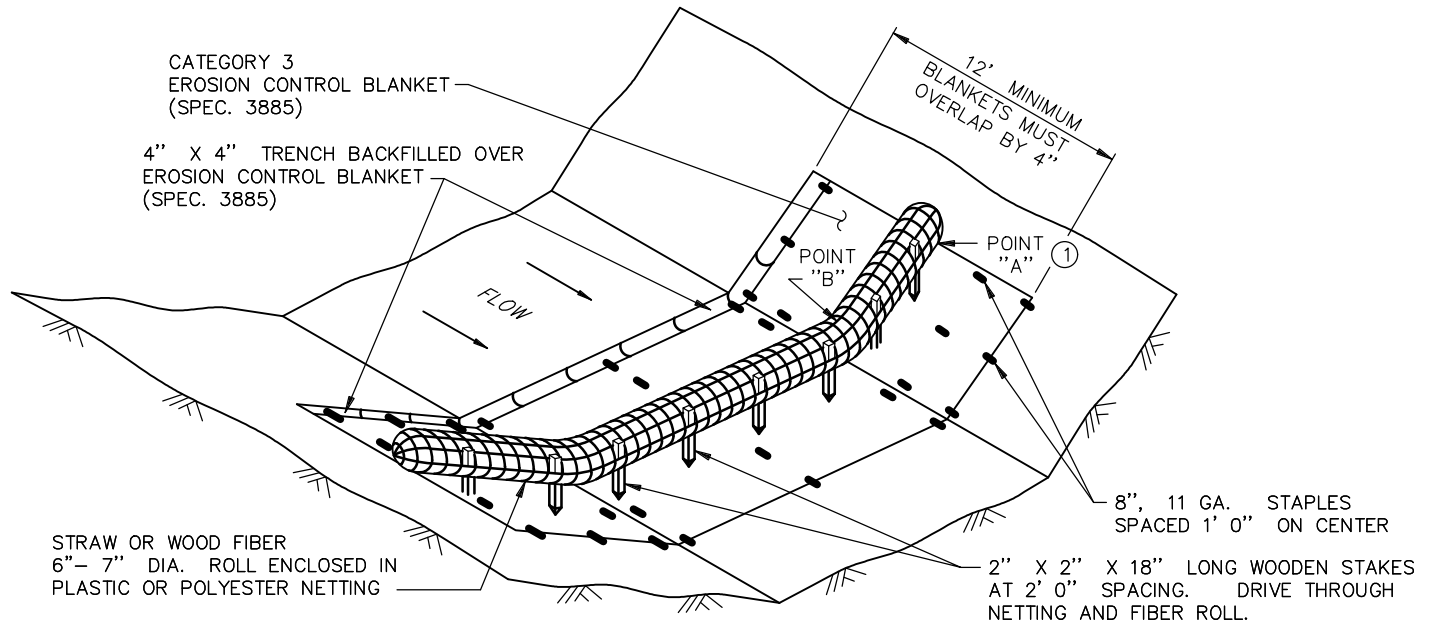
GEN-16



ROCK CONSTRUCTION ENTRANCE

JANUARY, 2024

GEN-17



BIOROLL BLANKET SYSTEM
(TYPE 3 SPEC. 3889)

Maintenance

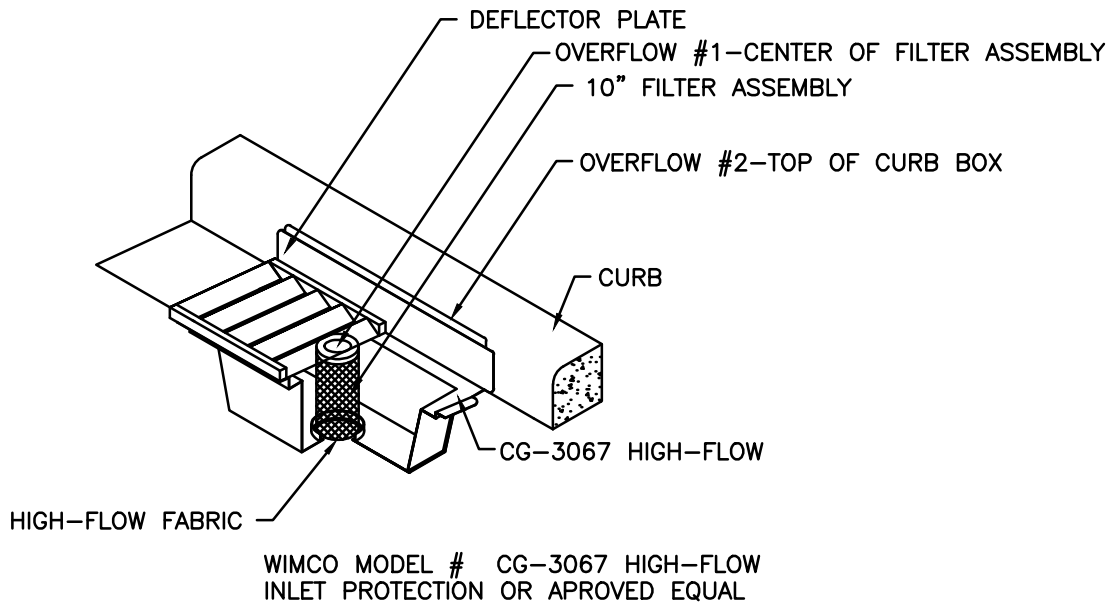
1. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SHOULD THE BIOROLL DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USEABLE LIFE AND THE BARRIER STILL BE NECESSARY. THE BIOROLL SHALL BE REPLACED PROMPTLY.
3. SEDIMENT DEPOSITS MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY 1/2 HEIGHT OF THE BARRIER, OR AS DIRECTED BY THE ENGINEER.
4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED, SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.
5. ALL MATERIAL & INSTALLATION MUST CONFORM TO THE REQUIREMENTS OF THE CURRENT EDITION OF THE MNDOT CONSTRUCTION SPECIFICATIONS SECTION 3889.



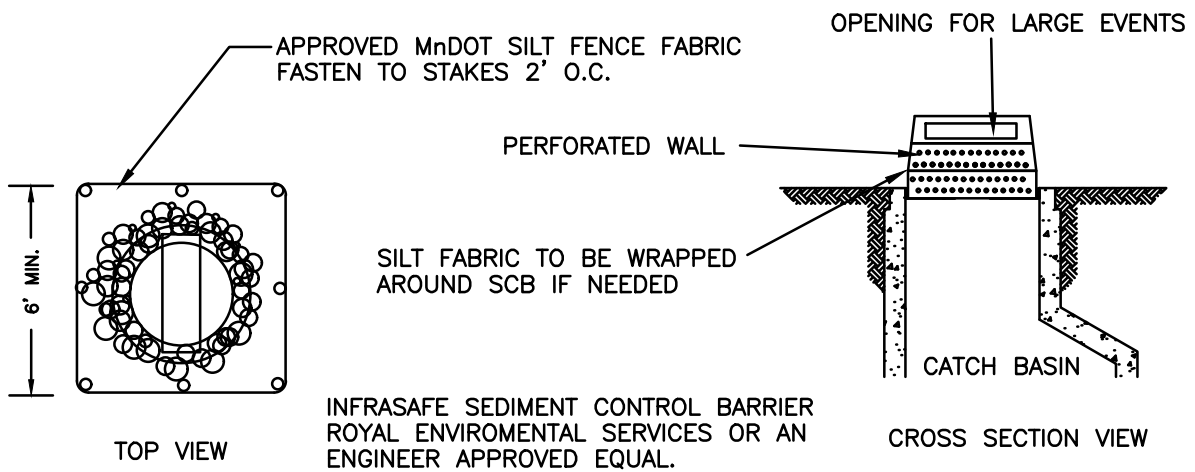
BIOROLL DITCH

JANUARY, 2024

GEN-18



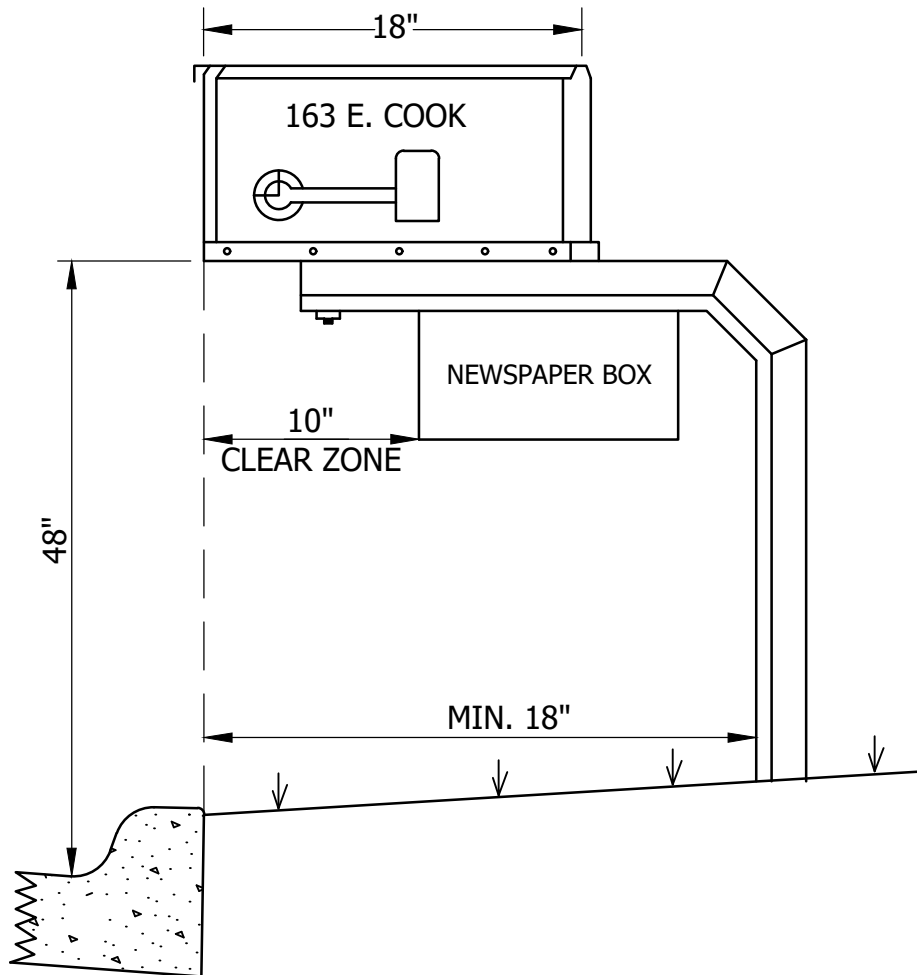
CURB AND GUTTER INLET PROTECTION
NO SCALE



REAR YARD INLET PROTECTION
NO SCALE

NOTES:
DIMENSIONS AS PER U.S. POSTAL SERVICE

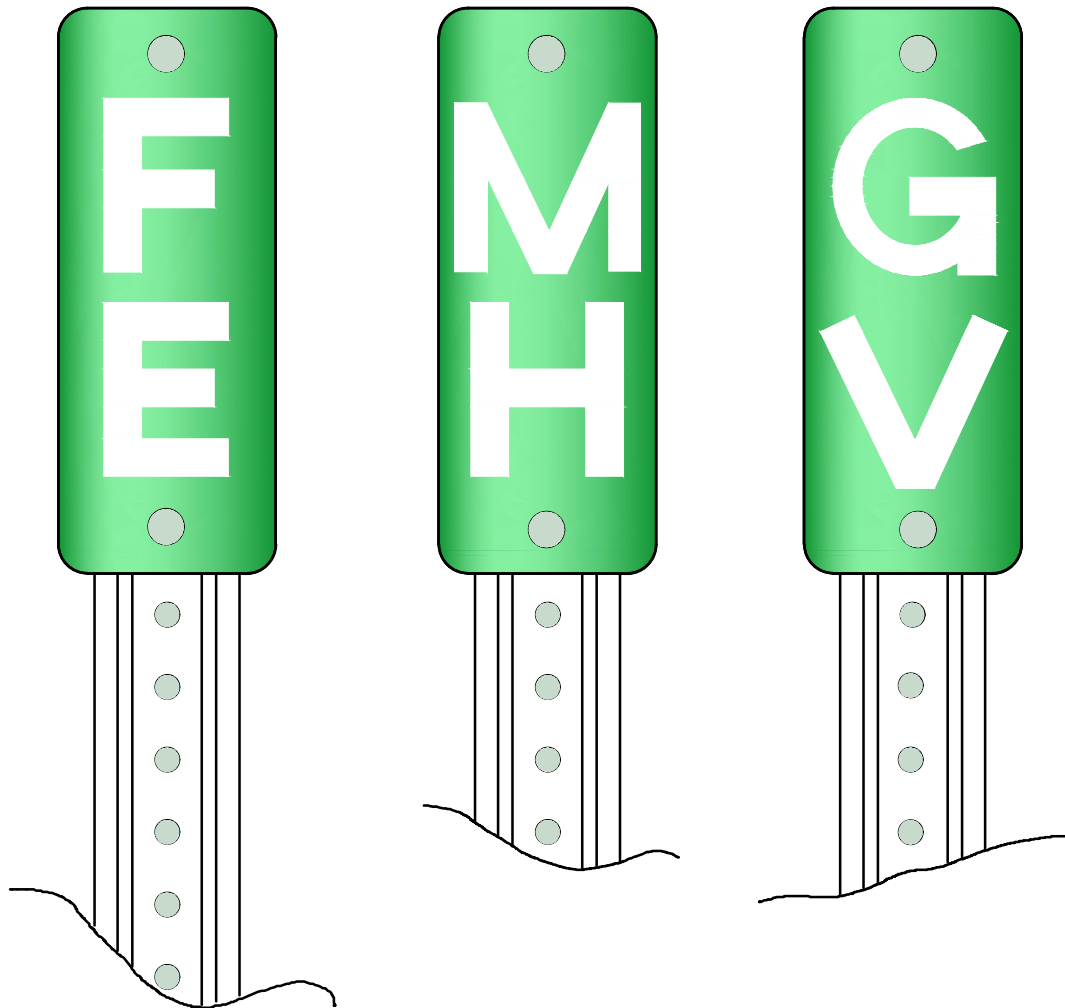
ADDRESS MUST BE ON SIDE OF BOX FROM WHICH CARRIER
APPROACHES IN LETTERS ABOUT ONE INCH HIGH (OR ON
FRONT WHERE BOXES ARE GROUPED).



MAIL BOX

JANUARY, 2024

GEN-20



NOTES:

1. STRUCTURE MARKER SIGNS SHALL BE FURNISHED AND INSTALLED FOR ALL STRUCTURES LOCATED OUTSIDE OF THE STREET RIGHT OF WAY AND SHALL BE CONSIDERED INCIDENTAL.
2. 0.063" THICK ALUMINUM SIGN. WHITE LETTERS ON GREEN HIGH INTENSITY REFLECTORIZED BACKGROUND.
3. U-CHANNEL POST, MINIMUM 1.2LB./FT. 6'- 6" LONG, PAINTED GREEN.



STREET MARKING SIGNS

JANUARY, 2024

GEN-21

PROTECTED OPEN SPACE AREA

Beyond this marker is a protected area of resource management features and natural ground cover abutting a watercourse, wetland or open space. Federal, State and local laws prohibit activities that could disturb this natural area and adjoining water bodies. Any alterations such as dumping, tilling, plowing, mowing and yard waste disposal are prohibited.



If you have questions on the protection of this area and the adjacent water resource areas, please contact City Hall at (651) 982-2400.

SPECIFICATIONS:

MONUMENT

CONSISTS OF A POST AND A PROTECTED OPEN SPACE SIGN

WETLAND BUFFER SIGNS

MOUNTED FLUSH WITH THE TOP OF THE POST FASTENED WITH NON-REMOVABLE SCREWS OR RIVETS SIZE: 5.5" H x 3.75" W ALUMINUM SHALL BE 5052-H38 OR 6061-T6 ALLOY. GAUGE SHALL BE 0.080

SIGN COLOR

COLOR SHALL BE GREEN AND BLUE LETTERS ON A WHITE BACKGROUND.

POST MATERIALS

4" X 4" SQUARE
TREATED WOOD OR OTHER CITY APPROVED MATERIAL

POST INSTALLATION

MOUNTED TO A HEIGHT OF FOUR FEET ABOVE GRADE SET AT LEAST 42 INCHES IN THE GROUND INSTALLED AT EACH LOT LINE WHERE IT CROSSES A WETLAND BUFFER WITH A MAXIMUM SPACING OF 300 FEET BETWEEN SIGNS (IF NO BUFFER IS REQUIRED THE MONUMENT SHALL BE AT THE EDGE OF THE WETLAND).

PLACE ADDITIONAL POSTS AS NECESSARY
TO FOLLOW BUFFER CONTOUR LINE

DIGITAL COPY OF SIGN AVAILABLE FROM ENGINEERING DEPARTMENT

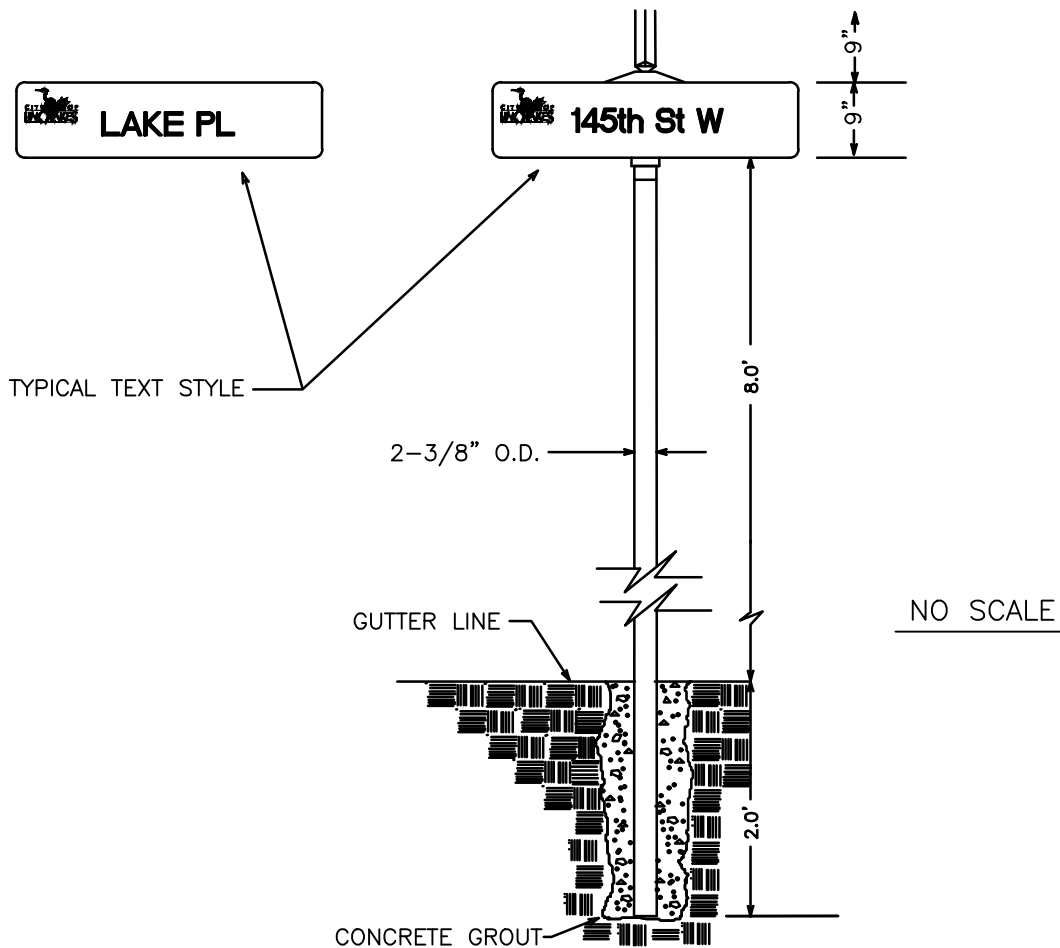
4 X 4 TREATED POST



WETLAND BUFFER SIGN

JANUARY, 2024

GEN-22



STREET SIGN SPECIFICATIONS

MATERIAL:

ALUMINUM BLANKS SHALL BE CONSTRUCTED OF 5052-H38 ALLOY, HAVE A GAUGE OF .080, BE NOTCHED FOR USE WITH E-450 BRACKETS, HAVE HOLES PUNCHED AT EACH END FOR BOLTING TOGETHER AND BE 9" AS REQUIRED. BLANKS SHALL HAVE 1 1/2" ROUND CORNERS.

PLATES SHALL BE COVERED WITH ENGINEERING GRADE REFLECTIVE SHEETING, WHITE ON GREEN. (PRIVATE STREETS SHALL BE WHITE ON BROWN) LETTERING SHALL BE SERIES C, 6" U.C. AND 4.5" L.C.

