

**Standard Specifications
for
Construction of Public Infrastructure**

City of Jordan, MN



2019 Edition

SECTION 00005 – CERTIFICATION

PROJECT MANUAL

for

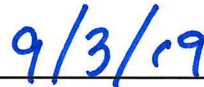
Standard Specifications for Construction of Public Infrastructure
2019 Edition
City of Jordan, MN

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.

By:


Michael J. Waltman, P.E., City Engineer
License No. 48696

Date:



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Standard Specifications for Construction of Public Infrastructure City of Jordan, MN

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General Conditions

for

Edition C-700 (Rev 1) EJCDC - 2013

Project Title

City of Jordan

Jordan, MN

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

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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 form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting 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, or both; 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, or both; 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; or (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. 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), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree 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 the 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. *Engineer*—The individual or entity named as such in the Agreement.
21. *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.
22. *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. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *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.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *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.
28. *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.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *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.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions 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.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. *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.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *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.
36. *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.

37. *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 furnished by Owner which are designated for the use of Contractor.
38. *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.
39. *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.
40. *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 thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, 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.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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.

48. *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 the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. 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:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. 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 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean 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, shall mean 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, shall mean 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. 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 Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), 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 executed 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 specifically 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 *Initial 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 for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall 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.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items 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 items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one 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 or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall 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.

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, shall mean 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, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, 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, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 Documents 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 Documents 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 shall 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 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 thereunder.
- 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 give written notice to Owner and Contractor 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 editions, 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 shall preclude 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 thirtieth 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 sixtieth day after the day of Bid opening or the thirtieth 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 shall 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 shall 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 shall 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 the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the 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. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall 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 utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. 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.
- E. Paragraph 8.03 governs 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.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times 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.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

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

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor 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; 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 7.12, 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 at law; 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 shall 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 known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); 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 upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 - 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.

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 either:
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; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 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 the necessity of Owner's obtaining 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 above; 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, 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 conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
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; or
 - 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 as 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, or both, then any such adjustment shall 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, or both, 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.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. 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 in the Contract Documents, or was not shown or indicated 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), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; 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 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. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, 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. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. 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, or both, then any such adjustment shall 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, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. 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 Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, 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.
- 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 or 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.H shall obligate 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 shall obligate 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 all of Contractor's obligations under the Contract. These bonds shall 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 Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, 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 shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. 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.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

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. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. 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, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect 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 shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall 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.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *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 shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) 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 Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed 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.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. 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.

6.05 *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 full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed 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.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- 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 notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* 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 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers 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. 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 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 Subcontractors, all individuals or entities identified in the Supplementary Conditions as 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. None of the above waivers shall extend 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. 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:
 - 1. loss 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 perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner 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.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work 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 any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 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 6.05 shall 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, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *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 at all times maintain good discipline and order at the Site.
- B. 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 shall 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.

7.03 *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 shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall 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 shall 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.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, 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 material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it 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) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it 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 shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment 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 material or equipment under the circumstances described below. To the extent possible such requests shall 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 material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.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 material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall 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 that specified, and
 - 3) be suited to the same use as that 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 that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall 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 shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity 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 five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. 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, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, 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, Supplier, or other individual or entity, whether initially or as a replacement, shall 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 fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create 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.

7.07 *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 a particular 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 shall be disclosed by Owner 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.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. 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

7.09 *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.

7.10 *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. Except where otherwise expressly required by applicable Laws and Regulations, 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 shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give 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 notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *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.

7.12 *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. 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.
- B. 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. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when 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.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. 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.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.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).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall 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.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of 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 threatened 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 thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified 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
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 2. Each submittal shall 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 submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will 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.D.

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.D.

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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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, conform to the information given in 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 shall 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.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 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, shall 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, Sample, or other submittal shall 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.D.4.

E. *Resubmittal Procedures:*

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 submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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 and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper 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.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 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. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. 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 shall 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 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 performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury 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 shall 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.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

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 utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

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 at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner 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, or both. 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 shall 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. When applicable, any such equitable adjustment in Contract Price shall 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 is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. 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 to 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.
- C. 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 to Contractor.

- D. 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 shall 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 Documents (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 10.08. 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 *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 Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *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.

10.07 *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.

10.08 *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, shall 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 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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *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 (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not 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, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* 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 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: 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. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *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. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes 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 shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate 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.

11.03 *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.

11.04 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall 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); or
 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 11.04.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 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall 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 shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five 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 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.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 five 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 shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall 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 will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. 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. The supporting data shall 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. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall 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.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *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 that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the 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 11.02, (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 in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *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 shall be submitted 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; and
 - 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.
- 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 shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall be incorporated in a Change Order 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. 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 shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall 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. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, 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, shall 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 shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall 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, who 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 shall 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 for services specifically related to the Work.
5. Supplemental costs including 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, and hand tools not owned by the workers, 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.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the 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 property insurance established in accordance with Paragraph 6.05), 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 shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall 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 shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety 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. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. 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.
- 5. 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:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

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 on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a 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 on account of Work covered by allowances, and the Contract Price shall 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, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

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 will 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 therewith 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 shall 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 shall 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 shall 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 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 shall 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 special 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, or both, 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 shall 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 rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven 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 on account of 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. 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 shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and 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.
 - 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 - 3. 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, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, 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 on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of 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 that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated 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;
 - l. there are other items entitling 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 shall 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 shall be treated as an amount due as determined by Paragraph 15.01.C.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 seven 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 shall 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 seven 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 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 6.05 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 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall 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 disputes that Contractor believes are unsettled; 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 Application and Acceptance:*

1. 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 ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall 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. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. 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. *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.
- D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- 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 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 terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then 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 other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, 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 therefrom.
- B. If 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 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 correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. 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.
- D. 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.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not 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, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall 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) ten 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) 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 seven 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 shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven 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 on account of loss of anticipated overhead, profits, or revenue, 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 seven 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, seven 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

Supplementary Conditions
for
Edition C-700 EJCDC® - 2013

Project Title
City of Jordan
Jordan, MN

SECTION 00800 - SUPPLEMENTARY CONDITIONS
TO THE STANDARD GENERAL CONDITIONS
OF THE CONSTRUCTION CONTRACT
SUPPLEMENTARY CONDITIONS - GENERAL COMMENTS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions which are not so amended or supplemented remain in full force and effect.

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 thereto.

SC-4.03 REFERENCE POINTS

Delete Paragraph 4.03.A of the General Conditions in its entirety and insert the following Paragraph 4.03.A in its place:

4.03.A. The OWNER will provide engineering surveys to establish reference points for construction as described in Section 01720, Field Engineering, of the Specifications.

SC-5.03 SUBSURFACE AND PHYSICAL CONDITIONS

Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following:

5.03.A. No reports of explorations or tests of subsurface conditions at or contiguous to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner, unless provided with the bidding documents. If such explorations or test results are available to the Owner, applicable information and reports available to the owner will be provided with the bidding documents.

SC-5.06 HAZARDOUS ENVIRONMENTAL CONDITIONS

Delete subparagraphs 5.06.A.1 and 5.06.A.2 in their entirety and insert the following:

5.06.A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner, unless provided with the bidding documents. If such conditions are known to the owner, applicable information and reports available to the owner will be provided with the bidding documents.

SC-6.02 INSURANCE – GENERAL PROVISIONS

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

6.02.B.1. Contractor may obtain worker's compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the project is located, (b) is certified or authorized as a worker's compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker's compensation insurance for similar projects by the state within the last 12 months.

SC-6.03 CONTRACTOR'S INSURANCE

Delete paragraph SC-6.03.J in its entirety and insert the following:

6.03.J. The coverage requirements for specific policies of insurance, including the requirements of SC 6.03.K.2.a, must be met by such policies, with exception that an Excess or Umbrella Liability insurance policy may be used to supplement Contractor's policy limits on a follow-form basis to satisfy the full policy limits required by this Contract.

SC-6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

6.03.K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	Statutory
Federal, if applicable (e.g., Longshoreman's):	Statutory
Jones Act coverage, if applicable:	
Bodily injury by accident, each accident	\$ Not Applicable
Bodily injury by disease, aggregate	\$ Not Applicable
Employer's Liability:	
Bodily injury, each accident	\$ 1,000,000.00
Bodily injury by disease, each employee	\$ 1,000,000.00
Bodily injury/disease aggregate	\$ 1,000,000.00

For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$ Not Applicable
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Foreign voluntary worker compensation	Statutory
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2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	2,000,000.00
Products - Completed Operations Aggregate	\$ 2,000,000.00
Each Occurrence (Bodily Injury and Property Damage)	\$ 1,500,000.00
Personal and Advertising Injury	\$ 1,500,000.00

- a. The aggregate limits under SC-6.03.K.2 (Commercial General Liability) be maintained fully available for this Contract by obtaining and maintaining a Designated Construction Project General Aggregate Limit endorsement, or equivalent

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:	
Each person	\$ 1,000,000.00
Each accident	\$ 1,000,000.00
Property Damage:	
Each accident	\$ 1,000,000.00
<u>OR</u>	
Combined Single Limit of	\$ 1,000,000.00

5. Contractor's Pollution Liability:

Per Occurrence	\$	<u>N/A</u>
General Aggregate	\$	<u>N/A</u>

☐ If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Bolton & Menk, Inc. as Engineer, include the other persons or entities identified in the bidding documents on the commercial general liability, automobile liability, umbrella or excess, and pollution liability policies as additional insureds.

SC-7.08 PERMITS

The following Paragraph 7.08.B shall be added immediately after Paragraph 7.08.A:

7.08.B. If the OWNER has obtained, or has applied for, the necessary construction permits from any regulatory agencies, they will be addressed in Section 01410, Regulatory Requirements, of the Specifications. CONTRACTOR shall obtain and pay for all construction permits, licenses and bonds, not specifically highlighted as previously obtained, or applied for, in the referenced Section.

SC-7.11 RECORD DOCUMENTS

The following Paragraphs 7.11.B through 7.11.C shall be added immediately after Paragraph 7.11.A:

7.11.B. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modification of the work to proceed without lengthy and expensive site measurement, investigation, and examination.

7.11.C. Prior to submitting a request for final payment, submit the final Project Record Documents to the Engineer and/or Owner for approval. Approval of the Record Documents shall not constitute final acceptance of the completed project.

SC-7.12 SAFETY AND PROTECTION

The following Paragraph 7.12.A.4 shall be added immediately after Paragraph 7.12.A.3:

7.12.A.4. The OWNER, ENGINEER or their representatives may indicate potential safety hazards noticed at the construction site. However, the CONTRACTOR shall remain the only party liable for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.

SC-7.20 PROGRESS PAYMENTS TO SUBCONTRACTORS

Add the following Paragraph 7.20 immediately after Paragraph 7.19

7.20 Progress Payments to Subcontractors

- A. For contracts involving payment with public funds within the State of Minnesota, including but not limited to cities, counties, towns, school districts, political subdivisions or agencies of local government, within ten days after receipt of payment has been made to the Prime Contractor, the Prime Contractor shall make payment to all Subcontractors for undisputed services provided by the Subcontractor. The Prime Contractor shall pay interest of 1.5% per month or for any part of a month to the Subcontractor on any undisputed amount not paid on time to the Subcontractor. The minimum monthly interest penalty payment for an unpaid balance of \$100.00 or more is \$10.00 for an unpaid balance of less than \$100.00, the Prime Contractor shall pay the actual penalty due to the subcontractor. 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.

SC-8.02 COORDINATION

Delete Paragraph 8.02.A and 8.02.B in its entirety and replace with the following:

8.02.A. Owner does not intend to contract with others for the performance of other work on the Project at the Site, unless otherwise stated in the bidding documents.