E-450 BRACKETS ARE TO BE ALUMINUM DESIGNED FOR USING 9" PLATES AS REQUIRED.

ABBREVIATIONS

Ave FOR AVENUE
Blvd FOR BOULEVARD
Cir FOR CIRCLE
Ct FOR COURT
Dr FOR DRIVE
E FOR EAST
Pky FOR PARKWAY
Pl FOR PLACE
St FOR STREET
Ter FOR TERRACE
Trl FOR TRAIL
W FOR WEST

TUBULAR POSTS SPECIFICATIONS

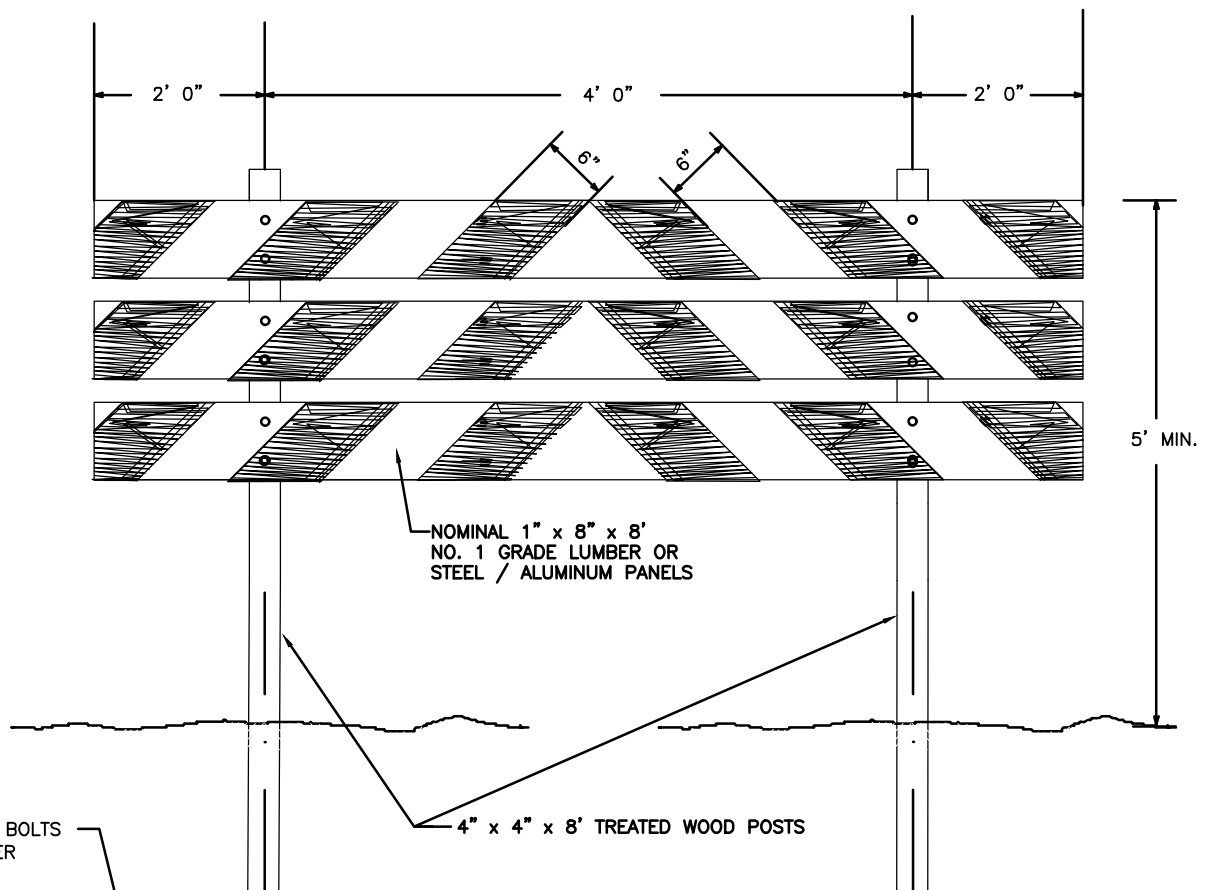
TUBULAR POSTS USED FOR MOUNTING STREET NAME/TRAFFIC CONTROL SIGNS, SHALL VARY IN LENGTH, SHALL BE 2-3/8" O.D., SHALL BE GALVINIZED AND SHALL HAVE A WEIGHT OF 2LB./FT.



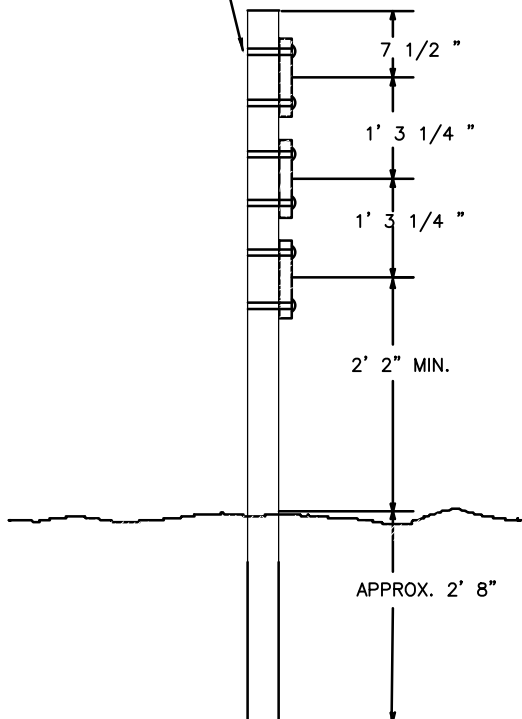
STREET SIGN

JANUARY, 2024

GEN-23



1/2"x6" GALV. BOLTS
W/ CUT WASHER



NOTES:

1. THE BARRICADE BOARD FACE SURFACE SHALL BE FULLY REFLECTORIZED IN ALTERNATE SILVER WHITE AND RED STRIPING, USING REFLECTIVE SHEETING CONFORMING TO THE REQUIREMENTS OF SPEC. 3352.2A2a STANDARD NO. 1.
2. PRIOR TO INSTALLING THE REFLECTIVE SHEETING, THE BARRICADE BOARDS SHALL BE GIVEN A COMPLETE COAT OF WHITE WOOD PRIMER PAINT FOLLOWED BY A SECOND COAT OF WHITE EXTERIOR PAINT APPLIED ONLY TO THE SURFACES NOT COVERED WITH REFLECTIVE SHEETING.
3. THE BARRICADE BOARDS SHALL BE COMPLETELY PAINTED AND RELECTORIZED SHEETING APPLIED BEFORE INSTALLED ON THE POSTS.

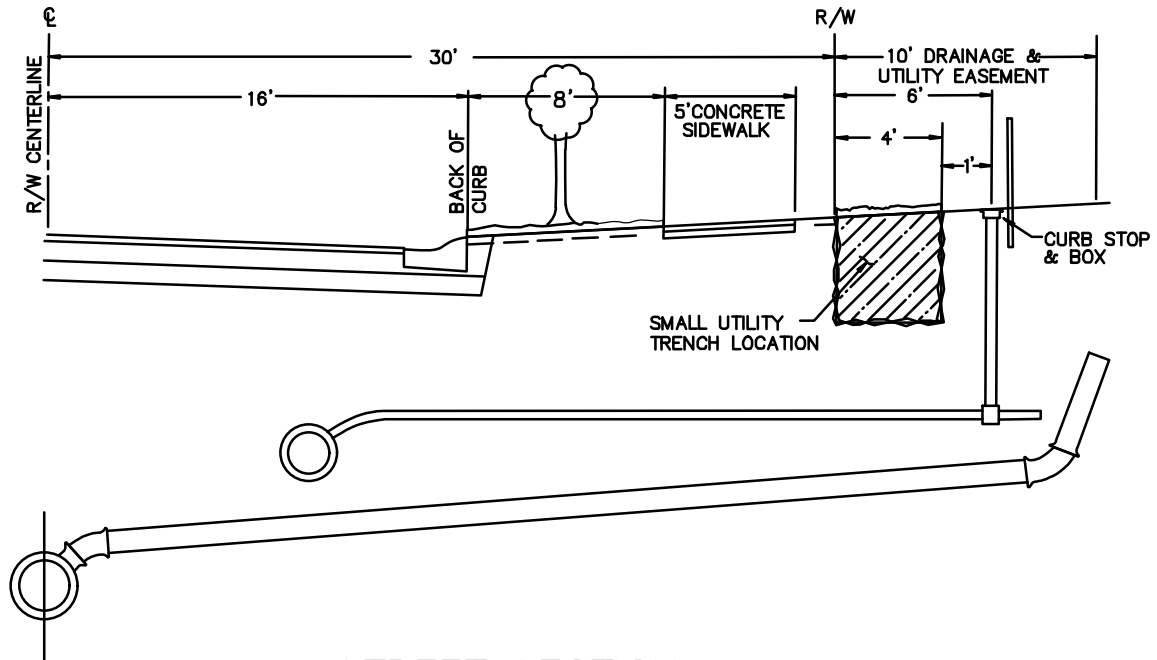


PERMANENT BARRICADE

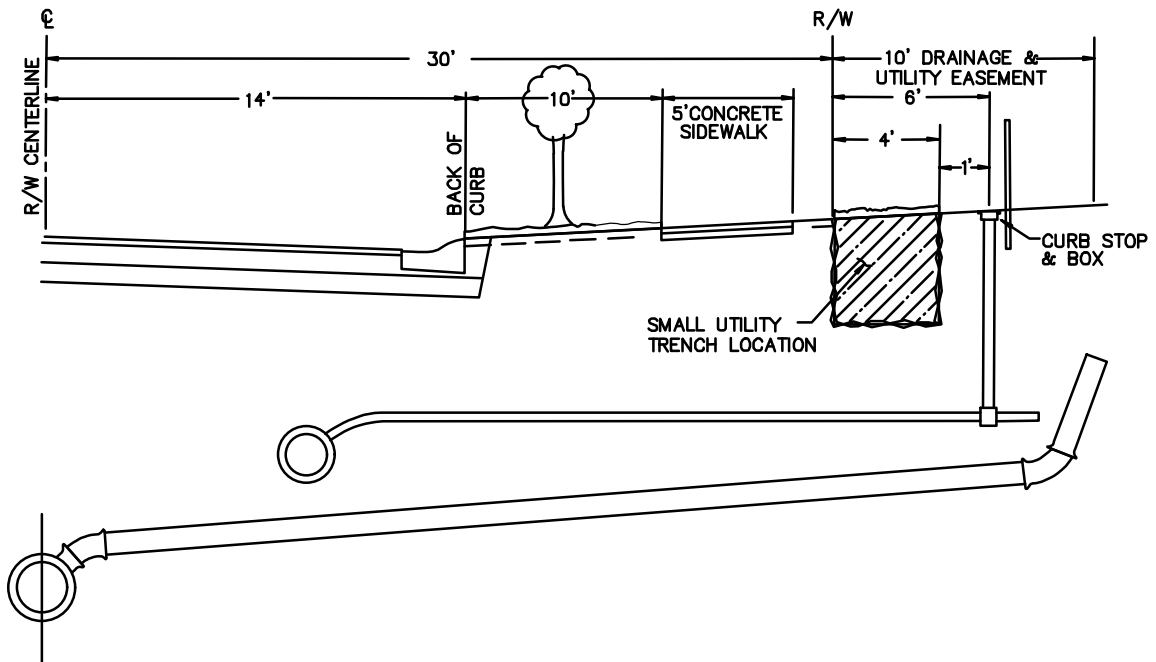
JANUARY, 2024

GEN-24

STREET SECTION
SIDEWALK, SMALL UTILITY TRENCH
& CURB STOP LOCATION
(60' R/W – 32' B/B)



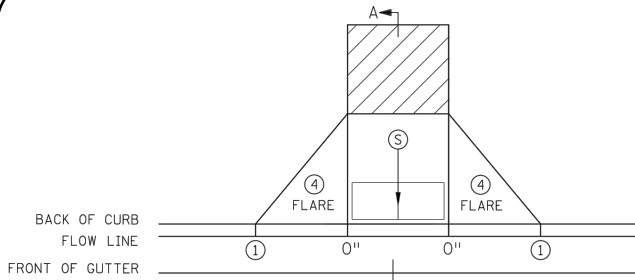
STREET SECTION
SIDEWALK, SMALL UTILITY TRENCH
& CURB STOP LOCATION
(60' R/W – 28' B/B)



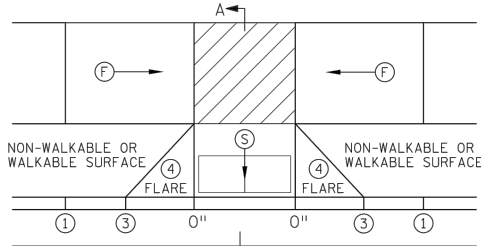
STREET SECTION
SMALL UTILITY TRENCH DETAIL

JANUARY, 2024

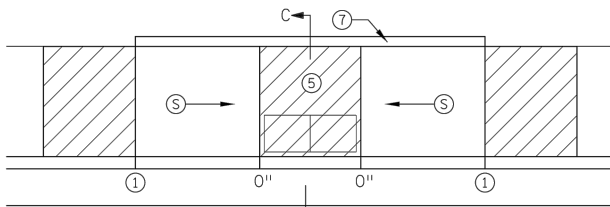
GEN-25



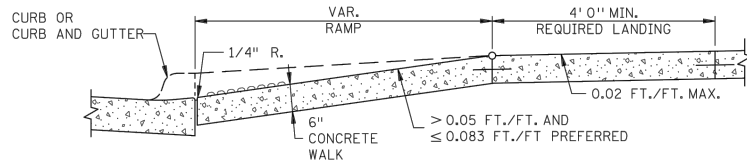
PERPENDICULAR



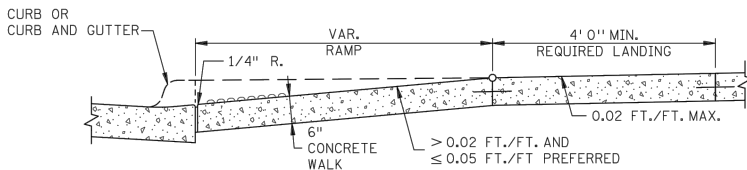
TIERED PERPENDICULAR



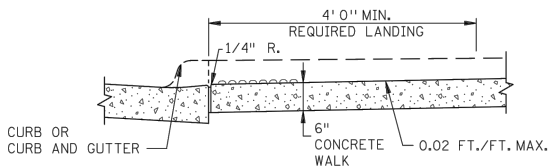
PARALLEL



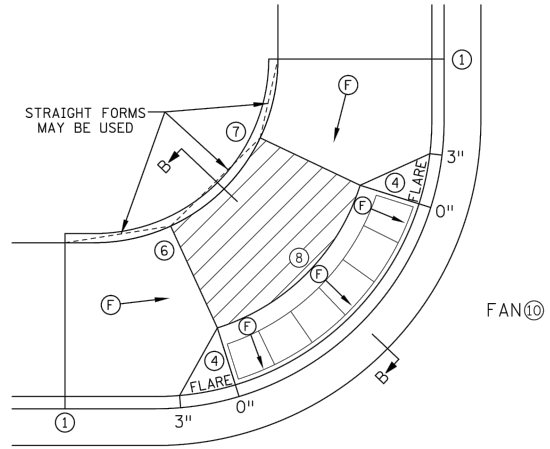
SECTION A-A
PERPENDICULAR/TIERED/DIAGONAL



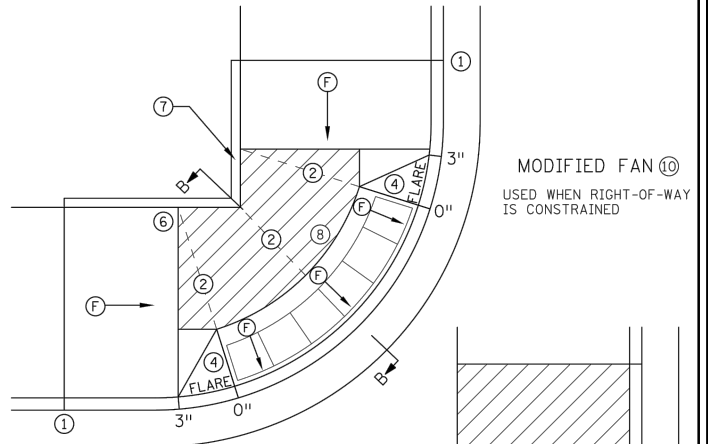
SECTION B-B
FAN



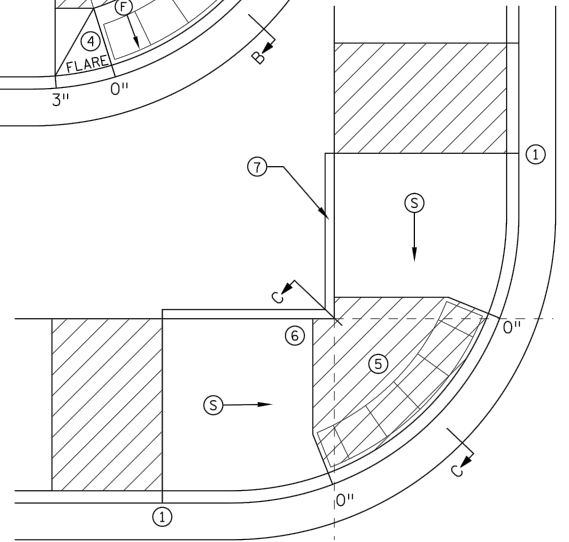
SECTION C-C
PARALLEL/DEPRESSED CORNER



FAN ⑩



MODIFIED FAN ⑩
USED WHEN RIGHT-OF-WAY
IS CONSTRAINED



DEPRESSED CORNER

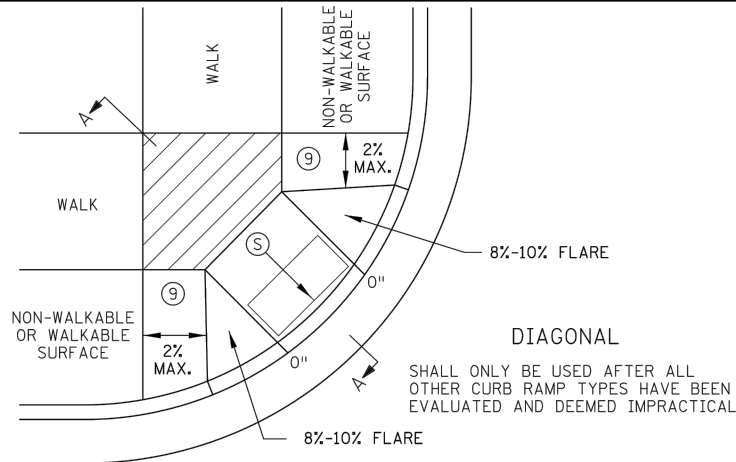
NOTE: REFER TO MnDOT STANDARD PLANS FOR CURRENT PEDESTRIAN RAMP CONSTRUCTION REQUIREMENTS.



ACCESSIBLE SIDEWALK PEDESTRIAN RAMP (1 of 2)

JANUARY, 2024

GEN-26



NOTES:

LANDINGS SHALL BE LOCATED ANYWHERE THE PEDESTRIAN ACCESS ROUTE (PAR) CHANGES DIRECTION, AT THE TOP OF RAMPS THAT HAVE RUNNING SLOPES GREATER THAN 5.0%, AND IF THE APPROACHING WALK IS INVERSE GRADE GREATER THAN 2%.

INITIAL CURB RAMP LANDINGS SHALL BE CONSTRUCTED WITHIN 15' FROM THE BACK OF CURB, WITH 6' FROM THE BACK OF CURB BEING THE PREFERRED DISTANCE, ONLY APPLICABLE WHEN THE INITIAL RAMP RUNNING SLOPE IS OVER 5.0%.

SECONDARY CURB RAMP LANDINGS ARE REQUIRED FOR EVERY 30" OF VERTICAL RISE WHEN THE LONGITUDINAL RUNNING SLOPE IS GREATER THAN 5.0%.

CONTRACTION JOINTS SHALL BE CONSTRUCTED ALONG ALL GRADE BREAKS WITHIN THE PAR. 1/4" DEEP VISUAL JOINTS SHALL BE USED AT THE TOPS OF CONCRETE FLARES ADJACENT TO WALKABLE SURFACES.

ALL GRADE BREAKS WITHIN THE PAR SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL, THUS BOTH SIDES OF A SLOPED WALKING SURFACE MUST BE EQUAL LENGTH. (EXCEPT AS STATED IN ⑥ BELOW.)