SC-8.04 CLAIMS BETWEEN CONTRACTORS

Add the following new paragraphs immediately after paragraph 8.03:

8.04 Claims Between Contractors

8.04.A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, Engineer, or the construction coordinator, then Contractor (without involving Owner, Engineer, or construction coordinator) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

8.04.B. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, Engineer, the construction coordinator and the officers, directors, partners, employees, agents and other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any other contractor against Owner, Engineer, consultants, or the construction coordinator to the extent said claim is based on or arises out of Contractor's performance of the Work. Should another contractor cause damage to the Work or property of Contractor or should the performance of work by any other contractor at the Site give rise to any other Claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, or the construction coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, or the construction coordinator on account of any such damage or Claim.

8.04.C. If Contractor is delayed at any time in performing or furnishing the Work by any act or neglect of another contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, and construction coordinator for any delay, disruption, interference, or hindrance caused by any other contractor. This paragraph does not prevent recovery from Owner, Engineer, or construction coordinator for activities that are their respective responsibilities.

SC-10.03 PROJECT REPRESENTATIVE

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

10.03.B. When the Engineer is contracted by the Owner to do so, the Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge

and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.

2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
4. 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 proper execution of the Work.
5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
- 10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
 - b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - c. Maintain records for use in preparing Project documentation.
- 11. Reports:
 - a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
 - c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
- 12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
- 13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
- 14. Completion:
 - a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

10.03.C. The RPR shall 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 Contractor's work.
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. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC-13.03. UNIT PRICE WORK

Delete Paragraph 13.03.E. in its entirety and insert the following in its place:

13.03.E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. if the original bid amount of a particular item of Unit Price Work amounts to five (5) percent or more of the total Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than twenty (20) percent from the estimated quantity of such item indicated in the Agreement; and
2. if there is no corresponding adjustment with respect to any other item of Work; and
3. if Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

SC-15.01.B.4 APPLICATIONS FOR PAYMENT

Add the following Paragraph 15.01.B.4 immediately after Paragraph 15.01.B.3.

15.01.B.4. All out-of-state contractors shall comply with all State of Minnesota surety deposit requirements. The OWNER may withhold an additional sum of 8 percent of the amount due the CONTRACTOR from each payment and forward it to the Department of Revenue until the CONTRACTOR's state tax obligations are considered fulfilled unless the CONTRACTOR can show reason for exemption. Exemption will be granted provided the out-of-state CONTRACTOR meets the exemption guidelines established for the Minnesota Department of Revenue. All necessary forms may be obtained from the Minnesota Department of Revenue, Mail Station 4450, St. Paul, Minnesota 55146-4450, or phone 1-800-657-3777 or online at: <http://www.revenue.state.mn.us/businesses/withholding/Pages/Forms.aspx>.

SC-15.01.D.1 PAYMENT BECOMES DUE

Delete Paragraph 15.01.D.1 in its entirety and replace with the following:

15.01.D.1 The time period for payment shall be in accordance with the Agreement.

SC-15.04 PARTIAL UTILIZATION

Add the following Paragraph 15.04.B immediately after Paragraph 15.04.A.4 of the General Conditions. Paragraph 15.04.B modifies Paragraph 15.04.A of the General Conditions and reference is made thereto.

15.04.B. Nothing in Paragraph 15.04.A shall obligate the CONTRACTOR to apply for a Certificate of Substantial Completion for any part of this Project. The provisions for partial utilization of the Project, if any, are established by the Specifications and no Certificate of Substantial Completion will be issued for partial utilization occurring within the terms of the Specifications. Partial utilization of the Project not covered by the Specifications shall be in accordance with Paragraph 15.04.A and its sub-paragraphs. If a Certificate of Substantial Completion is not issued, Substantial Completion shall be when final payment is due in accordance with Paragraph 15.06.D.

SC-15.06.A.4. WITHHOLDING OF INCOME TAX AT SOURCE

Add the following Paragraph 15.06.A.4. Immediately following Paragraph 15.06.A.3 of the General Conditions and immediately before 15.06.B:

15.06.A.4. "Final payment will not be made to the CONTRACTOR until a certificate showing that the CONTRACTOR has complied with the provisions of M.S.A. 290.92 requiring withholding of income tax on wages at the source. Said certificate shall be executed by the Commissioner of Revenue. Forms for certification may be obtained from the Commissioner of Revenue, Centennial Building, St. Paul, Minnesota 55145."

SC-15.08 CORRECTION PERIOD

Modify Paragraphs 15.08.A of the General Conditions to change all references for the correction period length from one year to two years, except for luminaires, which is five years.

Add the following Paragraph 15.08.F immediately after Paragraph 15.08.E:

15.08.F. For purposes of this Paragraph 15.08, the date of Substantial Completion shall be interpreted as the date when final payment is due in accordance with Paragraph 15.06.B and 15.06.C, and the two year correction period shall commence on the date when final payment is due in accordance with Paragraph 15.06.B and 15.06.C, unless otherwise modified by the Specifications or by Written Agreement.

******END OF SECTION******

- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

10.03.C. The RPR shall 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 Contractor's work.
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. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC-13.03. UNIT PRICE WORK

Delete Paragraph 13.03.E. in its entirety and insert the following in its place:

13.03.E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. if the original bid amount of a particular item of Unit Price Work amounts to five (5) percent or more of the total Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than twenty (20) percent from the estimated quantity of such item indicated in the Agreement; and
2. if there is no corresponding adjustment with respect to any other item of Work; and
3. if Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

SC-15.01.B.4 APPLICATIONS FOR PAYMENT

Add the following Paragraph 15.01.B.4 immediately after Paragraph 15.01.B.3.

15.01.B.4. All out-of-state contractors shall comply with all State of Minnesota surety deposit requirements. The OWNER may withhold an additional sum of 8 percent of the amount due the CONTRACTOR from each payment and forward it to the Department of Revenue until the CONTRACTOR's state tax obligations are considered fulfilled unless the CONTRACTOR can show reason for exemption. Exemption will be granted provided the out-of-state CONTRACTOR meets the exemption guidelines established for the Minnesota Department of Revenue. All necessary forms may be obtained from the Minnesota Department of Revenue, Mail Station 4450, St. Paul, Minnesota 55146-4450, or phone 1-800-657-3777 or online at:
<http://www.revenue.state.mn.us/businesses/withholding/Pages/Forms.aspx> .

SC-15.01.D.1 PAYMENT BECOMES DUE

Delete Paragraph 15.01.D.1 in its entirety and replace with the following:

15.01.D.1 The time period for payment shall be in accordance with the Agreement.

SC-15.04 PARTIAL UTILIZATION

Add the following Paragraph 15.04.B immediately after Paragraph 15.04.A.4 of the General Conditions. Paragraph 15.04.B modifies Paragraph 15.04.A of the General Conditions and reference is made thereto.

15.04.B. Nothing in Paragraph 15.04.A shall obligate the CONTRACTOR to apply for a Certificate of Substantial Completion for any part of this Project. The provisions for partial utilization of the Project, if any, are established by the Specifications and no Certificate of Substantial Completion will be issued for partial utilization occurring within the terms of the Specifications. Partial utilization of the Project not covered by the Specifications shall be in accordance with Paragraph 15.04.A and its sub-paragraphs. If a Certificate of Substantial Completion is not issued, Substantial Completion shall be when final payment is due in accordance with Paragraph 15.06.D.

SC-15.06.A.4. WITHHOLDING OF INCOME TAX AT SOURCE

Add the following Paragraph 15.06.A.4. Immediately following Paragraph 15.06.A.3 of the General Conditions and immediately before 15.06.B:

15.06.A.4. "Final payment will not be made to the CONTRACTOR until a certificate showing that the CONTRACTOR has complied with the provisions of M.S.A. 290.92 requiring withholding of income tax on wages at the source. Said certificate shall be executed by the Commissioner of Revenue. Forms for certification may be obtained from the Commissioner of Revenue, Centennial Building, St. Paul, Minnesota 55145."

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Modify Paragraphs 15.08.A of the General Conditions to change all references for the correction period length from one year to two years, except for luminaires, which is five years.

Add the following Paragraph 15.08.F immediately after Paragraph 15.08.E:

15.08.F. For purposes of this Paragraph 15.08, the date of Substantial Completion shall be interpreted as the date when final payment is due in accordance with Paragraph 15.06.B and 15.06.C, and the two year correction period shall commence on the date when final payment is due in accordance with Paragraph 15.06.B and 15.06.C, unless otherwise modified by the Specifications or by Written Agreement.

****END OF SECTION****

CITY STANDARD CONDITIONS OF THE CONTRACT

for

City of Jordan, MN

SECTION 01110 - SUMMARY OF WORK

PART 1 -- GENERAL

1.1 PROJECT LOCATION

- A. The project is located in or adjacent to the City of Jordan, MN.

1.2 PROJECT DESCRIPTION

- A. The project involves work as described in the plan sheets and bidding documents. Individual elements of work may include, but are not limited to:
1. Removal of bituminous pavement, concrete curb and gutter, sidewalk and driveways, pipe and other miscellaneous items.
 2. Clearing and grubbing.
 3. Street excavation.
 4. Sanitary sewer construction.
 5. Water main construction.
 6. Water and sewer service construction.
 7. Storm sewer construction.
 8. Concrete walk construction.
 9. Concrete curbing and driveway pavement construction.
 10. Bituminous street construction.
 11. Turf restoration and erosion control construction.
 12. Seal coating
 13. Crack filling
 14. Retaining wall construction
 15. Signage and striping
 16. Traffic Control; and/or
 17. Other miscellaneous work shown on the plans or specified herein.

1.3 ALTERNATE MATERIALS & METHODS OF CONSTRUCTION

- A. The Contractor may present alternative materials and/or methods of construction for consideration by the Owner. Proposals for such alternatives shall be in accordance with the provisions of Section 01230 "Alternates and Alternatives" of this Project Manual.

1.4 CONTRACTOR USE OF PROJECT SITE

- A. The Contractor's use of the project site shall be limited to its construction operations, including on-site storage of materials and field offices. No materials shall be stored in a location as to limit access to the affected public. Any damage caused by Contractor operations to private property, including but not limited to, parking lots, trees, shrubs, material spatter, etc. shall promptly be corrected at the Contractor's expense.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 OPERATIONAL LIMITATIONS AND REQUIREMENTS

- A. The Contractor shall confine its work within the limits of the easements, public rights-of-way, and/or construction limits as shown on the plans. If the Contractor desires additional space, it shall be the Contractor's responsibility to acquire easements and/or permission, as desired.

3.2 BARRICADES

- A. The Contractor shall furnish and install any necessary barricades to protect the public or workers during the project. Barricades to keep public out of construction areas shall be left in place until removed by Contractor after they are no longer required for protection. The Contractor is responsible to secure the site at all times during the demolition.
- B. The Contractor shall furnish names, addresses, and phone numbers of at least two local individuals capable of immediate response who will be responsible for the site security and traffic control devices to:

The Engineer
The Owner
Local Law Enforcement Agencies

- C. The Contractor shall respond with sufficient personnel, equipment and/or materials and conduct the required work or be subject to a **\$100 per hour fee from the time of notification for non-attention to project security and safety.**

3.3 SAFETY HAZARDS

- A. The Owner, Engineer or their representatives may indicate potential safety hazards noticed at the Construction site. However, the Contractor shall remain the only party liable for the maintenance of safe construction practices.

3.4 INTERFERENCE WITH TREES

- A. The Contractor may be required to trim tree branches that overhang the work zone as specifically identified during construction by the Engineer, where branches are likely to be broken or excessively damaged by construction equipment and activities. Branches which are accidentally damaged during construction shall be trimmed immediately. All trimmed ends shall be coated with an appropriate coating material.
- B. The Contractor shall protect existing trees within close proximity of the construction from stripping and root damage. Roots extending into excavations shall be cut before excavating in their vicinity. Roots cut or otherwise damaged shall be coated with an appropriate protective dressing prior to backfilling.
- C. No direct compensation for tree protection and interference shall be made, unless specifically identified in the Schedule of Unit Prices.