TO ENSURE INITIAL RAMPS AND INITIAL LANDINGS ARE PROPERLY CONSTRUCTED, LANDINGS SHALL BE CAST SEPARATELY. FOLLOW SIDEWALK REINFORCEMENT DETAILS ON SHEET 6 AND THE ADA SPECIAL PROVISIONS - PROSECUTION OF WORK (ADA).

TOP OF CURB SHALL MATCH PROPOSED ADJACENT WALK GRADE.

WHEN THE BOULEVARD IS 4' WIDE OR LESS, THE TOP OF CURB TAPER SHALL MATCH THE RAMP SLOPES TO REDUCE NEGATIVE BOULEVARD SLOPES FROM THE TOP BACK OF CURB TO THE PAR.

ALL RAMP TYPES SHOULD HAVE A MINIMUM 3' LONG RAMP LENGTH.

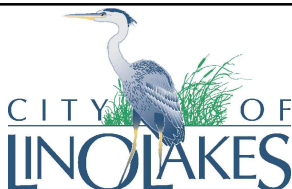
4' MINIMUM WIDTH OF DETECTABLE WARNING IS REQUIRED FOR ALL RAMPS. DETECTABLE WARNINGS SHALL CONTINUOUSLY EXTEND FOR A MIN. OF 24" IN THE PATH OF TRAVEL. DETECTABLE WARNING TO COVER ENTIRE WIDTH OF SHARED-USE PATHS AND THE ENTIRE PAR WIDTH OF THE WALK. DETECTABLE WARNING SHOULD BE 6" LESS THAN THE PAR/TRAIL WIDTH. ARC LENGTH OF RADIAL DETECTABLE WARNINGS SHOULD NOT BE GREATER THAN 20 FEET.

RECTANGULAR DETECTABLE WARNINGS SHALL BE SETBACK 3" FROM THE BACK OF CURB. RADIAL DETECTABLE WARNINGS SHALL BE SETBACK 3" MINIMUM TO 6" MAXIMUM FROM THE BACK OF CURB.

- ① MATCH FULL HEIGHT CURB.
- ② 4' MINIMUM DEPTH LANDING REQUIRED ACROSS TOP OF RAMP.
- ③ 3" HIGH CURB WHEN USING A 3' LONG RAMP, 4" HIGH CURB WHEN USING A 4' LONG RAMP.
- ④ SEE SHEET 4 OF 6, TYPICAL SIDE TREATMENT OPTIONS, FOR DETAILS ON FLARES AND RETURNED CURBS, WHEN INITIAL LANDING IS AT FULL CURB HEIGHT.
- ⑤ DETECTABLE WARNINGS MAY BE PART OF THE 4' X 4' MIN. LANDING AREA IF IT IS NOT FEASIBLE TO CONSTRUCT THE LANDING OUTSIDE OF THE DETECTABLE WARNING AREA.
- ⑥ THE GRADE BREAK SHALL BE PERPENDICULAR TO THE BACK OF WALK. THIS WILL ENSURE THAT THE GRADE BREAK IS PERPENDICULAR TO THE DIRECTION OF TRAVEL. (TYPICAL FOR ALL)
- ⑦ WHEN ADJACENT TO GRASS, GRADING SHALL ALWAYS BE USED WHEN FEASIBLE. V CURB, IF USED, SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS. WHEN ADJACENT TO PARKING LOTS, CONCRETE OR BITUMINOUS TAPERS SHOULD BE USED OVER V CURB TO REDUCE TRIPPING HAZARDS AND FACILITATE SNOW & ICE REMOVAL.
- ⑧ A 7' MIN TOP RADIUS GRADE BREAK REQUIRED TO BE CONSTRUCTIBLE.
- ⑨ PAVE FULL WALK WIDTH.
- ⑩ "S" SLOPES ON FANS SHALL ONLY BE USED WHEN ALL OTHER FEASIBLE OPTIONS HAVE BEEN EVALUATED AND DEEMED IMPRACTICAL.

LEGEND	
THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT. IF SITE CONDITIONS WARRANT, LONGITUDINAL SLOPES UP TO 8.3% OR FLATTER ARE ALLOWED.	
	INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.
	INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE GREATER THAN 2.0% AND LESS THAN 5.0% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.
	LANDING AREA - 4' X 4' MIN. (5' X 5' MIN. PREFERRED) DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PAR.
X"	CURB HEIGHT

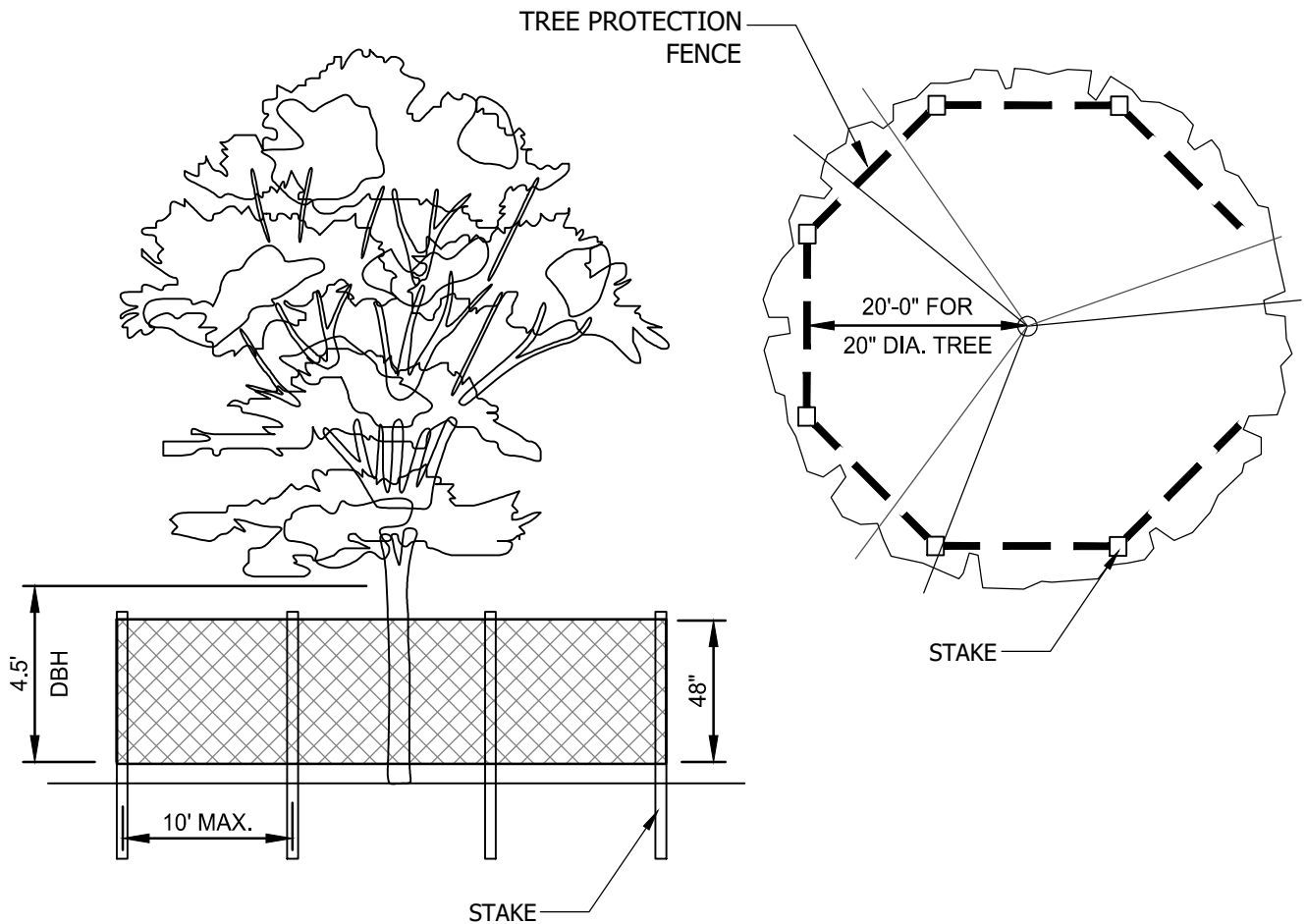
NOTE: REFER TO MnDOT STANDARD PLANS FOR CURRENT PEDESTRIAN RAMP CONSTRUCTION REQUIREMENTS.



ACCESSIBLE SIDEWALK PEDESTRIAN RAMP (2 of 2)

JANUARY, 2024

GEN-26A



Notes:

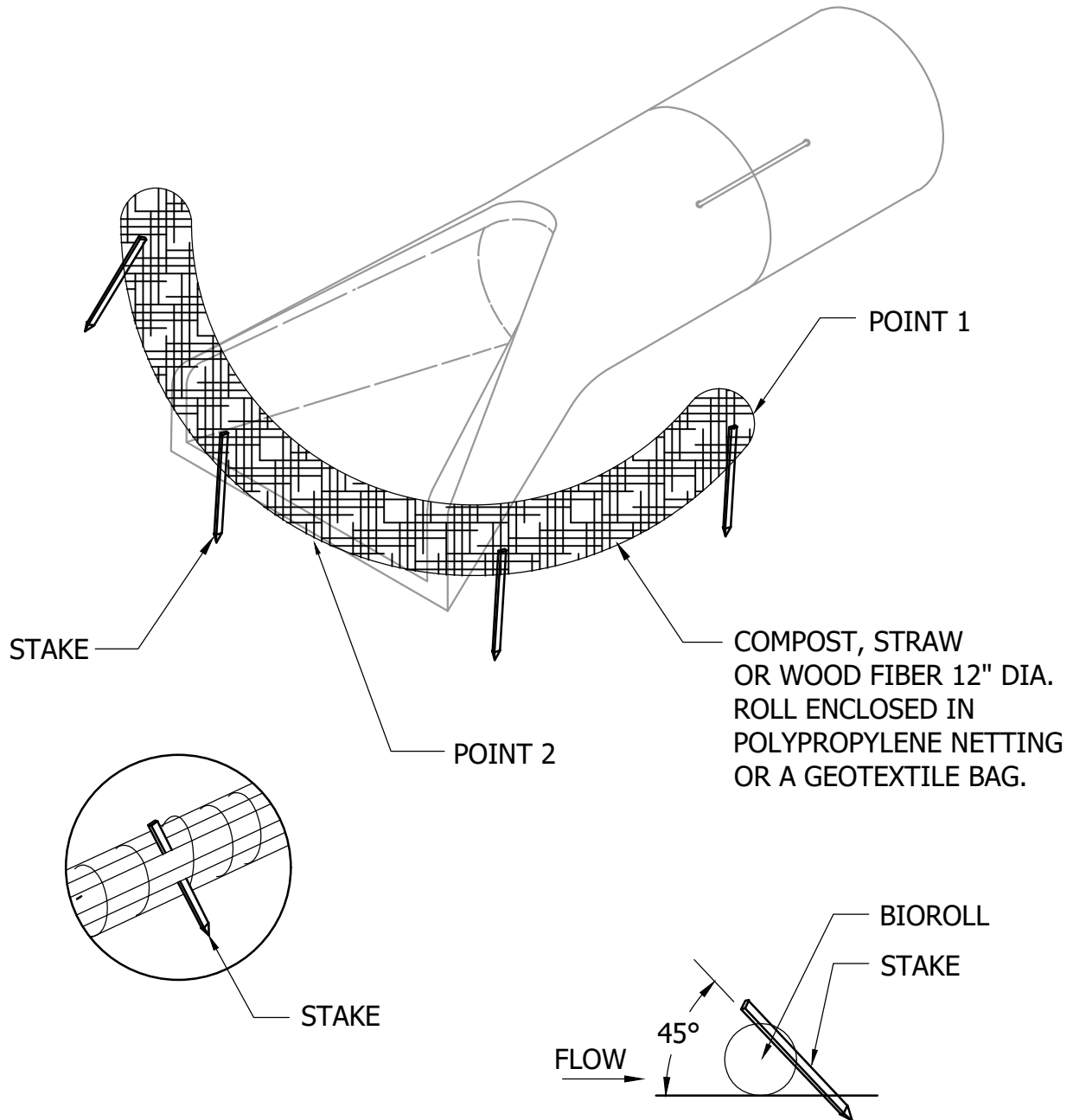
1. Tree protection fence shall be installed prior to any other construction activity taking place on site and shall not be removed until construction is complete.
2. Fence shall be placed a minimum of 1 foot per caliper inch DBH (diameter at breast height, measured at 4.5' above grade) away from trunk of tree to be saved.
3. Groups of trees may share a tree protection fence, provided the distances in note #1 can be maintained, and as approved by the City Forester.
4. Fence shall be 48" orange safety fence, anchored with 6' metal t-posts or 2" by 2" wooden stakes placed a maximum of 10' apart. Substitutions in materials must be approved by City Forester.
5. No grading, storage, parking, or any other vehicular traffic or construction activity shall occur within protection fence, including during fence installation and removal.
6. If there are incursions into the tree protection zone, the trees may be deemed damaged by the City Forester. These trees may have to be mitigated by planting of additional trees.



TREE PROTECTION
FENCE DETAIL

JANUARY, 2024

GEN-27



NOTE:
POINT 1 MUST BE A MINIMUM OF 6" HIGHER THAN POINT 2 TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.

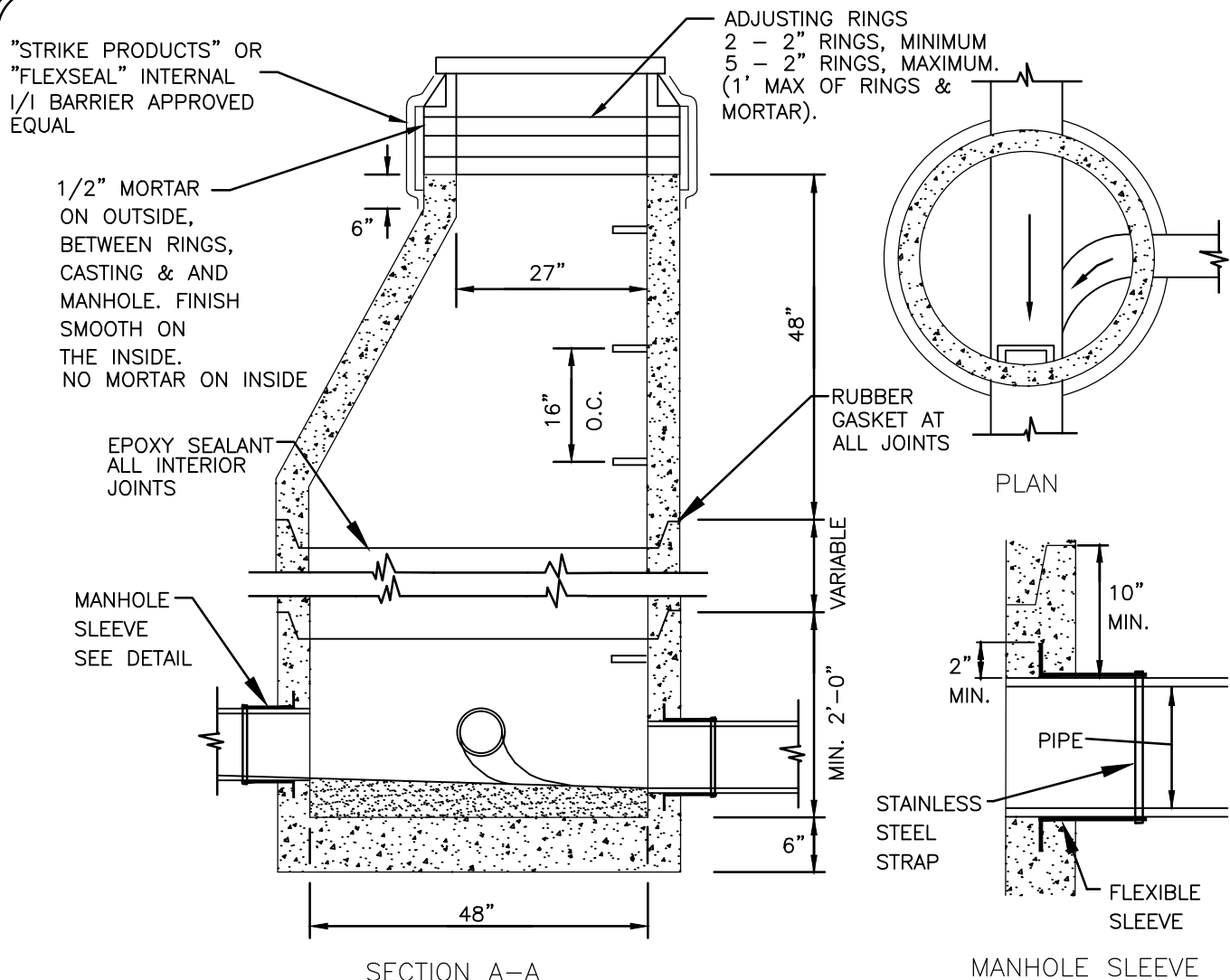
2" x 2" x 16" LONG WOODEN STAKES AT 1'-0" SPACING MINIMUM. STAKES SHALL BE DRIVEN THROUGH THE BACK HALF OF THE COMPOST LOG AT AN ANGLE OF 45° WITH THE TOP OF THE STAKE POINTING UPSTREAM.



PIPE CHECK BIOROLL WEIR

JANUARY, 2024

GEN-28



"INFI-SHIELD", "GATOR WRAP" OR APPROVED EQUAL ALL JOINTS AND RINGS.

A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.

ALL INTERIOR JOINTS TO BE COVERED WITH REINFORCED EPOXY SEALANT PER SPECIFICATION.

NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
ADJUSTING RINGS MAY BE CONCRETE OR PLASTIC.

CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.

MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC, PER ASTM C478. STEP LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.

PRECAST REINFORCED CONCRETE MANHOLE SECTIONS PER ASTM C478, FURNISHED WITH O-RING GASKETS AND LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.

PIPE CONNECTIONS TO MANHOLE SHALL BE MADE WATER TIGHT BY CAST INPLACE RUBBER BOOT AND CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.

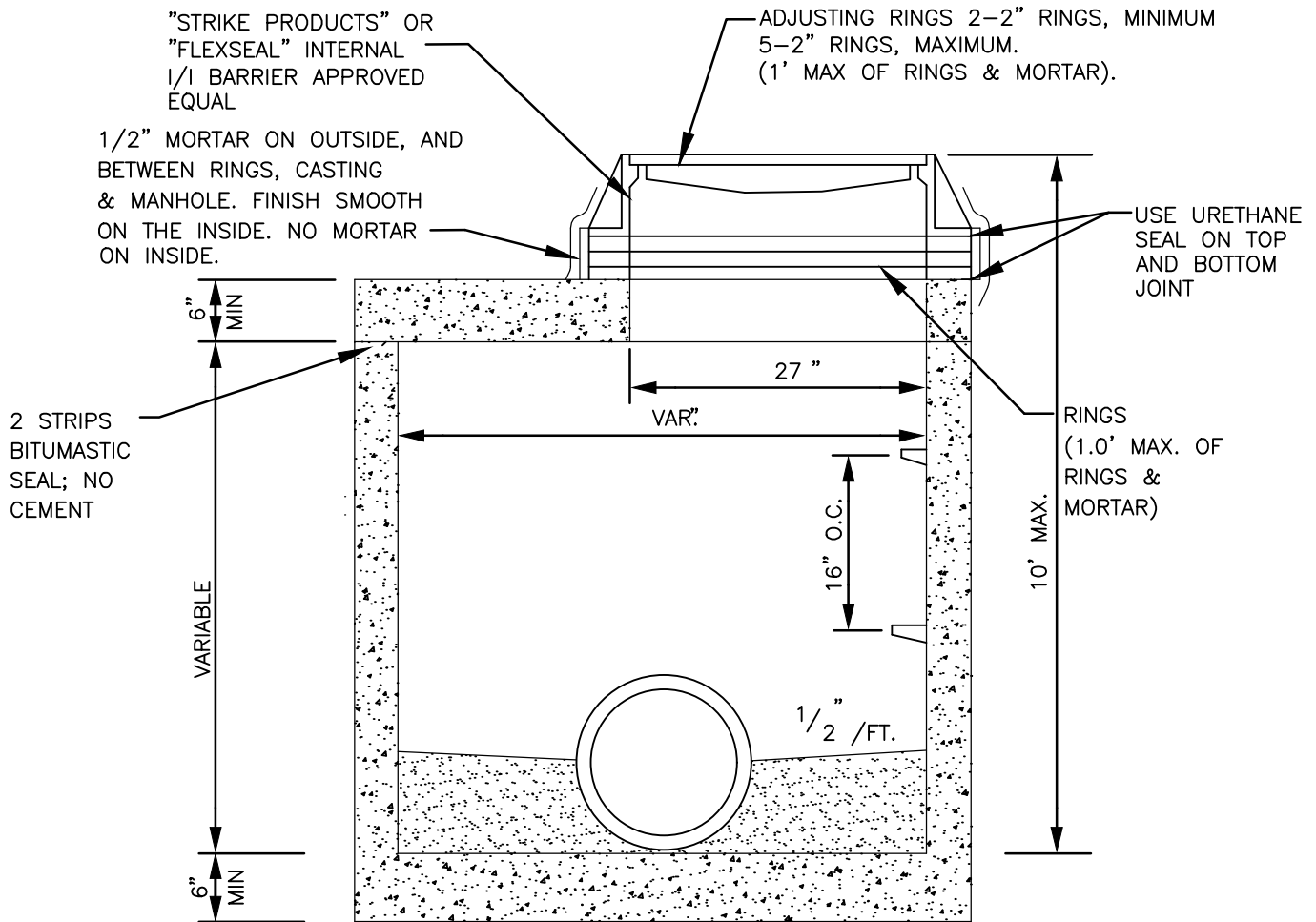
PROTECT MANHOLE FROM RAINWATER, INFILTRATION AND SEDIMENT DURING CONSTRUCTION BY GRADING, SEALING AND COVERING.