******END OF SECTION******

SECTION 01310 - COORDINATION

PART 1 -- GENERAL

1.1 SEQUENCE OF CONSTRUCTION

- A. A written project management scheduling tool (i.e., critical path (CPM), detailed bar chart, etc.) shall be employed by the Contractor for cost value reporting, planning and scheduling of all work required under the Contract Documents. This schedule shall show the order in which the Contractor proposes to execute the work with dates on which it proposes to start the various phases of the work and the estimated completion date of each phase. The Contractor shall submit a preliminary version of its intended schedule within 10 working days following the *Notice of Award* on the attached form or on a form of its own choosing. The Contractor is required to show the initial critical path (CPM) of tasks to be performed.
- B. Unless otherwise approved by the Engineer, the schedule shall also include an anticipated payment schedule for the volume of work to be completed each month. This schedule shall indicate the Contractor's intention and ability to complete the work within the contract times, as specified in Article 4 of Section 00520 "Agreement" of this Project Manual.
- C. The Preconstruction Conference as outlined in Section 01315 "Project Meetings" of this Project Manual will not be conducted until the schedule is submitted. In addition, no construction staking shall be provided until the schedule is submitted by the Contractor and reviewed by the Engineer.

1.2 WORKING HOURS

- A. Except in connection with safety or emergency situations, all work at the site shall be performed during daylight hours.
- B. The Contractor shall notify the Owner and Engineer of any work planned on Saturday, Sunday, or any legal holidays at least 48 hours prior to such work.
- C. The Contractor shall coordinate any construction or hauling activity in the vicinity of churches, schools, medical facilities, and funeral homes. The Contractor shall be cognizant of the disruptive effects of continued construction during funerals. The Owner reserves the right to temporarily stop construction within one block of, and during the time of, any funeral procession. No compensation shall be granted to the Contractor due to temporary delays caused by funerals.

1.3 TRAFFIC CONTROL

- A. Reference Specification 01555 "Maintenance and Control of Traffic" of this Project Manual.

1.4 COORDINATION WITH BUSINESSES AND PRIVATE PROPERTY OWNERS ADJACENT TO THE PROJECT

- A. The Contractor shall notify all property owners and occupants adjacent to the project 2 days in advance to allow moving machinery and/or vehicles or other items that may be blocked in or damaged due to the upcoming construction in the area. Access to the properties shall be restored as soon as possible after each phase of construction.

1.5 COORDINATION WITH UTILITY COMPANIES

- A. The Contractor is responsible for working with public and private utility companies in protecting and/or relocating existing or new utility lines located near and affected by this construction.
 - 1. Coordination with the utility companies is very important and should be considered in planning the work and the associated extra costs involved.
 - 2. Private utility companies are responsible for their own lines and are so obligated under City Code Agreements to protect and/or relocate their utilities, if required.
- B. The Contractor shall consult with the City's maintenance personnel when working around or performing the required sanitary sewer installations.

- C. The Contractor shall also work with the City's maintenance personnel to provide for scheduled water shut-downs in a given area and to provide for continued water service to the properties along the project throughout the duration of the project.
- D. The Contractor shall work with all utility companies, as necessary, to allow for installation and for maintenance of service of gas, power, lighting, telephone, cable TV, etc. in the boulevards or across the streets prior to final shaping of aggregate base and/or topsoil. This coordination with the utility companies is the responsibility of the Contractor and is considered incidental to the construction and no additional compensation shall be granted.

1.6 COOPERATION WITH FIRE & EMERGENCY DEPARTMENTS

- A. The Contractor shall coordinate all work requiring shutting down water service or limiting access to buildings by emergency equipment with the fire & emergency departments. This shall include notification of the daily construction schedule by the Contractor.

1.7 COOPERATION WITH OTHER CONTRACTORS

- A. The Contractor shall cooperate with other contractors performing construction on other projects in the vicinity of this Project, including but not limited to allowing access for the delivery of equipment and materials.

1.8 COORDINATION WITH SERVICE PROVIDERS

- A. The Contractor shall coordinate with the postal service, recycling service, garbage collection service, school bus service, etc. to maintain continual uninterrupted service to all residences and businesses throughout the duration of the project.
- B. The Contractor shall temporarily relocate mailboxes, haul recycling and garbage for residents to a designated pick up location, etc., as required by the subject service provider. All equipment materials and labor required to coordinate with service providers and maintain services shall be incidental to the Contract.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

*******END OF SECTION*******

SECTION 01315 - PROJECT MEETINGS

PART 1 -- GENERAL

1.1 SUMMARY

A. Pre-construction Conference

1. For all contract work in excess of \$25,000 and as required by the Engineer, prior to the start of the work, a joint meeting will be held with representatives of the Contractor, the Owner, the Engineer, and any other interested parties. This meeting is intended to introduce the various key personnel from each organization and to discuss the start of the work, order of work, labor and legal requirements, insurance requirements, method of payment, shop drawing requirements, protection of existing facilities, location of disposal and stockpile areas, and other pertinent items associated with the project.
2. The Contractor shall be prepared to discuss his proposed detailed construction progress schedule. The construction schedule shall be subject to the review of the Owner, Engineer and applicable agencies.

B. Construction Progress Meetings

1. These meetings will require the attendance of the Contractor's Project Manager or other designated staff authorized by the Contractor to discuss project status and negotiate agreements between the Contractor and Owner. Failure of the Contractor to attend scheduled project meetings as required may result in project delays expensed by the Contractor.
2. Meetings will be held between the Owner, Contractor and Engineer for the purpose of reviewing the project schedule or the status of the project. These meetings will be arranged by the Owner, and/or Engineer, as deemed necessary.

C. Safety Meetings

1. The Owner, Engineer or their representatives shall be allowed to attend Contractor's onsite safety meetings. The Contractor shall be responsible for meeting content and coordination and shall inform the Owner, Engineer or their representatives of the time and location of the meeting a minimum of two business days prior to the meeting.
2. The Contractor shall make additional copies of any safety related handouts or materials for distribution to the Owner, Engineer or their representatives. However, the Contractor shall remain the only party responsible for the maintenance of project safety materials.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

*****END OF SECTION*****

SECTION 01330 - SUBMITTALS

PART 1 -- GENERAL

1.1 SUMMARY

- A. The Contractor shall submit three copies of all required submittals and sample items as noted below. The Engineer will review them with reasonable promptness. The Contractor shall make all required corrections and file with the Engineer three corrected sets for final review. If the Contractor requires more than two reviewed copies, the Contractor shall submit additional sets.
- B. The responsibility for completeness of submittals lies with the Contractor. If the Engineer and/or Owner sign the submittal with no exception taken, such action shall not absolve the responsibilities of the Contractor in any way.
- C. Emailed submittals to the Engineer in pdf format will be accepted.

1.2 ITEMS TO BE SUBMITTED

- A. Written Progress Management Schedule Tool (as defined in Section 01310) - to be reviewed at the Preconstruction Conference. See Article 4 of Section 00520 "Agreement" of this Project Manual for contractual time requirements.
- B. The following items must be submitted when applicable to the project scope:
 - 1. Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001) – Reference Section 02370 "Erosion & Sediment Control" of this Project Manual.
 - 2. Concrete Mix Design
 - 3. Bituminous Mix Design (wear and non-wear)
 - 4. Gradation Test Results from 2 separate tests, as required in Source Quality Control provisions of individual sections contained herein, from material stockpiles of aggregates to be used on this project. These tests may be run by the Contractor or its supplier during aggregate production.
 - 5. Geotextile Fabrics - Certificates of Compliance.
 - 6. Sanitary Sewer and Sanitary Sewer Service
 - (a) Manhole structure - shop drawings.
 - (b) Manhole casting - shop drawings.
 - (c) Piping and fittings - Certificates of Compliance.
 - (d) Final televising DVD and log.
 - 7. Storm Sewer, Subdrain and Sump Drain Lines
 - (a) Manhole and catch basin structure - shop drawings.
 - (b) Manhole and catch basin casting - shop drawings.
 - (c) Piping and fittings - Certificates of Compliance.
 - 8. Watermain and Water Service Lines
 - (a) Hydrants - Certificates of Compliance.
 - (b) Valves & boxes - Certificates of Compliance.
 - (c) Pipe & fittings - Certificates of Compliance.
 - (d) Corporation stops, saddles, curb stops, curb boxes, copper pipe - Certificates of Compliance.
 - 9. Seeding - Certificates of Compliance for seed mixture.

10. Trees & Shrubs - Certificates of Compliance.

11. Lift Stations

- (a) Pumps & panels - shop drawings
- (b) Valve manhole - shop drawings.
- (c) Valves - shop drawings and Certificates of Compliance.
- (d) Maintenance and operations manuals.

1.3 MATERIAL SAFETY DATA SHEETS

- A. The Contractor shall submit two copies of Safety Data Sheets (SDSs) (formerly known as Material Safety Data Sheets or MSDSs) for each material on site to the OWNER.
- B. The Contractor shall maintain an orderly file of Safety Data Sheets at the job site.

1.4 RECORD DRAWINGS

- A. The CONTRACTOR shall maintain at the construction site one complete set of drawings suitably marked to show all deviations from the original set of drawings and other information as specified. Supplementary sketches shall be included, if necessary, to clearly indicate all work as constructed. Sanitary and water service tie-in or stub-out locations shall show station and distances left or right of the survey control centerline. Existing sanitary and water service piping material type and size at the tie-in locations shall be noted also.
- B. All manholes, watermain bends and valves shall be located with tie-off dimensions to known items on the plans or in the field to enable the Contractor or City personnel to locate these structures for adjustment.
- C. The CONTRACTOR shall fill out a service record form for each water service and sanitary sewer service connection or stub out. A blank service record form will be supplied by the ENGINEER to be used by the CONTRACTOR. The completed service record forms and photos taken of the services shall be submitted to the ENGINEER in a digital format and in booklet form.
- D. All work shall be clearly shown and the record drawings and service record forms shall be satisfactory to the OWNER in order to insure that adequate information is indicated to show the actual construction. The complete set of the record drawings shall be submitted to the ENGINEER prior to submittal of the final Application for Payment. Failure of the CONTRACTOR to maintain an up-to-date set of record drawings on the project site shall be reason to withhold payments. All underground lines shall be determined from the record drawings.
- E. The CONTRACTOR must provide a complete an as-built record form, as provided in the appendix, for acceptance of each storm sewer and sanitary sewer structure, as well as each sanitary sewer and water service line. The completed report shall be submitted each week to the Engineer or the Engineer's designated representative at some mutually agreeable time. Failure to submit the required form shall render the structure or services subject to non-acceptance.

1.5 CONSTRUCTION PHOTOS

- A. The CONTRACTOR shall take digital photos during the course of construction using only cameras or smart phones with Global Positioning System (GPS) capabilities. GPS location settings shall be turned on at the time of taking each photo. The quality of the photos submitted shall be sufficient to clearly depict the focal points in the photo.
- B. The CONTRACTOR shall take photos of underground construction work prior to backfilling. Such items to be photographed include but are not limited to: connections to existing utilities, watermain fittings, small/private underground utilities, utility stub-outs, manholes, etc.
- C. The CONTRACTOR shall take photos of all water service and sanitary sewer service connections at the main and at the tie in or stub out locations prior to backfilling the service. The photo shall indicate the house address number or lot description of the service location.