SANITARY SEWER MANHOLE TYPE 301 (PIPES 27" OR LESS)

JANUARY, 2024

SAN-1



"INFI-SHIELD", "GATOR WRAP" OR APPROVED EQUAL ALL JOINTS AND RINGS.

A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.

NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY. ADJUSTING RINGS MAY BE CONCRETE OR PLASTIC.

CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.

MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC, PER ASTM C478. STEP LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.

PRECAST REINFORCED CONCRETE MANHOLE SECTIONS & PRECAST BASE PER ASTM C478, FURNISHED WITH O-RING GASKETS AND LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.

PRECAST REINFORCED CONCRETE COVER SLAB (TYPE 2), PER ASTM C478.

PIPE CONNECTIONS TO MANHOLE SHALL BE MADE WATER TIGHT BY CAST INPLACE RUBBER BOOT AND CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.

ALL INTERIOR JOINTS TO BE COVERED WITH REINFORCED EPOXY SEALANT PER SPECIFICATION.



SANITARY SEWER MANHOLE TYPE 302 (PIPES 30" & LARGER)

JANUARY, 2024

SAN-2

"STRIKE PRODUCTS" OR "FLEX SEAL" INTERNAL I/I BARRIER OR APPROVED EQUAL

ADJUSTING RINGS
2 - 2" RINGS, MINIMUM
5 - 2" RINGS, MAXIMUM.
(1' MAX OF RINGS & MORTAR).

1/2" MORTAR ON OUTSIDE, BETWEEN RINGS, CASTING & MANHOLE. FINISH SMOOTH ON INSIDE. NO MORTAR ON INSIDE.

RUBBER GASKET AT ALL JOINTS

2 STRIPS BITUMASTIC SEAL; NO CEMENT

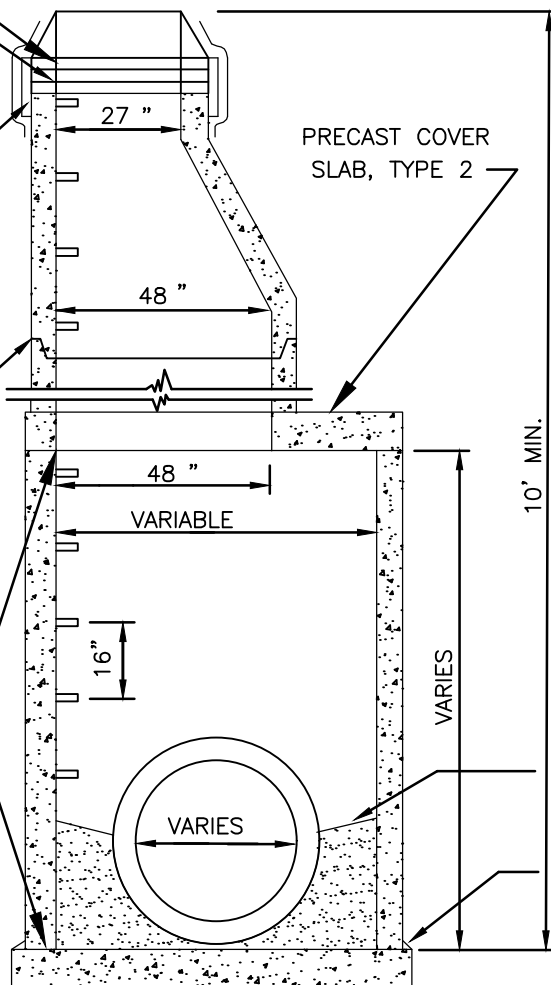
PRECAST COVER SLAB, TYPE 2

10' MIN.

SLOPE BENCHES 1/2" PER FOOT

CEMENT MORTAR

PRECAST BASE	
MH DIA.	SLAB THICKNESS
48"	6"
54"-102"	8"
108"	10"
120"	12"



"INFI-SHIELD", "GATOR WRAP" OR APPROVED EQUAL ALL JOINTS AND RINGS.

A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.

NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY. ADJUSTING RINGS MAY BE CONCRETE OR PLASTIC.

CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.

MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. STEP LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.

PRECAST REINFORCED CONCRETE MANHOLE SECTIONS PER ASTM C478, FURNISHED WITH O-RING GASKETS AND LUBRICANT EXCEPT AS OTHERWISE SPECIFIED. A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.

PIPE CONNECTIONS TO MANHOLE SHALL BE MADE WATER TIGHT BY CAST INPLACE RUBBER BOOT AND CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.

PROTECT MANHOLE FROM RAINWATER, INFILTRATION AND SEDIMENT DURING CONSTRUCTION BY GRADING, SEALING AND COVERING.

ALL INTERIOR JOINTS TO BE COVERED WITH REINFORCED EPOXY SEALANT PER SPECIFICATION.



SANITARY SEWER MANHOLE TYPE 303

JANUARY, 2024

SAN-3

A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.

"STRIKE PRODUCTS" OR
"FLEXSEAL" INTERNAL
I/I BARRIER APPROVED
EQUAL

ADJUSTING RINGS
2 - 2" RINGS, MINIMUM
5 - 2" RINGS, MAXIMUM.
(1' MAX OF RINGS &
MORTAR).

WATERTIGHT
SEAL

1/2" MORTAR ON
OUTSIDE, AND BETWEEN
RINGS, CASTING &
MANHOLE. FINISH
SMOOTH ON THE INSIDE.
NO MORTAR ON INSIDE.

MECHANICAL JOINT DIP, CL.50 PIPE
AND FITTINGS TO BE USED FOR DROP
SECTION. DROP SECTION PIPE SIZE TO
BE EQUIVALENT TO INLET PIPE SIZE.

WATERTIGHT
SEAL

RUBBER
GASKET AT
ALL JOINTS

END OF DIP PIPE TO BEAR
ON UNDISTURBED SOIL

18' MIN. DIP

DIP TEE

WATERTIGHT
SEAL
CORE DRILL
TO EXISTING
MANHOLE

16" O.C.

CONSTRUCTION JOINT
IF NECESSARY.

OUTSIDE DROP TO BE
SECURED TO MANHOLE
WITH 3" X 14 GA. GALV.
STRAPS ANCHORED WITH
4-KWIK BOLTS @ 5' O.C.

WATERTIGHT
SEAL

VARIES (SEE PLAN)

NON-SHRINK GROUT

RCP HORSESHOE
WITH MORTAR JOINTS

SLOPE INVERT AS SHOWN

#5 DOWELS 8" MAX SPACING
FOR CONNECTION OF NEW BAR
TO EXISTING MANHOLE

2'-0" MIN.

D/2

6"

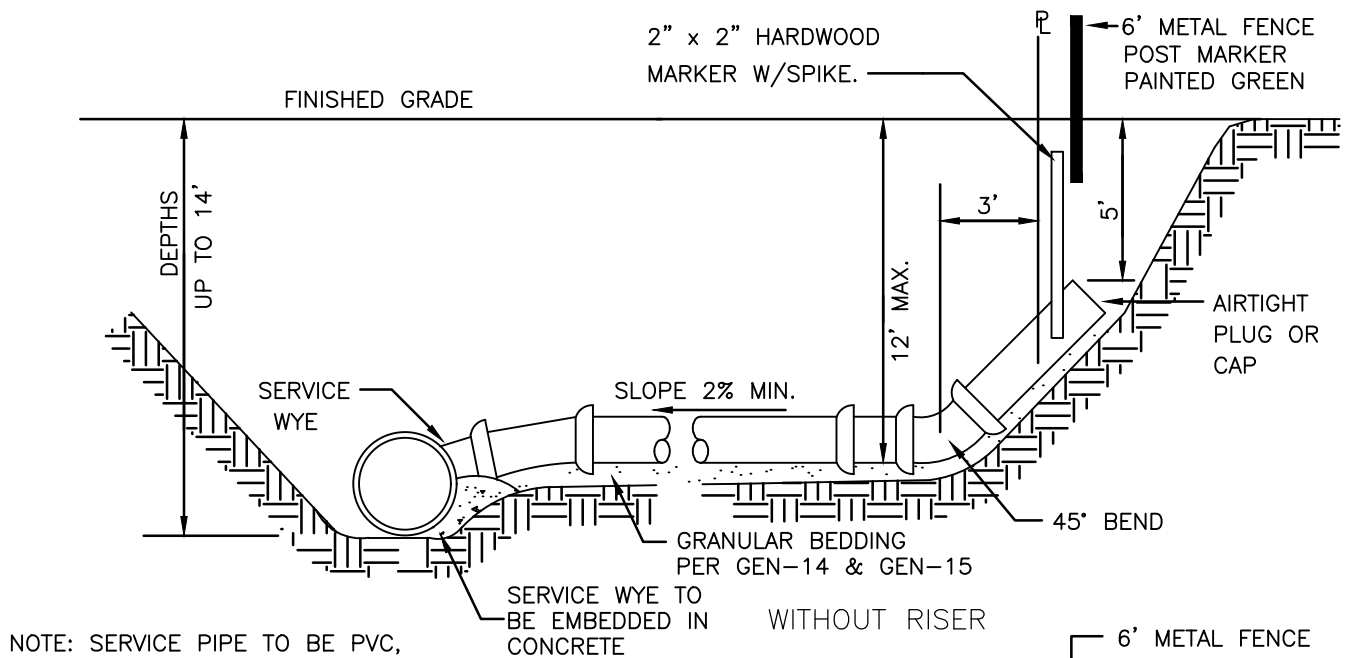
FOR MANHOLE REQUIREMENTS SEE NOTES IN SAN-1



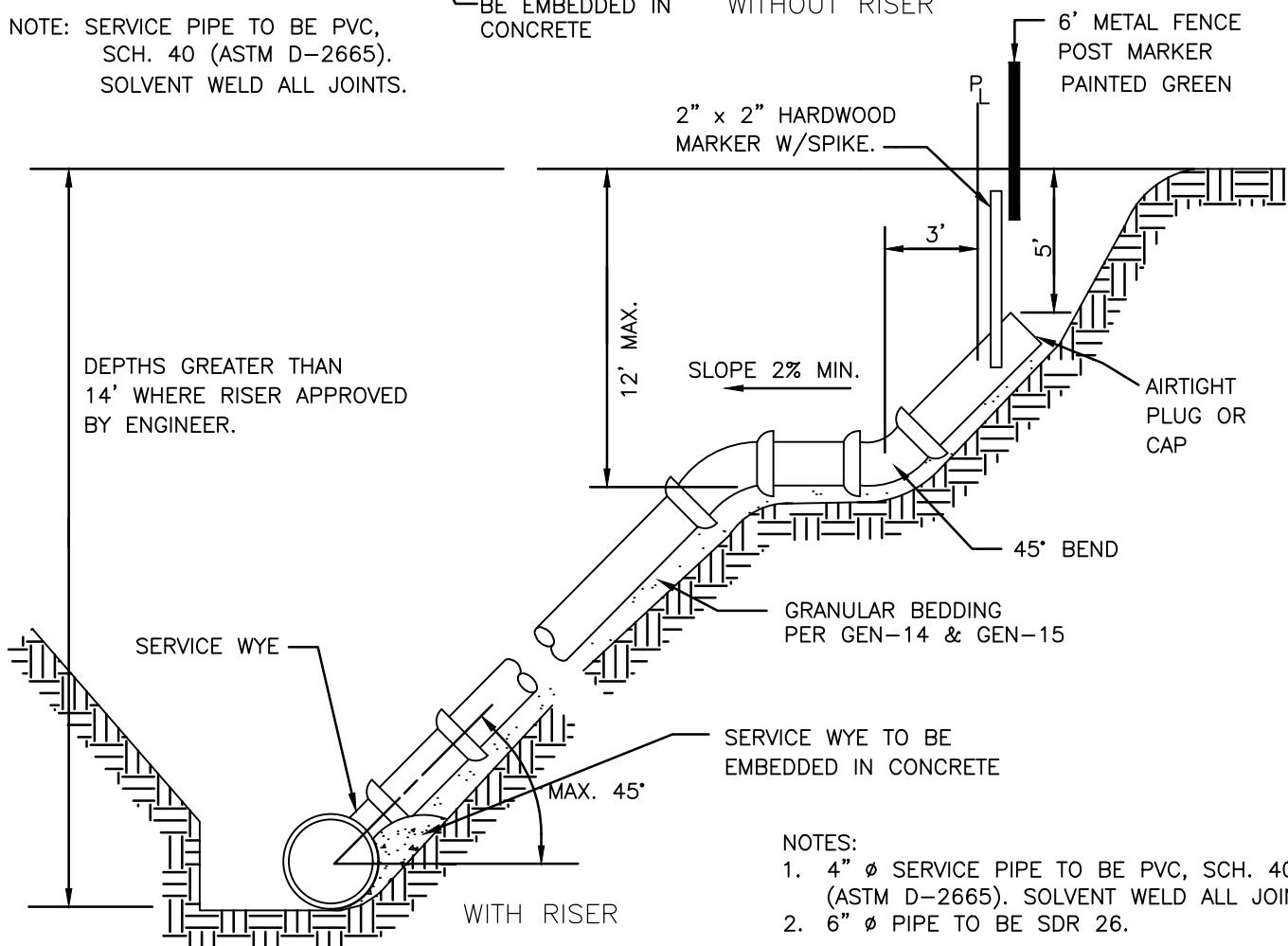
SANITARY SEWER OUTSIDE DROP

JANUARY, 2024

SAN-4



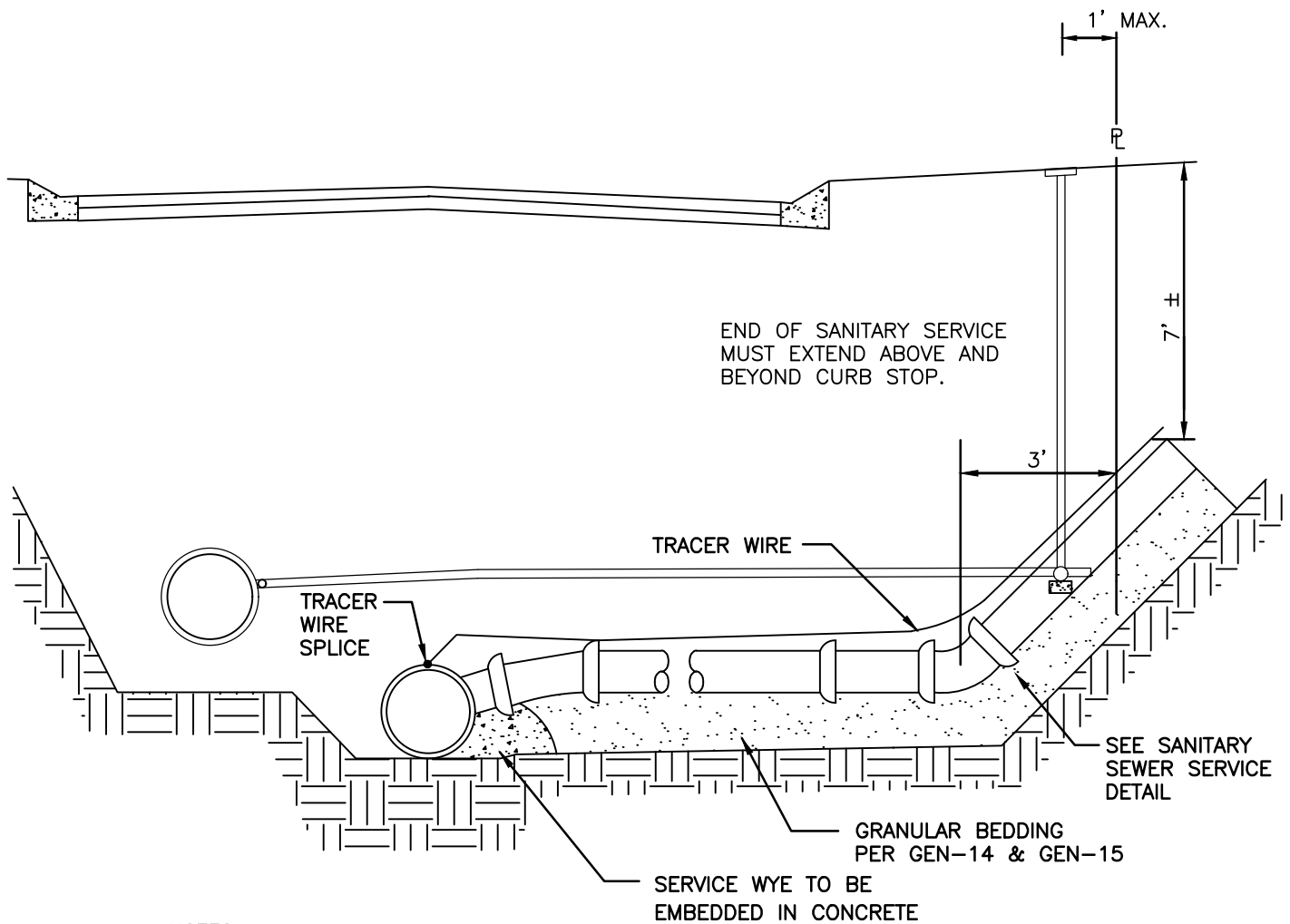
NOTE: SERVICE PIPE TO BE PVC, SCH. 40 (ASTM D-2665). SOLVENT WELD ALL JOINTS.



SANITARY SEWER SERVICE

JANUARY, 2024

SAN-6



NOTES:

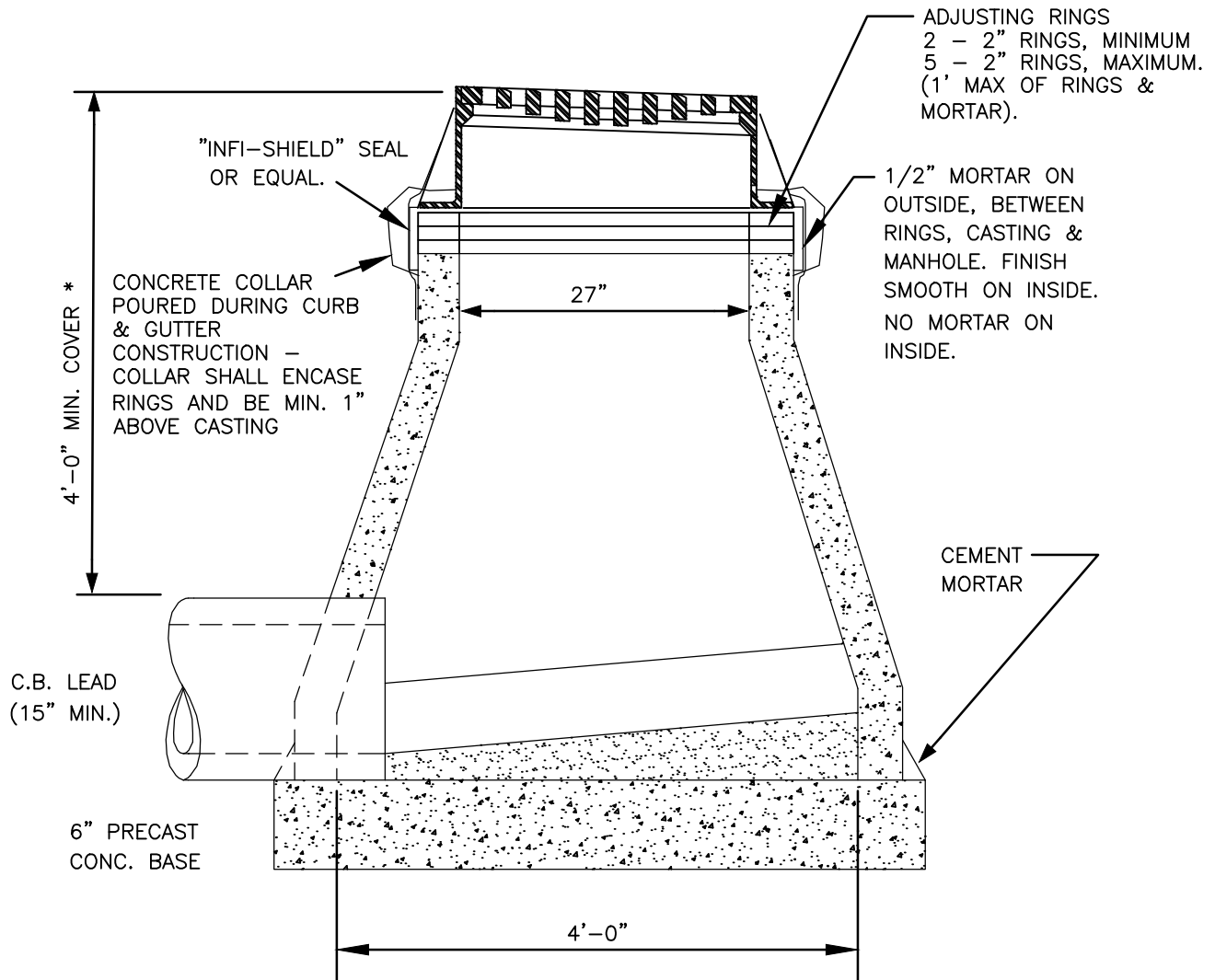
1. SERVICES SHALL BE 4" DIAMETER PVC SCHEDULE 40
2. SEWER SERVICES ARE LOCATED 3' DOWNSTREAM OF WATER SERVICE IF IN SAME TRENCH
3. TRACER WIRE SHALL BE INSTALLED ON ALL SANITARY SEWER SERVICES
4. AN "S" SHALL BE STAMPED INTO THE CURB ABOVE THE SANITARY SERVICE FOR FUTURE LOCATING PURPOSES.