- D. After the first couple days of underground construction, the CONTRACTOR shall submit to the ENGINEER a sample set of digital photos. The test set of photos will be reviewed to verify that the date, GPS coordinates, and other photo features are being recorded.
- E. All photos shall be submitted to the ENGINEER in a digital format immediately upon completion of the utility installation. The digital properties of the photos, such as date and time taken and GPS coordinates, shall be full intact at the time of submittal. Failure of the CONTRACTOR to maintain a set of construction photos shall be reason to withhold payments.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 SUBMITTAL ROUTING

- A. All submittals shall be approved by the Contractor prior to submission to the Engineer.
- B. A Letter of Transmittal that identifies the submitted item and the review action required shall accompany all submittals.
 - 1. The Contractor shall be responsible for filling in the following information on the Letter of Transmittal:
 - (a) Date.
 - (b) Submittal No.
 - (c) Identify what is being sent checking the appropriate box.
 - (d) No. Copies Submitted.
 - (e) Identify the Specification Section the attached information relates to.
 - (f) Subject of Shop Drawing or Other Submittal.
 - (g) Check whether the Shop Drawings are or are not in compliance.
 - (1) If not in compliance, list the features which are not.
 - (h) Sign and Date.

3.2 RESPONSIBILITY

- A. The Engineer's review of a submittal shall not relieve the Contractor from the responsibility for deviation from the drawings and specifications unless the Contractor has, in writing, called the Engineer's attention to the deviations at the time of submission; nor shall it relieve the Contractor from the responsibility of errors in the submittals.
- B. All submittals shall be reviewed by the Engineer prior to their incorporation into the project. If materials are installed without prior review, they will be subject to removal, at the Contractor's expense, if the material is found to be non-conforming to the Specifications.

****** END OF SECTION ******

SECTION 01410 - REGULATORY REQUIREMENTS

PART 1 -- GENERAL

1.1 SUMMARY

- A. Applicable codes and standards referred to in these specifications shall establish minimum requirements for equipment, materials, construction and shall be superseded by more stringent requirements of drawings and specifications when and where they occur.
- B. All equipment furnished and installed under the contract shall be designed, fabricated, assembled, installed, and placed into service. The equipment will conform to the applicable provisions of the Federal and State Safety and Health Standards, including but not limited to Federal Occupational Safety and Health Regulations for Construction; the Division of Environmental Health, Minnesota Department of Health; the Minnesota Pollution Control Agency; the Department of Natural Resources; the Minnesota Department of Transportation, Division of Highways; the Minnesota Industrial Commission and ordinances of the City that apply to this work.
- C. All construction methods and tools shall comply with commonly accepted standards for safety and health of personnel engaged on construction, including but not limited to Federal Occupational Safety and Health Regulations for Construction; the Division of Environmental Health, Minnesota Department of Health; the Minnesota Pollution Control Agency; the Department of Natural Resources; the Minnesota Department of Transportation, Division of Highways; the Minnesota Industrial Commission and ordinances of the City that apply to this work.
- D. Any conflicts between specifications and applicable codes and standards shall be referred to the Engineer.

1.2 PERMITS OBTAINED BY OWNER

- A. Permits obtained by or to be obtained by the Owner will be identified in the bidding documents. The Contractor shall perform all work and conduct itself in full accordance with the requirements of the applicable permits, which may include but not be limited to:
 - 1. Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001)
 - 2. Minnesota Pollution Control Agency (MPCA) - Extension of sanitary sewers.
 - 3. Minnesota Health Department - Watermain Plan Review.
 - 4. Minnesota Department of Transportation (MnDOT) - Utility Accommodation on Trunk Highway Right-of-Way.
 - 5. Minnesota Department of Transportation (MnDOT) - Access Driveway Permit
 - 6. Utility installation within Scott County right-of-way.
 - 7. Work within Union Pacific railroad right-of-way.
 - 8. Wetland Conservation Act (WCA) requirements
- B. The Contractor shall be responsible for meeting any bonding or insurance requirements which may be required as a condition to any permit, listed above.

1.3 PERMITS OBTAINED BY CONTRACTOR

- A. The Contractor shall secure and pay the cost of any other permits not mentioned above, which may be required including but not limited to:
 - 1. Work within City right-of-way permit.
 - 2. Building permits.

1.4 WORK WITHIN A RAILROAD RIGHT OF WAY

- A. This project may include work within the Union Pacific Railroad right of way. A copy of the Owner's permit or agreement with the railroad is included in the Appendix.
- B. The Contractor is reminded that each railway has its own unique requirements and the Contractor is responsible for ascertaining what those requirements are prior to commencing work. While on or about railroad property, The Contractor shall fully comply with the railway's requirements, including (but not limited to) insurance requirements, bond requirements, flagging requirements, and safety requirements. The contractor shall be responsible for fully informing itself as to railroad requirements.
- C. For projects requiring work within Union Pacific Railroad right-of-way, the Contractor shall comply with all provisions of MnDOT Specification 1708 as revised below:
 - 1. The Contractor shall provide notifications to the Engineer a minimum of 5 working days prior to notification to the railroad. Requirements for advance notification to the railroad for work within railroad right-of-way shall be as required by the railroad. No notifications shall be made without prior approval of the Engineer and no work shall begin prior to notification to the railroad.
 - 2. The Contractor shall be responsible for all costs associated with securing Railroad Liability Insurance with limits required by the railroad.
 - 3. The Contractor shall be responsible for increasing contractor's general liability insurance coverage limits beyond those required in the Supplementary Conditions if required by the railroad.
 - 4. The railroad shall be named as an additional insured on all insurance policies except workman's compensation and employers liability.
 - 5. No work shall begin until the proof of insurance forms for all required coverages are received by the Engineer.
 - 6. The Contractor shall be responsible for all costs associated with securing appropriate flagging, protective services, and devices.
 - 7. The special bond requirements are listed in the permit for the work in the railroad right of way.
 - 8. Unless specific bid items are provided, these costs shall be incidental to the related work items in the railroad right-of-way.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

*******END OF SECTION*******

SECTION 01420 - SPECIFICATION REFERENCE AND WORKS CONSULTED

PART 1 -- GENERAL

The references listed in this section are not all inclusive. There may be other references in individual specification sections that are not listed in this Section.