SERVICE
DETAILS

JANUARY, 2024

SAN-7



1. A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.
2. NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
3. RINGS MAY BE CONCRETE OR PLASTIC.
4. CAST IRON CATCH BASIN FRAME & COVER CASTINGS PER SPECIFICATIONS.
5. PRECAST REINFORCED CONCRETE CONE SECTION & PRECAST BASE PER ASTM C478.
6. FILL OPENING BETWEEN PIPE AND MANHOLE WALL WITH CEMENT MORTAR INSIDE SURFACE SHALL BE FINISHED SMOOTH.

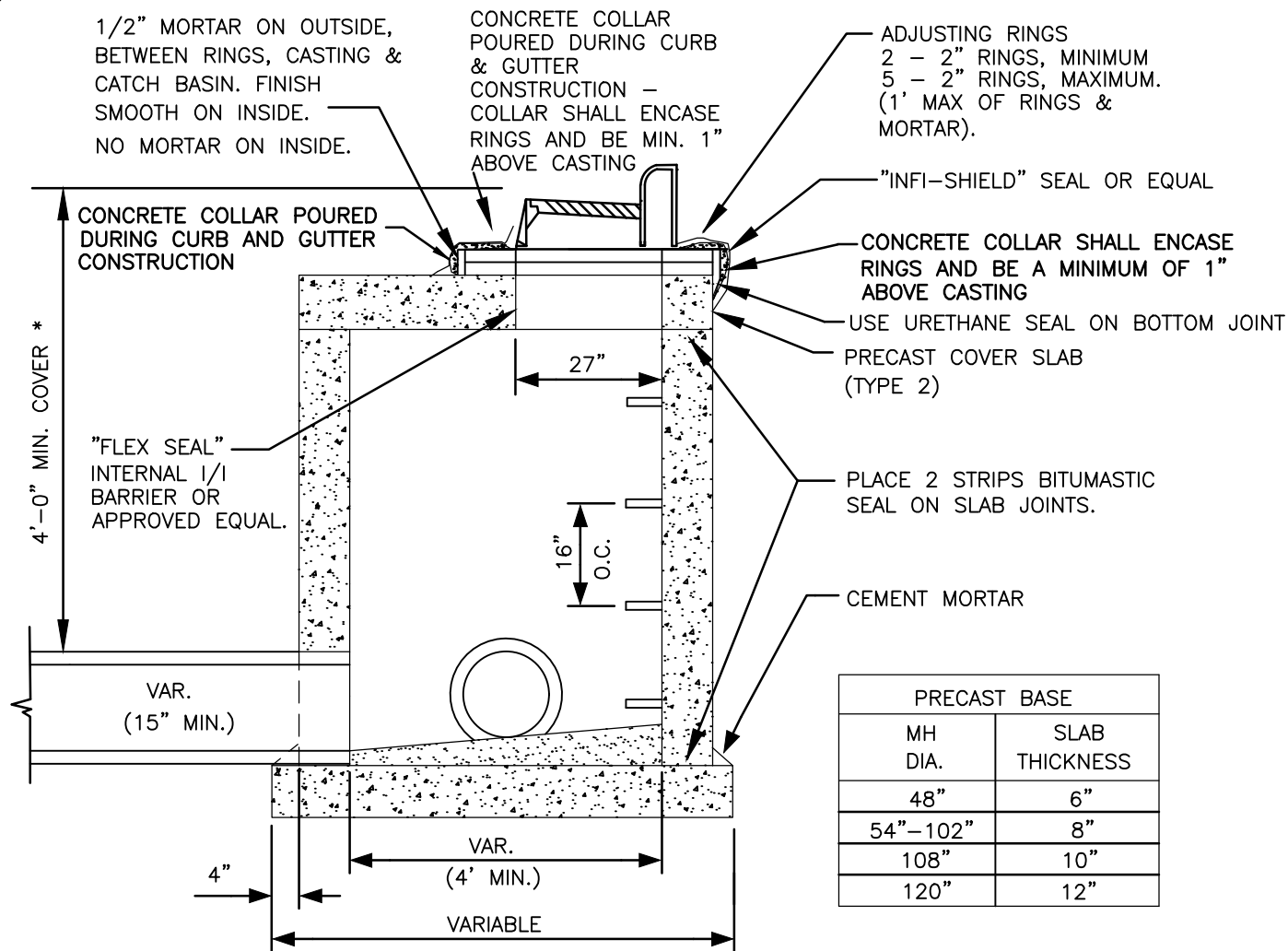
* MINIMUM PIPE COVER CAN BE REDUCED FROM 4' TO 2'-6" WITH INSTALLATION OF PERFORATED PIPE DRAIN PER "GRANULAR SUBCUT AND PERFORATED PIPE DRAIN" DETAIL.



CATCH BASIN TYPE G

JANUARY, 2024

STR-1



1. "INFI-SHIELD", "GATOR WRAP" OR APPROVED EQUAL ALL JOINTS AND RINGS.
2. A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.
3. NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
4. RINGS MAY BE CONCRETE OR PLASTIC.
5. CAST IRON FRAME & GRATE CASTINGS PER SPECIFICATIONS.
6. MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
7. PRECAST REINFORCED CONCRETE BASE SLAB & COVER SLAB PER ASTM C478,
8. PRECAST REINFORCED CONCRETE MANHOLE SECTIONS PER ASTM C478, OR 8" CONCRETE MANHOLE BLOCK WITH 1/2" MORTARED EXTERIOR.
9. FURNISH PRECAST CONCRETE MANHOLE SECTIONS WITH O-RING GASKETS & LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
10. FILL OPENING BETWEEN PIPE AND MANHOLE WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.
11. MANHOLES THAT HOLD WATER AFTER CONSTRUCTION SHALL HAVE "FLEX SEAL" APPLIED TO ENTIRE INTERIOR OF STRUCTURE.
12. * MINIMUM PIPE COVER CAN BE REDUCED FROM 4' TO 2'-6" WITH INSTALLATION OF PERFORATED PIPE DRAIN PER "GRANULAR SUBCUT AND PERFORATED PIPE DRAIN" DETAIL.



CATCH BASIN TYPE 4020

JANUARY, 2024

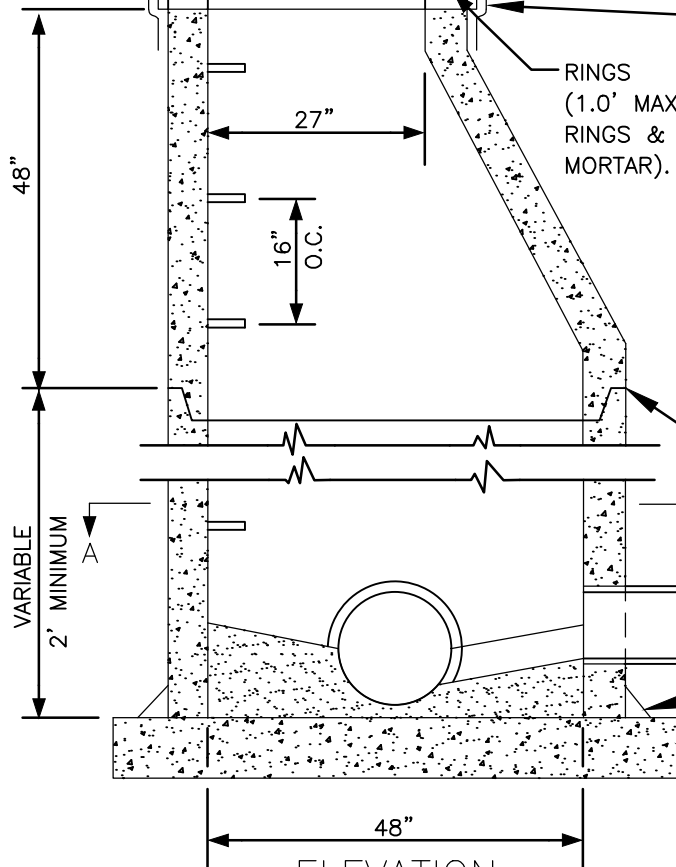
STR-2

"STRIKE PRODUCTS"
INTERNAL 1/1
BARRIER OR
APPROVED EQUAL

1/2" MORTAR ON
OUTSIDE, BETWEEN
RINGS, CASTING &
MANHOLE. FINISH
SMOOTH ON INSIDE.
NO MORTAR ON
INSIDE.

CONCRETE COLLAR
POURED DURING CURB
& GUTTER
CONSTRUCTION -
COLLAR SHALL ENCASE
RINGS AND BE MIN. 1"
ABOVE CASTING

RINGS
(1.0' MAX. OF
RINGS &
MORTAR).

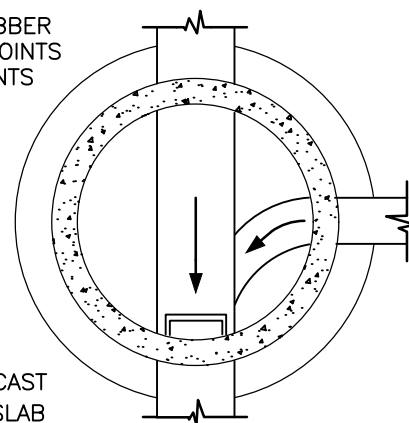


O-RING RUBBER
GASKETED JOINTS
ON ALL JOINTS

CEMENT
MORTAR

6' PRECAST
BASE SLAB

ELEVATION



SECTION
A-A

1. "INFI-SHIELD", "GATOR WRAP" OR APPROVED EQUAL ALL JOINTS AND RINGS.
2. A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.
3. NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
4. ADJUSTING RINGS MAY BE CONCRETE OR PLASTIC.
5. CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.
6. MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
7. PRECAST REINFORCED CONCRETE MANHOLE SECTIONS & BASE SLAB PER ASTM C478.
8. FURNISH PRECAST MANHOLE SECTIONS WITH O-RING GASKETS & LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
9. A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.
10. FILL OPENING BETWEEN PIPE & MH WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.

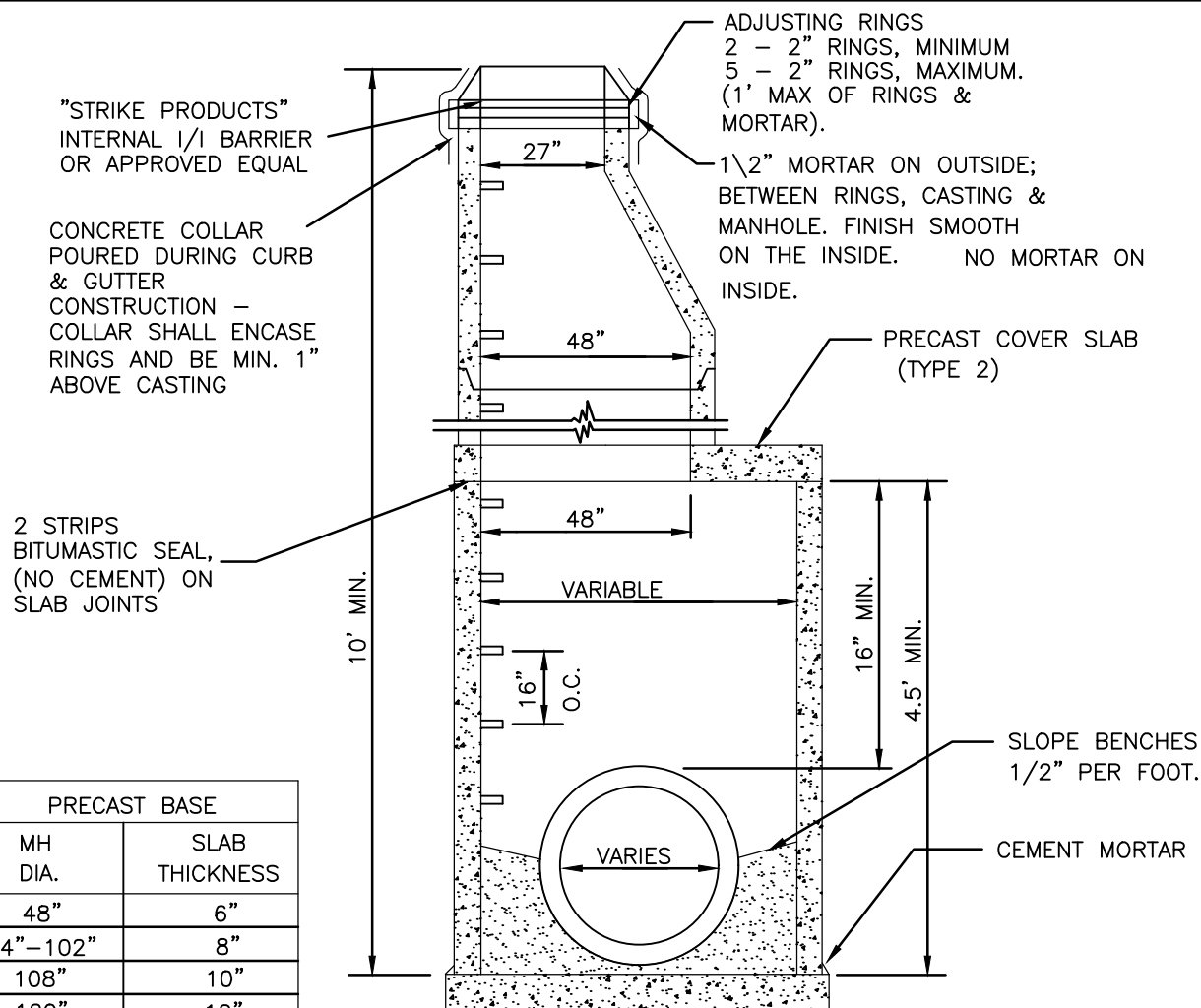


STORM SEWER MANOLE TYPE 4020 (PIPES 27" OR LESS)

JANUARY, 2024

STR-3

PRECAST BASE	
MH DIA.	SLAB THICKNESS
48"	6"
54"–102"	8"
108"	10"
120"	12"



1. "INFI-SHIELD", "GATOR WRAP" OR APPROVED EQUAL ALL JOINTS AND RINGS.
2. A URETHANE OR BUTYL SEAL SHALL BE USED TO SEAL THE TOP RING TO THE CASTING AND THE BOTTOM RING TO THE CONE OR TOP SLAB.
3. NO WOOD SHALL BE USED FOR ADJUSTING CASTING; CEMENT MORTAR ONLY.
4. ADJUSTING RINGS MAY BE CONCRETE OR PLASTIC.
5. CAST IRON MANHOLE FRAME & COVER AS PER SPECIFICATIONS.
6. MANHOLE STEPS SHALL BE CAST IRON, ALUMINUM OR STEEL REINFORCED PLASTIC PER ASTM C478. LOCATION SHALL BE AS NOTED IN THE SPECIFICATIONS.
7. PRECAST REINFORCED CONCRETE MANHOLE SECTIONS & BASE SLAB PER ASTM C478.
8. FURNISH PRECAST MANHOLE SECTIONS WITH O-RING GASKETS & LUBRICANT EXCEPT AS OTHERWISE SPECIFIED.
9. A 12" OR 18" BARREL SECTION SHALL BE INSTALLED UNDER THE CONE WHENEVER POSSIBLE.
10. FILL OPENING BETWEEN PIPE & MH WALL WITH CEMENT MORTAR. INSIDE SURFACE SHALL BE FINISHED SMOOTH.

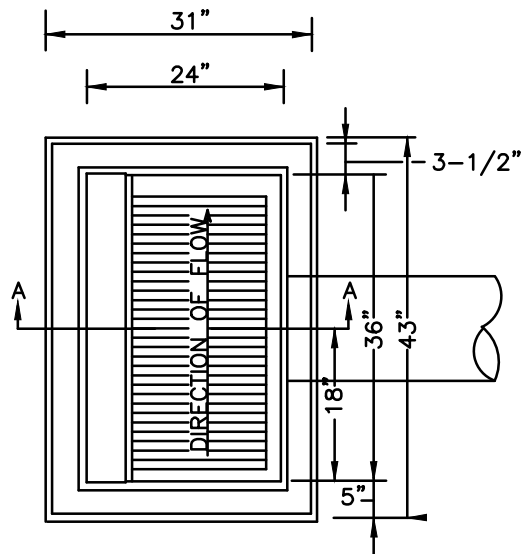


STORM SEWER MANHOLE TYPE 4020 (PIPES 30" & LARGER)

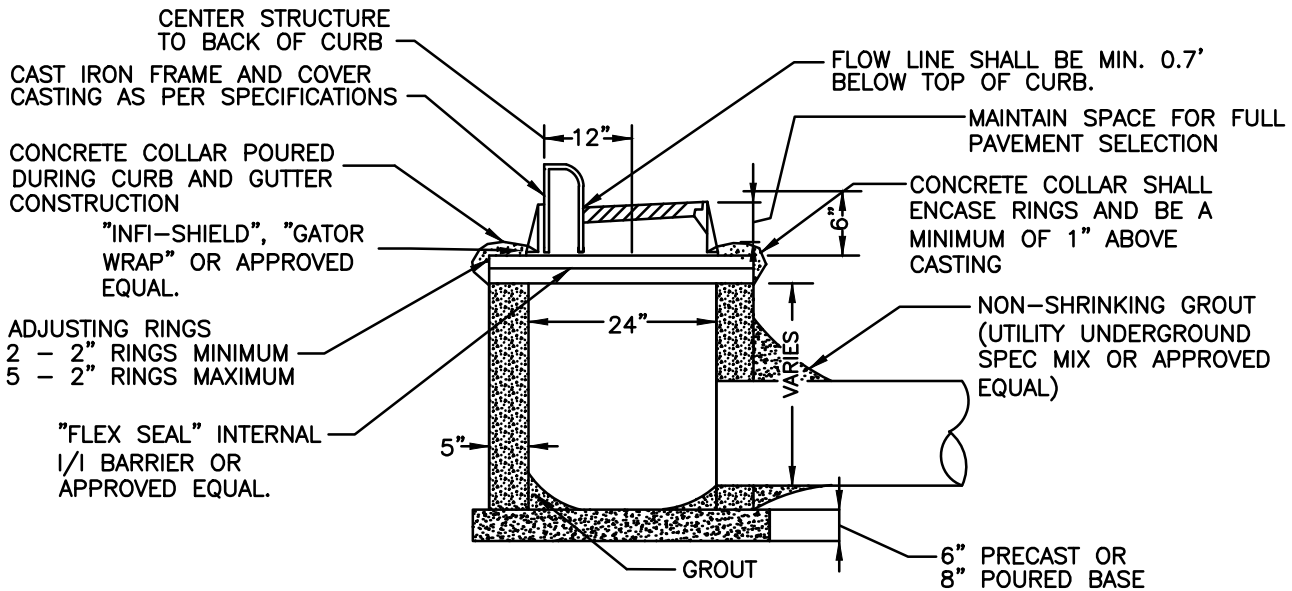
JANUARY, 2024

STR-4

STR-5



PLAN



VOIDS & DOGHOUSES FILLED WITH CONCRETE BRICK OR BLOCK ONLY

SECTION A-A

NOTES:

1. REINFORCING TO CONSIST OF #4 BARS @ 8" O.C., 4' MINIMUM LENGTH, EACH SIDE OF CASTING
2. GROUT BOTTOM TO DRAIN TO CENTER
3. PIPE CUT-OUTS TO BE LOCATED WHERE REQUIRED
4. ADJUSTING RINGS SHALL HAVE MORTAR JOINTS - PLASTER OUTSIDE, STRIKE CLEAN INSIDE
5. CATCH BASINS THAT HOLD WATER AFTER CONSTRUCTION SHALL HAVE "FLEX SEAL" APPLIED TO ENTIRE INTERIOR OF STRUCTURE.
6. INLET PROTECTION TO BE INSTALLED IN CATCH BASIN AND MAINTAINED AS DIRECTED BY THE ENGINEER

NO SCALE



2 x 3 CATCH BASIN

JANUARY, 2024

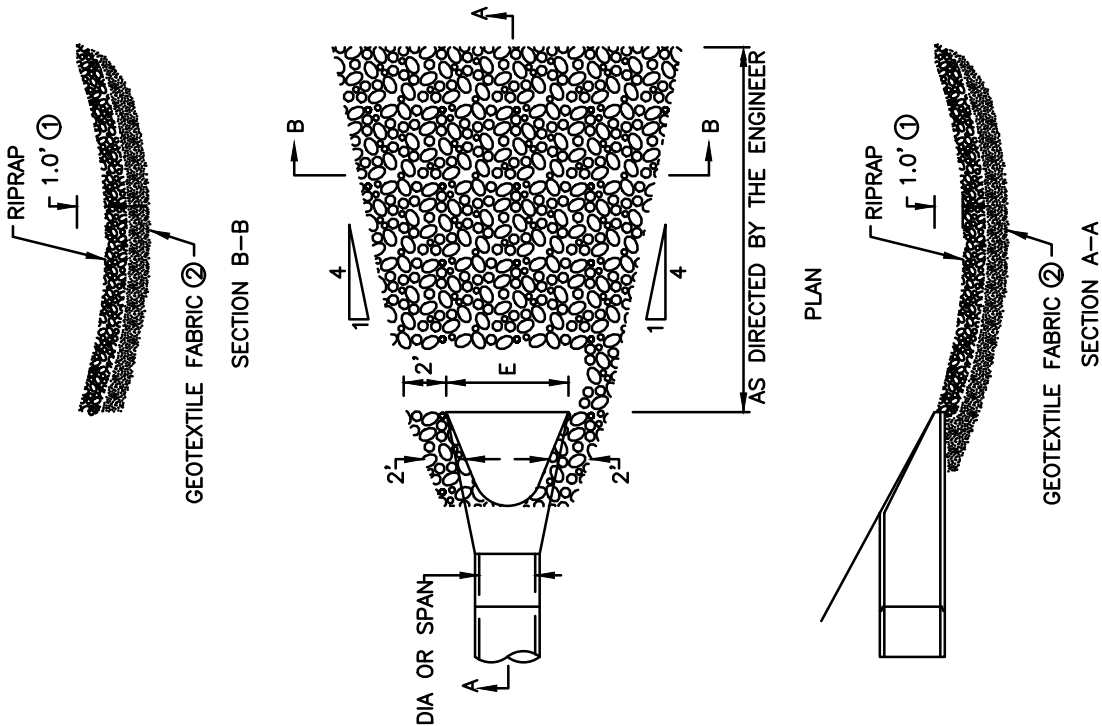
STR-6

TABLE OF QUANTITIES

RIPRAP AT RCP OUTLETS									
DIA ROUND PIPE (IN)	CLASS III D 50= 9"			CLASS IV D 50= 12"			CLASS V D 50= 15"		
	15" DEPTH RIPRAP (CU YD)	7.5" DEPTH GRANULAR FILTER (CU YD)	18" DEPTH RIPRAP (CU YD)	9" DEPTH GRANULAR FILTER (CU YD)	24" DEPTH RIPRAP (CU YD)	12" DEPTH GRANULAR FILTER (CU YD)	24" DEPTH RIPRAP (CU YD)	12" DEPTH GRANULAR FILTER (CU YD)	24" DEPTH RIPRAP (CU YD)
12	2.1	1.1	2.6	1.3	3.4	1.7	3.4	1.7	3.4
15	2.9	1.4	3.5	1.7	4.6	2.3	4.6	2.3	4.6
18	3.6	1.8	4.4	2.2	5.8	2.9	5.8	2.9	5.8
21	4.6	2.3	5.6	2.8	7.4	3.7	7.4	3.7	7.4
24	5.8	2.9	6.9	3.5	9.2	4.6	9.2	4.6	9.2
27	6.9	3.4	8.3	4.1	11.0	5.5	11.0	5.5	11.0
30	8.3	4.1	9.9	5.0	13.2	6.6	13.2	6.6	13.2
36	11.0	5.5	13.2	6.6	17.6	8.8	17.6	8.8	17.6
42	13.6	6.8	16.4	8.2	21.8	10.9	21.8	10.9	21.8
48	16.8	8.4	20.1	10.1	26.8	13.4	26.8	13.4	26.8
54	19.8	9.9	23.7	11.9	31.6	15.8	31.6	15.8	31.6
60	23.0	11.5	27.6	13.8	36.8	18.4	36.8	18.4	36.8
66	27.0	13.5	32.4	16.2	43.2	21.6	43.2	21.6	43.2
72	31.1	15.6	37.4	18.7	49.8	24.9	49.8	24.9	49.8
84	40.0	20.0	48.0	24.0	64.0	32.0	64.0	32.0	64.0
90	45.5	22.8	54.6	27.3	72.8	36.4	72.8	36.4	72.8

RIPRAP AT RCP-A OR BOXES OF EQUIVALENT SPAN WIDTH									
SPAN ROUND PIPE (IN)	CLASS III D 50= 9"			CLASS IV D 50= 12"			CLASS V D 50= 15"		
	15" DEPTH RIPRAP (CU YD)	7.5" DEPTH GRANULAR FILTER (CU YD)	18" DEPTH RIPRAP (CU YD)	9" DEPTH GRANULAR FILTER (CU YD)	24" DEPTH RIPRAP (CU YD)	12" DEPTH GRANULAR FILTER (CU YD)	24" DEPTH RIPRAP (CU YD)	12" DEPTH GRANULAR FILTER (CU YD)	24" DEPTH RIPRAP (CU YD)
22	3.6	1.8	4.4	2.2	5.8	2.9	5.8	2.9	5.8
28	5.8	2.9	6.9	3.5	9.2	4.6	9.2	4.6	9.2
36	8.1	4.1	9.8	4.9	13.0	6.5	13.0	6.5	13.0
43	11.0	5.5	13.2	6.6	17.6	8.8	17.6	8.8	17.6
51	13.6	6.8	16.4	8.2	21.8	10.9	21.8	10.9	21.8
58	16.5	8.3	19.8	9.9	26.4	13.2	26.4	13.2	26.4
65	19.8	9.9	23.7	11.9	31.6	15.8	31.6	15.8	31.6
73	23.3	11.6	27.9	14.0	36.8	18.4	36.8	18.4	36.8
88	32.4	16.2	38.9	19.4	49.8	24.9	49.8	24.9	49.8
102	43.5	21.8	52.2	26.1	64.0	32.0	64.0	32.0	64.0
115	44.0	22.0	52.8	26.4	64.0	32.0	64.0	32.0	64.0
122	49.3	24.6	59.1	29.6	78.8	39.4	78.8	39.4	78.8
138	61.3	30.6	73.5	36.8	98.0	49.0	98.0	49.0	98.0
154	74.4	37.2	89.3	44.6	119.0	59.5	119.0	59.5	119.0

NOTE: REQUIREMENTS FOR RIPRAP SIZE, THICKNESS, WILL BE DESIGNATED IN PLANS.



- ① FOR PIPES GREATER THAN OR EQUAL TO 48", USE 2.0'
- ② THE FABRIC SHOULD COVER THE AREA OF THE RIPRAP AND EXTEND UNDER THE CULVERT APRON 3 FEET.
- ③ GROUT REQUIRED ON 21" & GREATER DIA. PIPE OR AS DIRECTED BY ENGINEER. SEE DETAIL SD-10

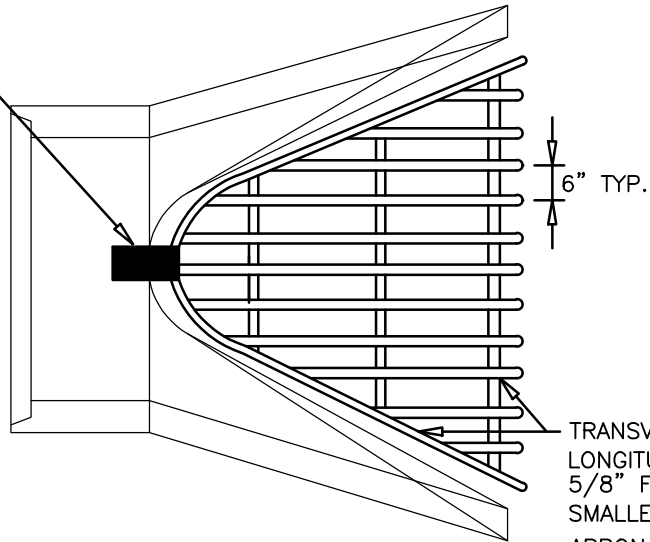


RIPRAP AT RCP
OUTLETS

JANUARY, 2024

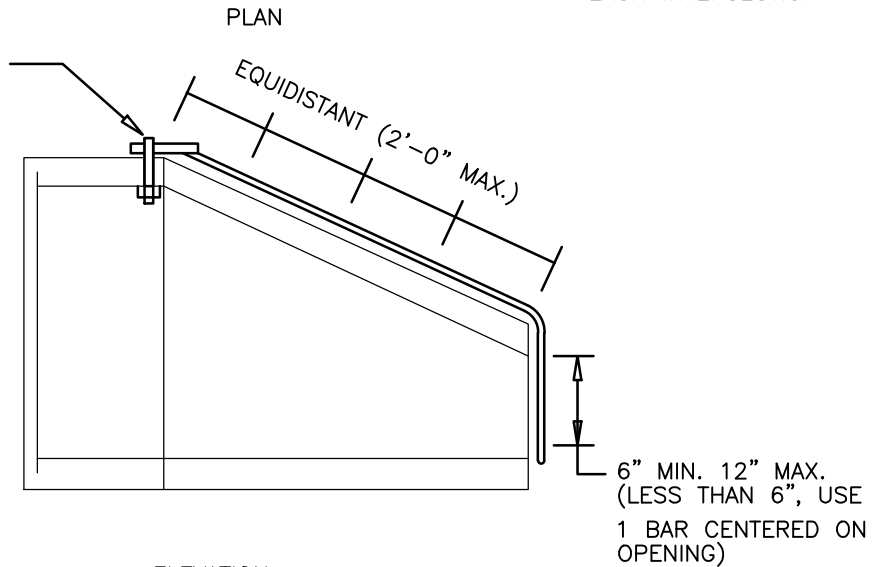
STR-7

16 GA. GALVANIZED
STEEL STRAP



TRANSVERSE &
LONGITUDINAL BARS—
5/8" FOR 24" APRON &
SMALLER, 3/4" FOR 27"
APRON & LARGER WELD
EACH INTERSECTION

(1) 1" EYE BOLT WITH
(2) WASHERS EACH



ELEVATION

6" MIN. 12" MAX.
(LESS THAN 6", USE
1 BAR CENTERED ON
OPENING)

NOTES:

1. ENTIRE TRASH GUARD ASSEMBLY TO BE HOT-DIP GALVANIZED AFTER FABRICATION.
2. SIZE OF TRASH GUARD VARIABLE DEPENDENT ON SIZE OF FLARED END SECTION.
3. PLACE TRASH GUARDS ON APRONS 18" AND LARGER, UNLESS OTHERWISE NOTED.



TRASH GUARDS

JANUARY, 2024

STR-8

SEE DETAIL FOR
F.E.S. STRUCTURE
MARKER

-(3) 1¼" HOLES USE (3) 1" BOLTS
AND TIE TO CONCRETE ABUTMENT

12" 3000 PSI
CONCRETE (TYP)

2'-0"
(TYP)

(3) 1 1/4" HOLES
USE (3) 1" BOLTS AND
TIE TO SHEET PILING

PLAN

A detailed cross-sectional diagram of a pile cap and sheet piling system. The diagram shows a central pile cap with a circular opening at the top. The pile cap is supported by a series of vertical sheet piling sections. The diagram includes the following labels and dimensions:

- 3000 PSI CONCRETE**: Label pointing to the top of the pile cap.
- #4 EACH FACE**: Label pointing to the reinforcement bars on the top and bottom faces of the pile cap.
- LEAVE TRASH GUARD TABS EXPOSED**: Label pointing to the top of the sheet piling sections.
- 2'-0" (TYP)**: Dimension indicating the height of the pile cap above the sheet piling.
- #4 AT 16" O/C STAGGERED**: Label pointing to the reinforcement bars in the sheet piling sections.
- SHEET PILING GALVANIZED INTERLOCK TO GAUGE MINIMUM**: Label pointing to the interlock between sheet piling sections.
- #4 EACH FACE**: Label pointing to the reinforcement bars on the sides of the sheet piling sections.
- 8'-0" (TYP)**: Dimension indicating the height of the sheet piling sections.
- OUTSIDE WIDTH OF END SECTION PLUS 4'-0"**: Dimension indicating the total width of the pile cap and sheet piling system.

ELEVATION

PILING FOR
FLARED END SECTION
NO SCALE

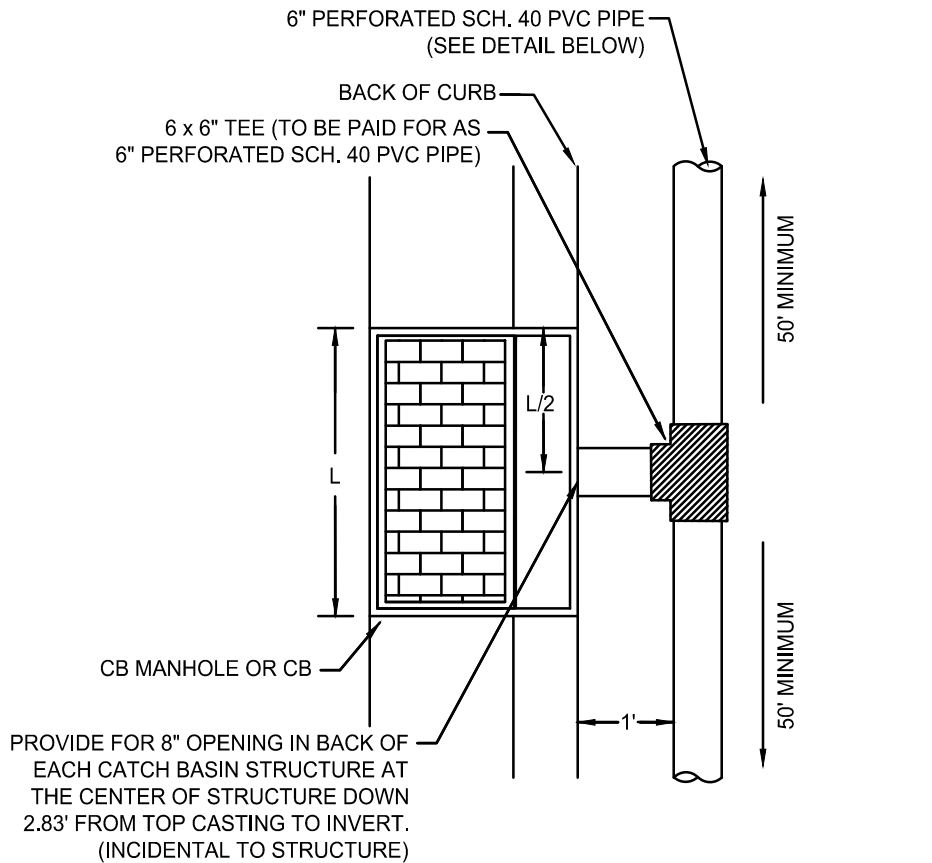


CITY OF
LINCOLNS LAKES

FES PILING

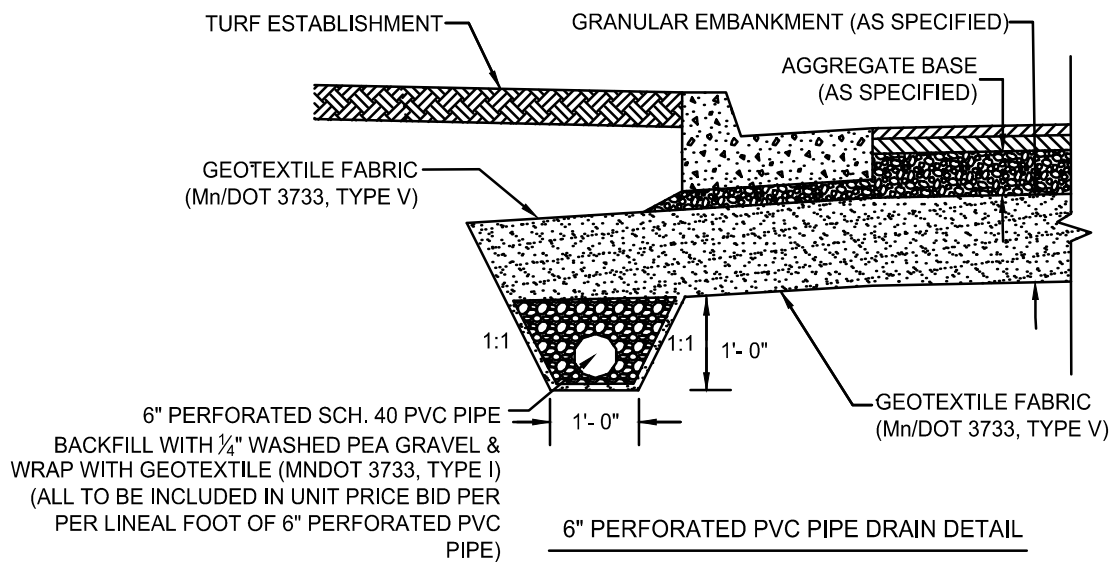
JANUARY, 2024

STR-9



PVC PIPE DRAIN CONNECTION TO MANHOLE OR CB

NO SCALE



NO SCALE

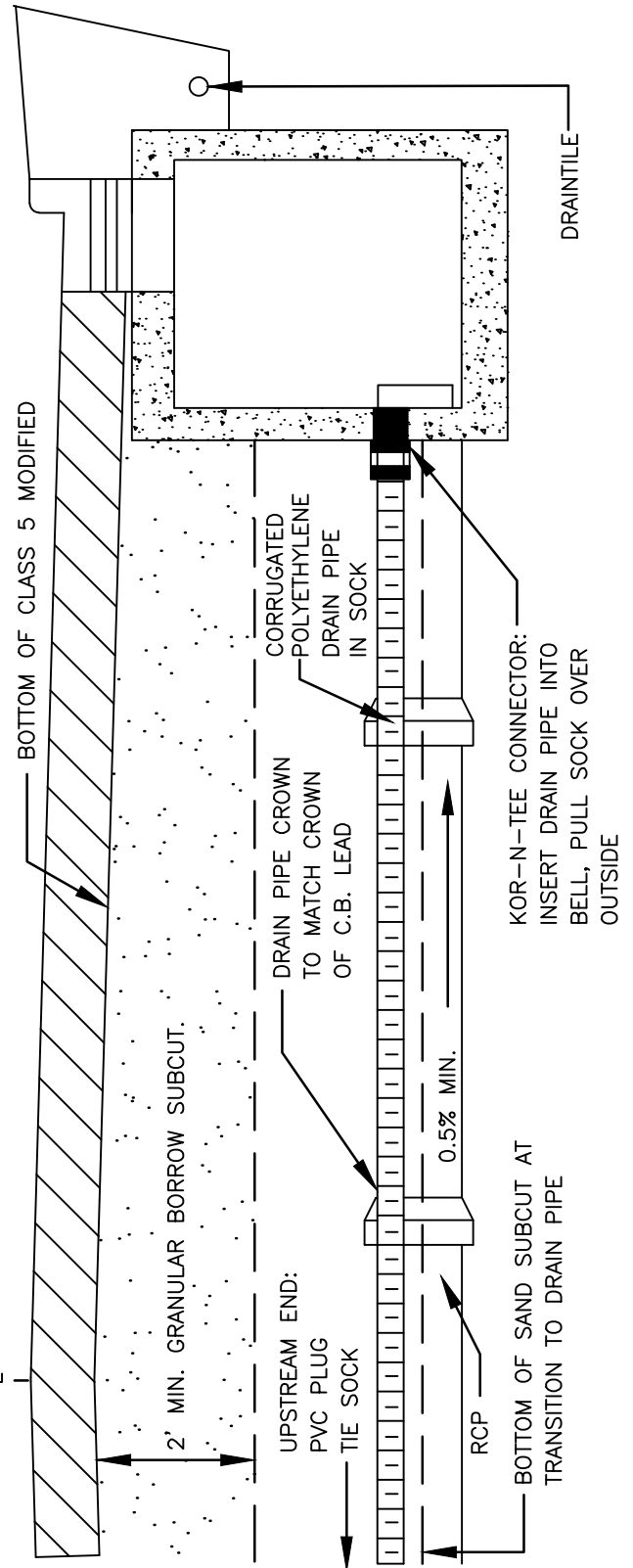
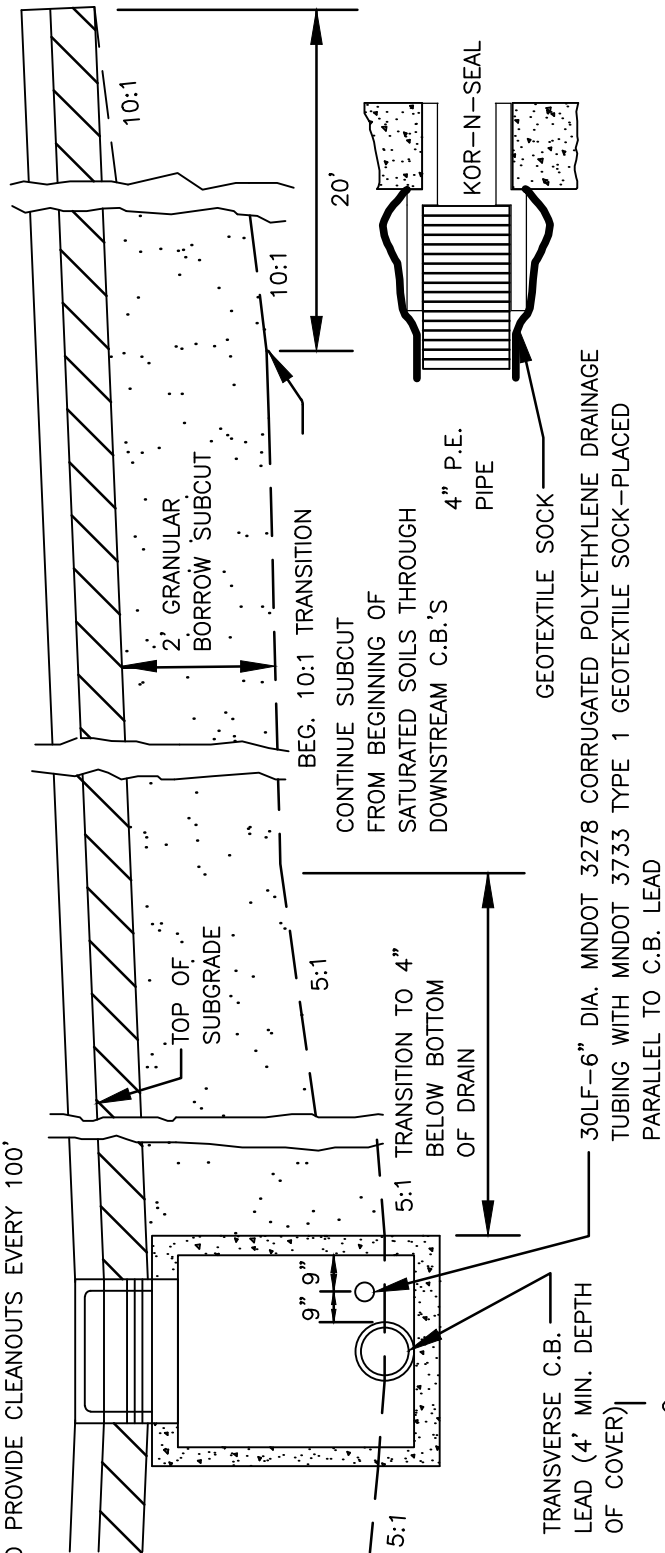


LOW POINT PERFORATED PIPE DRAIN

JANUARY, 2024

STR-10A

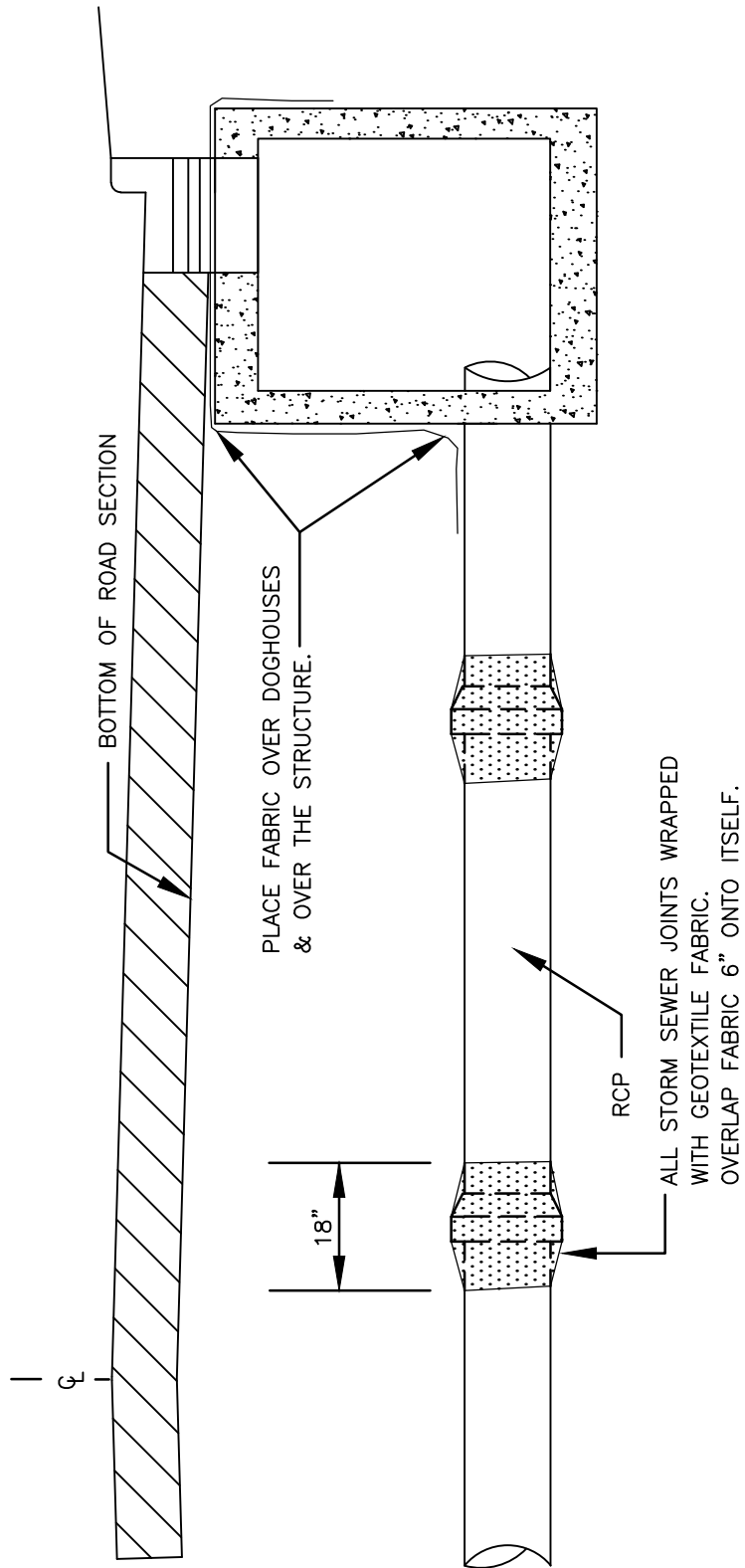
PROVIDE DRAIN ON BOTH SIDES OF C.B. LEAD IF AT LOW POINT AND PROVIDE CLEANOUTS EVERY 100'



PERFORATED PIPE DRAIN WHEN SPECIFIED WITH PIPE

JANUARY, 2024

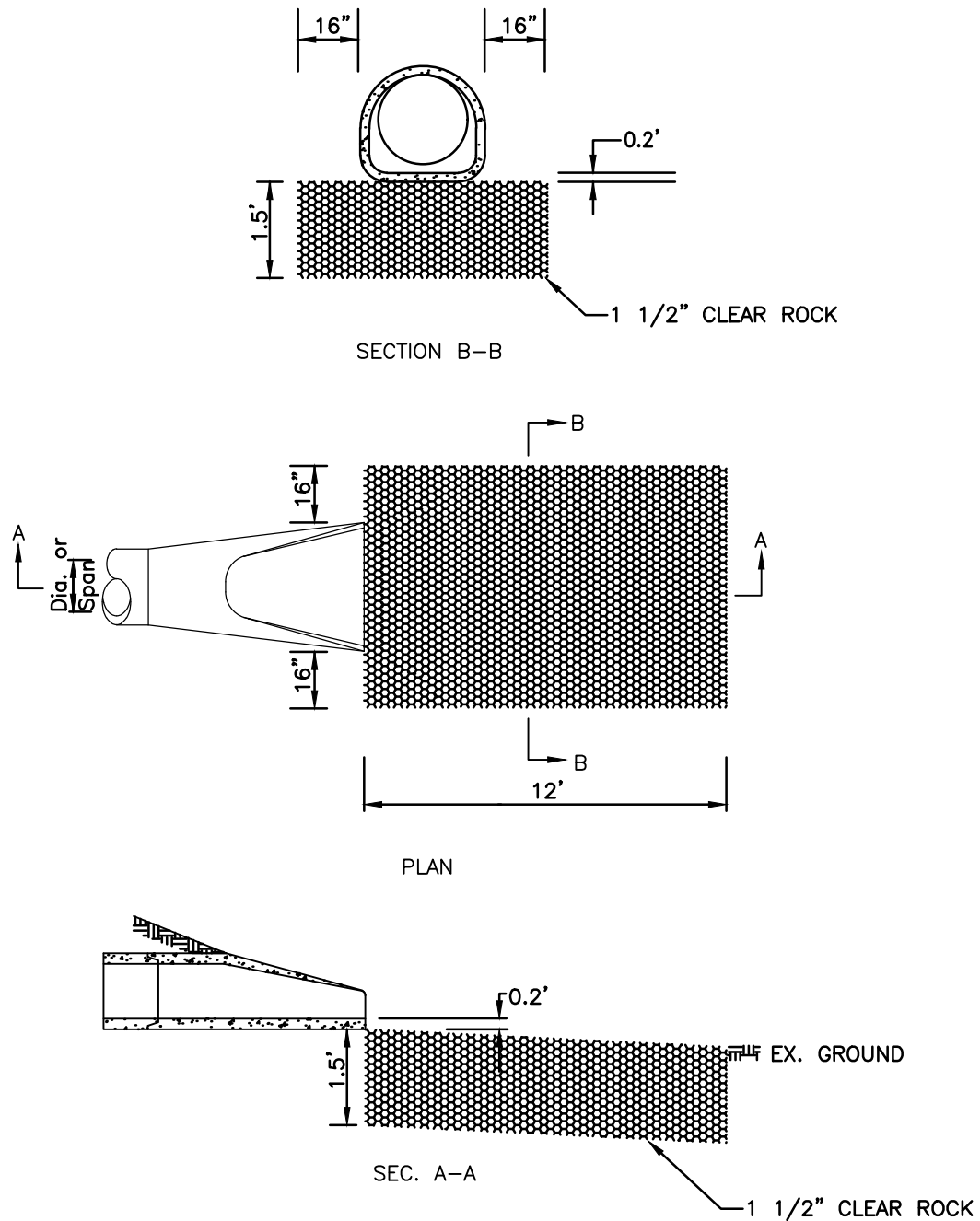
STR-10B



WRAPPING OF STORM SEWER JOINTS

JANUARY, 2024

STR-11



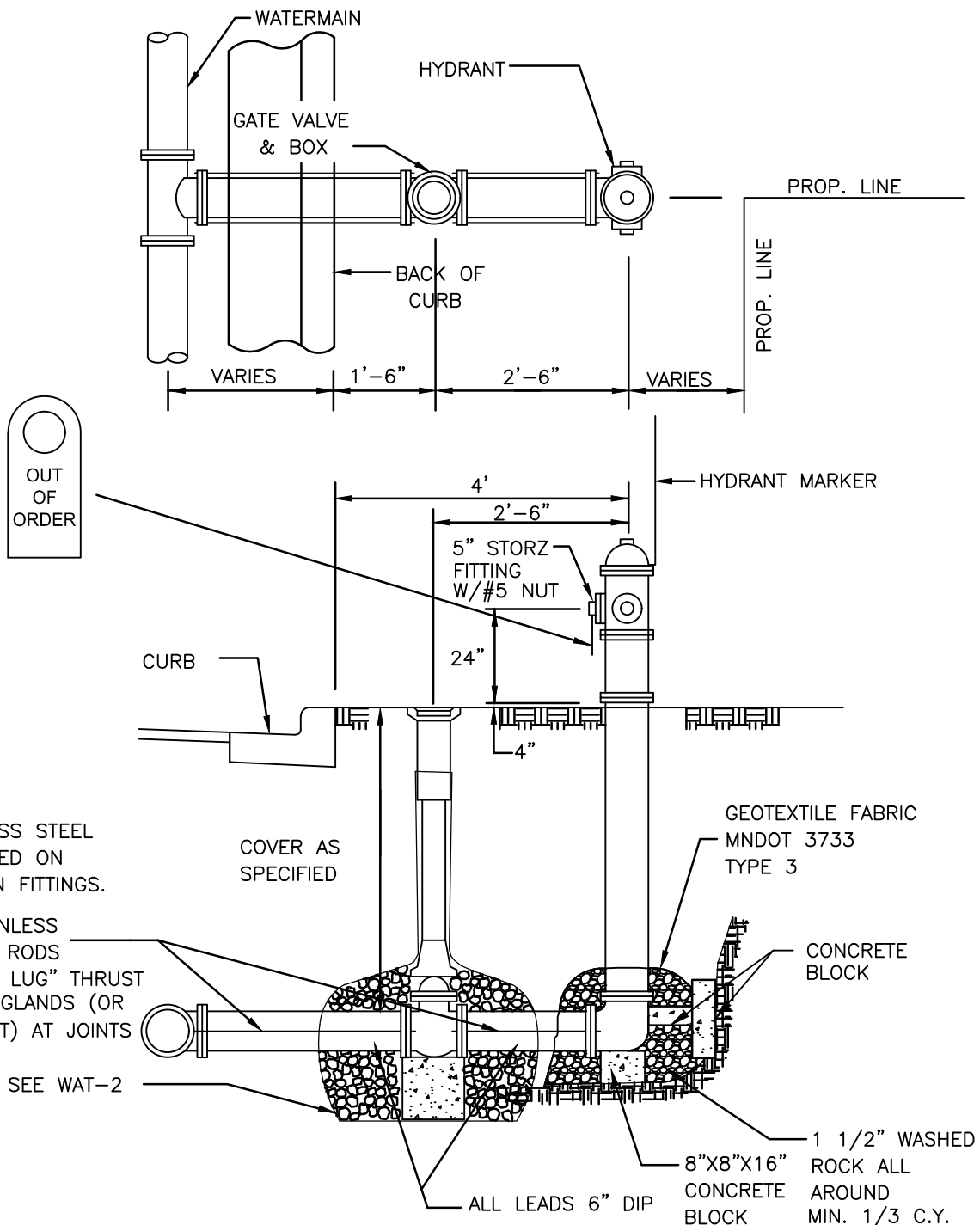
1. ALL TREES AND BRUSH SHALL BE REMOVED FROM THE AREA OF THE OUTFALL AS DESCRIBED ABOVE AND FROM AROUND COLLAR AREA OF F.E.S.
2. IF PIPE HAS TRASH GAURD IT SHALL BE REMOVED AND CLEANED OUT BY HAND TO FIRST PIPE JOINT.
3. EXISTING RIP RAP MAY BE DEPOSITED AROUND COLLAR AREA OF PIPE.
4. AN AREA 12' LONG BY TWICE THE WIDTH OF THE PIPE SHALL BE EXCAVATED TO 18" IN DEPTH AS SHOWN ABOVE. THIS AREA SHALL BE FILLED WITH 1 1/2" CLEAR ROCK. THE TOP OF THE ROCK SHALL BE 0.2' BELOW THE INVERT OF THE PIPE. EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.
5. RESTORATION OF DISTURBED AREA SHALL INCLUDE BUT NOT BE LIMITED TO BLACK DIRT AND SEED OR SOD TO MATCH EXISTING CONDITIONS.



CLEAN / OPEN STORM SEWER OUTFALL

JANUARY, 2024

STR-12



NOTE: STAINLESS STEEL BOLTS REQUIRED ON ALL WATERMAIN FITTINGS.

3/4" STAINLESS STEEL TIE RODS OR "MEGA LUG" THRUST RETAINER GLANDS (OR EQUIVALANT) AT JOINTS

SEE WAT-2

NOTES:

1. ALL FITTINGS SHALL BE MECHANICAL JOINTS
2. MEGALUG OPTION PERMITTED UPON CITY REVIEW
3. HYDRANTS SHALL HAVE 16" BREAKAWAY SECTION
4. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE POLYETHYLENE ENCASED
5. NO EXTENSIONS ARE ALLOWED.
6. GATE VALVE SHALL MEET ALL REQUIREMENTS OF WAT-2
7. VENTED CAP
8. HYDRANT TO BE INSTALLED WITH "OUT OF ORDER" TAG AND MARKER IN PLACE

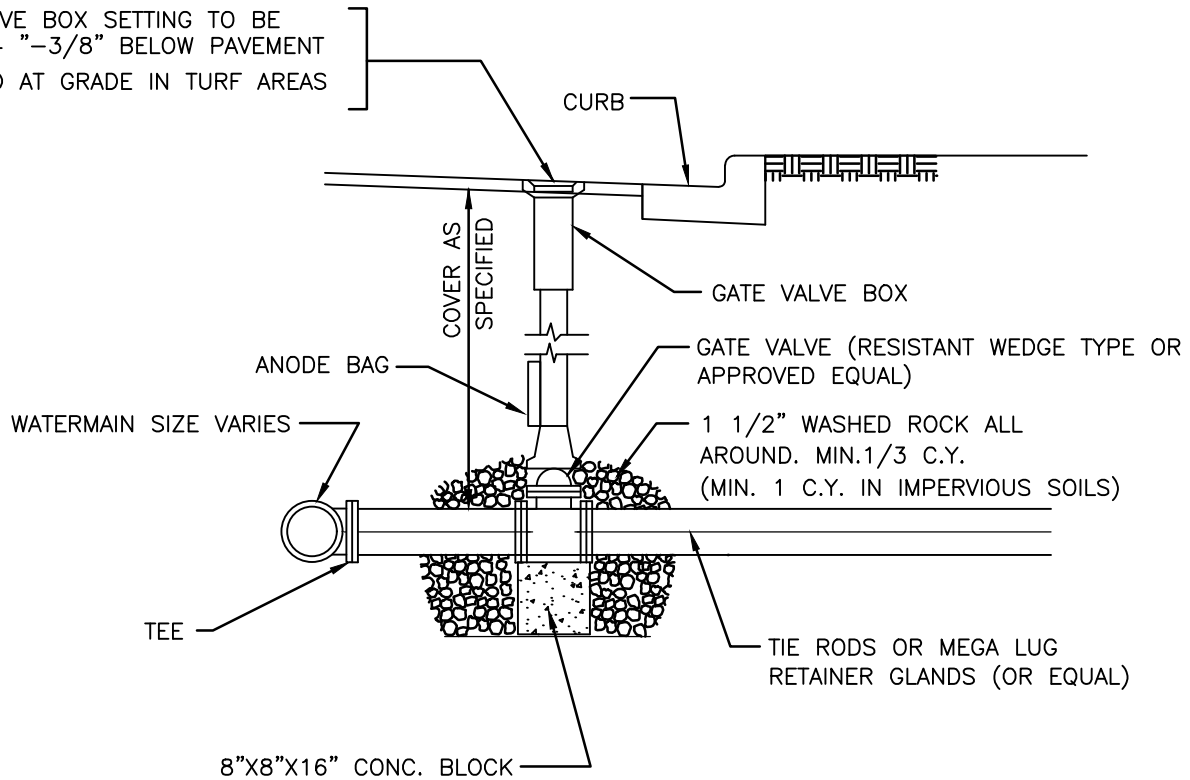


TYPICAL HYDRANT
DETAILS
(VALVE IN BOULEVARD)

JANUARY, 2024

WAT-1

VALVE BOX SETTING TO BE
1/4 "–3/8" BELOW PAVEMENT
AND AT GRADE IN TURF AREAS



NOTES:

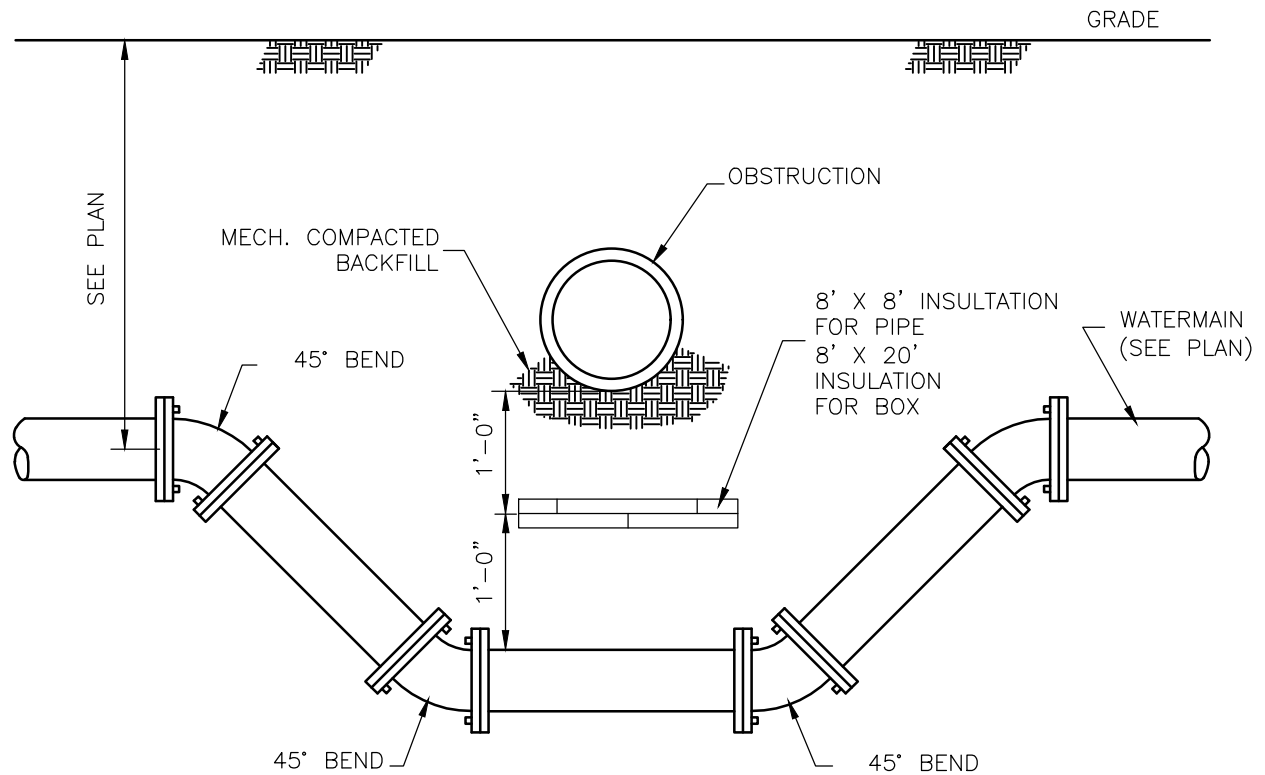
1. GATE VALVES SHOULD BE USED ON 6" THROUGH 16" WATERMAIN.
2. VALVE BOX INSERTS ARE NOT ALLOWED UNLESS APPROVED BY THE ENGINEER.
3. VALVE BOXES SHALL BE INSTALLED PLUMB AND SHALL ALLOW A 4" P.V.C. PIPE TO PASS ENTIRELY OVER THE GATE VALVE NUT AFTER INSTALLATION IS COMPLETE.
4. ALL VALVES SHALL BE TIED WITH 3/4" THREADED TIE RODS TO THE MAIN. MEGALUGS MAY BE USED IN LIEU OF TIE RODS.
5. THE INITIAL & FINAL RAISING OF VALVE BOXES SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.
6. BONNET ADAPTOR SHALL BE INSTALLED ON TOP OF GATE VALVE.
7. STAINLESS STEEL BOLTS REQUIRED ON ALL WATERMAIN FITTINGS.



GATE VALVE &
BOX INSTALLATION

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WAT-2



NOTES:

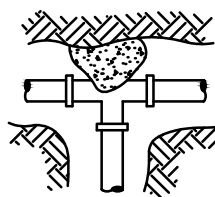
1. TIE ALL JOINTS WITH MEGALUGS 8 REQUIRED.
2. STAINLESS STEEL BOLTS REQUIRED ON ALL WATERMAIN FITTINGS.



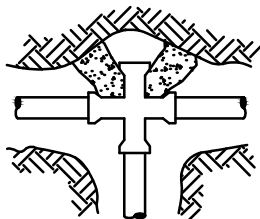
**WATER
LOWER**

JANUARY, 2024

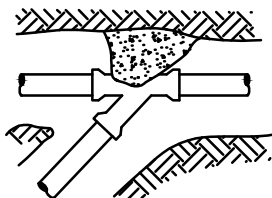
WAT-3



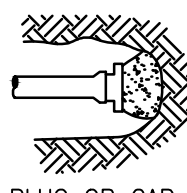
EACH AREA IS 1/2 OF TABULATED TOTAL AREA



PLUGGED CROSS

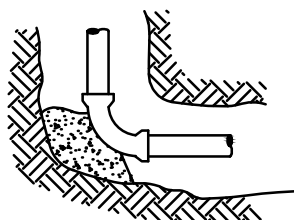


WYE

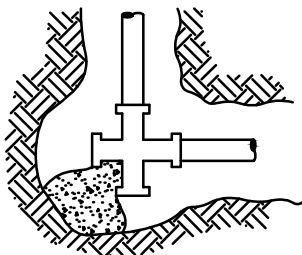


PLUG OR CAP

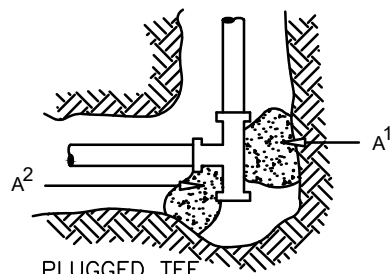
1/4" PLYWOOD OVER FACE OF BOLTS



BEND



PLUGGED CROSS



PLUGGED TEE

NOMINAL FITTING SIZE, INCHES	TEE, WYE, PLUG OR CAP	90° BEND, PLUGGED CROSS	TEE PLUGGED ON RUN		45° BEND	22-1/2° BEND	11-1/4° BEND
			A ¹	A ²			
4	1.0	1.4	1.9	1.4	1.0	-	-
6	2.1	3.0	4.3	3.0	1.6	1.0	-
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.6	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

NOTES:

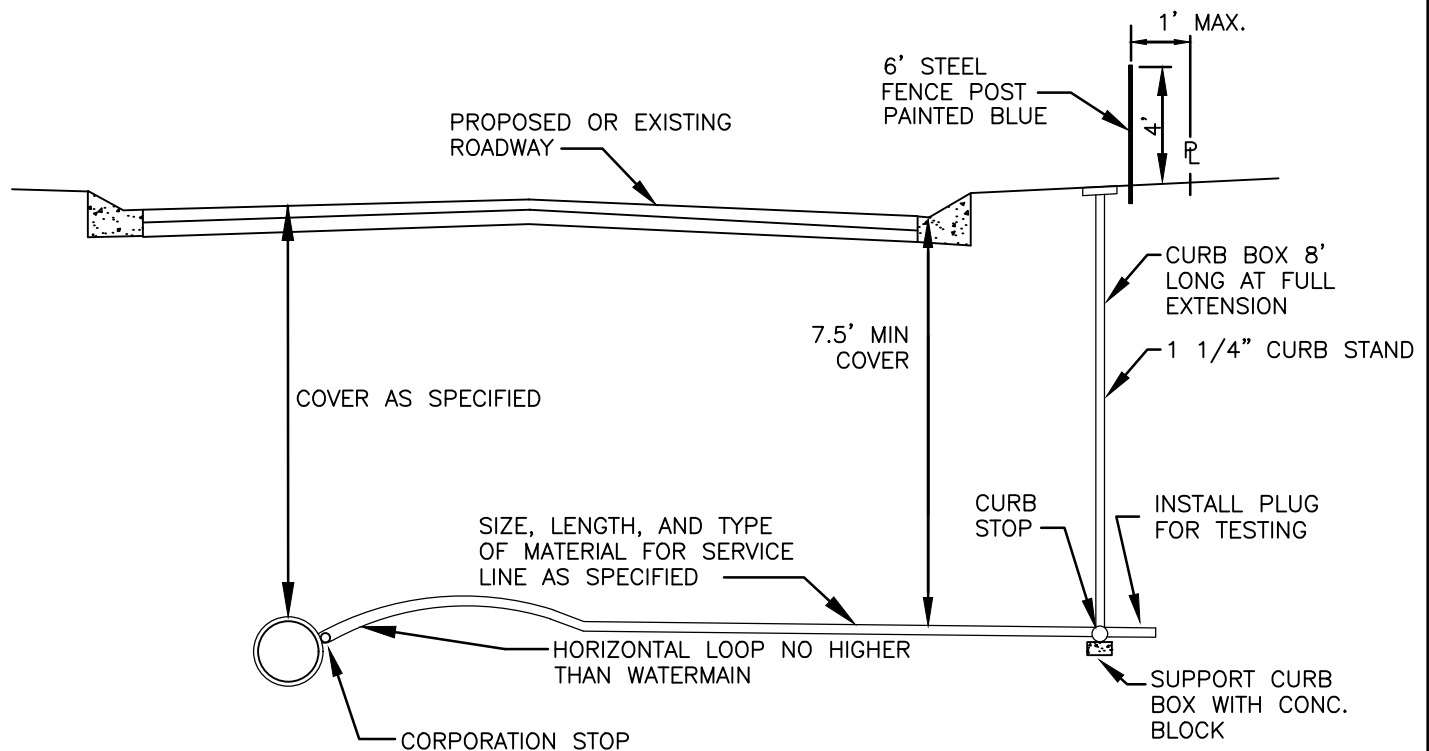
1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. KEEP CONCRETE CLEAR OF JOINT AND ACCESSORIES.
3. REQUIRED BEARING AREAS AT FITTING SHALL BE AS NOTED ABOVE, UNLESS INDICATED OTHERWISE.
4. BEARING AREAS AND SPECIAL BLOCKING DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER BEARING AREAS AND BLOCKING DETAILS SHOWN ON THIS STANDARD PLATE.
5. ABOVE BEARING AREAS BASED ON TEST PRESSURES OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 LBS. PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION: BEARING AREA = (TEST PRESSURE/150) X (2000/SOIL BEARING STRESS) X (TABLE VALUE).



DUCTILE IRON PIPE
REACTION BLOCKING
(FOR BENDS)

JANUARY, 2024

WAT-4



NOTES:

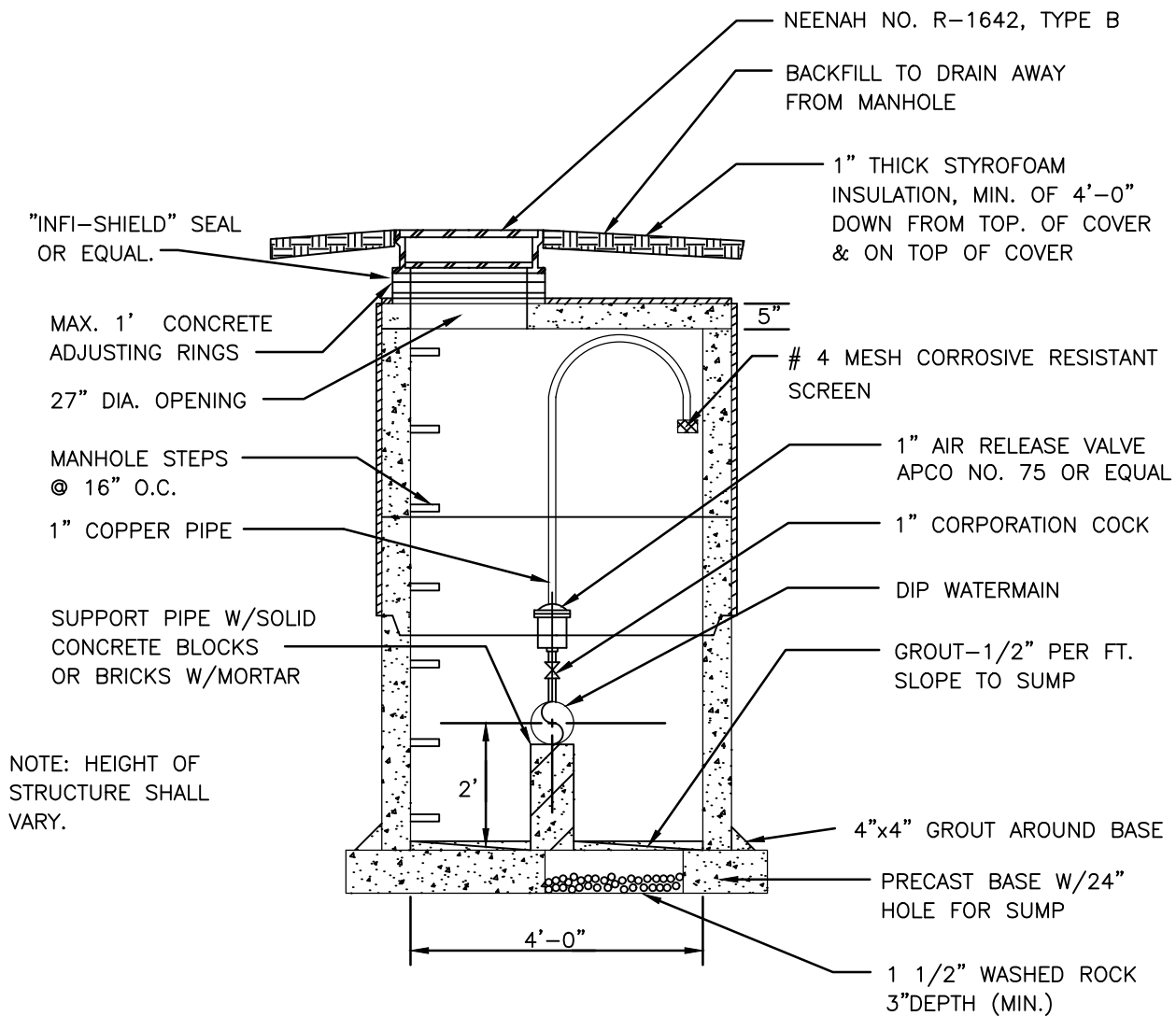
1. CURB BOXES INSTALLED IN AREAS WHERE BOULEVARD IS TO BE CUT AT A LATER DATE SHALL BE INSTALLED AT DEPTH REQUIRED, CURB BOX EXTENSION FOR BOXES EXCEEDING 7.5' IN LENGTH ARE TO BE BID AT CONTRACT PRICE AND SHALL INCLUDE STACK COUPLINGS, CONNECTIONS, ETC.
2. CURB BOXES LOCATED IN DRIVEWAYS OR PARKING LOTS SHALL UTILIZE THE FORD MINNEAPOLIS PATTERN CURB BOXES A-1 OR CITY APPROVED EQUIVALENT.
3. CORP. STOPS SHALL BE FORD BALLCORP FB600-4 AND CURB STOPS SHALL BE FORD BALL VALVE B22-444M OR CITY APPROVED EQUIVALENT.
4. WATER SERVICES SHALL BE TYPE K COPPER - 1" DIA. MIN.
5. MAINTAIN 18" VERTICAL & 36" HORIZONTAL SEPARATION BETWEEN SEWER & WATER SERVICES.
6. WATER SERVICE IS REQUIRED TO BE UPSTREAM OF SANITARY SEWER.
7. CURB STOPS SHALL HAVE INTERNAL OPERATING RODS TO FINISHED GRADE. OPERATING RODS NEED TO BE PINNED AND CONNECT TO THE CORP.
8. CURB STOPS LOCATED IN PAVED AREAS SHALL BE COVERED WITH METER BOX COVER (FORD A-1 OR APPROVED EQUAL).
9. A "W" SHALL BE STAMPED INTO THE CURB ABOVE THE WATER SERVICE FOR FUTURE LOCATING PURPOSES.
10. ALL FITTINGS ARE REQUIRED TO BE FLARE FITTINGS ON 1" COPPER.
11. ALL CORP STOPS ARE TO BE TAPPED IN TO THE MAIN, EXCEPT FOR EXISTING 6" DIP WHERE SADDLES WILL BE REQUIRED.



WATER SERVICE DETAIL

JANUARY, 2024

WAT-5



NOTE: HEIGHT OF STRUCTURE SHALL VARY.

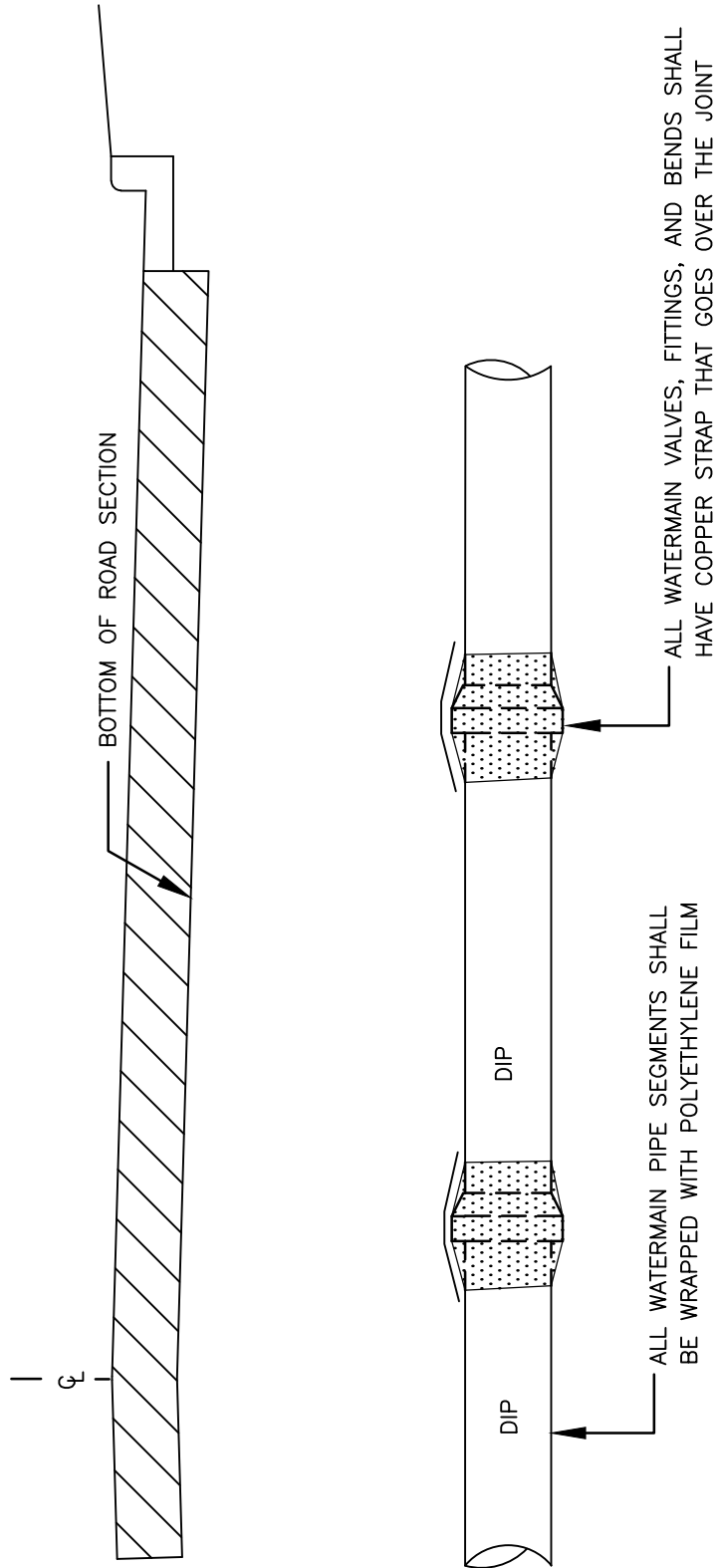
NOTE: 2 STRIPS BITUMASTIC SEAL AT SLAB JOINTS



AIR RELEASE MANHOLE

JANUARY, 2024

WAT-6



COPPER STRAP OVER WATER MAIN FITTINGS

JANUARY, 2024

WAT-7