Portions of referenced specifications not specifically affected by the supplemented information of modification shall remain in effect as originally written.

It is the Contractor's responsibility to have these and all other referenced specifications listed in individual Sections available onsite and to be familiar with them.

1.1 ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE (EJCDC)

- A. Documents with the EJCDC copyright notice in the footer are used in this Project Manual under a licensing agreement with EJCDC. The text of these documents has not been changed or modified by Bolton & Menk, Inc.
- B. EJCDC documents were consulted in the creation of the Project Manual Sections listed below. These documents have been altered from the original EJCDC text and the EJCDC footer has been removed in compliance with the EJCDC license agreement. Those portions of the text that originated in copyrighted EJCDC documents remain subject to the EJCDC copyright.
 - 1. 00100 – Advertisement for Bids
 - 2. 00200 – Instructions to Bidders
 - 3. 00410 – Bid Form
 - 4. 00520 – Agreement
 - 5. 00800 – Supplemental Conditions

1.2 SOIL DISTURBING ACTIVITIES

- A. Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001) available at: <http://www.pca.state.mn.us/water/stormwater/stormwater-c.html>

1.3 WATERMAIN, SANITARY SEWER AND STORM SEWER CONSTRUCTION

- A. "Standard Specifications" as published by the City Engineers Association of Minnesota, (CEAM) 2018 Edition available at: <http://www.ceam.org>
- B. American Water Works Association (AWWA) Standards: <http://www.awwa.org/>
- C. THREADED ITEMS - All threaded items furnished under this contract, including but not limited to mechanical joint connectors, flanged joint connectors, mainline valves, saddles, corporation stops, curb stops, hydrants, and air release valves shall be furnished to the nominal size as specified with ENGLISH threads.

1.4 GRADING, STREET AND SURFACE IMPROVEMENTS

- A. All of Divisions II and III, and any specifically referenced Division I sections of the Minnesota Department of Transportation (MnDOT), "Standard Specifications for Construction", 2018 Edition, together with all the Supplemental Specifications: <http://www.dot.state.mn.us/pre-letting/spec/>
- B. MnDOT Technical Memoranda in force 30 calendar days prior to bid date and referencing the use of English units of measure: <http://www.dot.state.mn.us/design/tools/index.html>
- C. MnDOT Standard Plans: <http://standardplans.dot.state.mn.us/>
- D. MnDOT Standard Details: <http://standardplates.dot.state.mn.us/>
- E. Whenever the word "Contracting Authority," "Department" or "Owner" is used in the sense of ownership as part of any of the MnDOT Documents, it shall mean Owner as defined in the Agreement.

1.5 TRAFFIC CONTROL

- A. The Minnesota Manual of Uniform Traffic Control Devices (MMUTCD) shall apply to this project and is available at: <http://www.dot.state.mn.us/trafficeng/publ/mutcd/>.
- B. The MnDOT's Temporary Traffic Control Zone Layouts Field available at: <http://www.dot.state.mn.us/trafficeng/publ/fieldmanual/>.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

- A. The Contractor shall have access to the reference documents at the site at all times during the construction either in paper or digital format.

******END OF SECTION******

SECTION 01425 - ABBREVIATIONS

PART 1 -- GENERAL

1.1 WHEREVER THE FOLLOWING ABBREVIATIONS ARE USED, THEY SHALL HAVE THE MEANINGS INDICATED:

- A. AASHTO American Association of the State Highway and Transportation Officials
- B. ACI American Concrete Institute
- C. AI The Asphalt Institute
- D. ASTM American Society for Testing and Materials
- E. AWWA American Water Works Association
- F. CEAM City Engineer's Association of Minnesota
- G. CLFMI Chain Link Fence Manufacturers Institute
- H. MnDOT Minnesota Department of Transportation
- I. OSHA Occupational Safety and Health Administration
- J. PCA Portland Cement Association or Minnesota Pollution Control Agency (context obvious)
- K. SWPPP Storm Water Pollution Prevention Plan

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

******END OF SECTION******

SECTION 01450 - QUALITY CONTROL

PART 1 -- GENERAL

1.1 SCOPE OF TESTS

- A. All materials, equipment, installation, and workmanship included in this contract, if so required by the Engineer, shall be tested and inspected to prove compliance with the contract requirements.
- B. All tests and inspections shall be completed under the direct supervision of a licensed professional engineer. All tests and inspections shall be the responsibility as identified in the individual sections of these specifications and shall be reported directly to the Owner and Engineer.
- C. No tests specified herein shall be applied until the item to be tested has been inspected and approval given for the application of such tests.
- D. Tests and inspections shall include all those specified in the individual sections and shall be compensated in accordance with the individual sections.
- E. Tests and inspection, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry.
- F. Soil compaction testing performed by the Owner is deemed to be for the convenience of the Owner for documentation of the progress and performance of the work. Soil compaction testing results will be made available to the Contractor. However, the Owner and Engineer make no representations that the number of tests taken will be sufficient to accurately characterize the condition of any trench, and the Contractor shall take any supplemental test it deems necessary to monitor its own performance. The Owner may, at its discretion, eliminate soil and compaction testing on any part or the entire project. The presence or absence of soil and compaction testing or the approval of the results thereof shall in no way reduce the Contractor's obligation to correct trench settlement as described in these Special Provisions.

1.2 FINAL TESTING AND START-UP

- A. If, under test, any portion of the work fails to fulfill the contract requirements and is altered, renewed or replaced, tests on that portion so altered, removed, replaced, together with all other portions of the work as are affected thereby, shall, if so required by the Engineer, be repeated within reasonable time and in accordance with the specified conditions and the Contractor shall pay to the Owner all reasonable expenses incurred by the Owner as a result of the carrying out of such tests.

1.3 TESTING AND LABORATORY SERVICES

- A. Independent Testing Laboratory
 - 1. Where in the individual sections of this Specification, tests or inspections are required to be furnished by the Contractor by an independent testing laboratory, the Contractor shall employ and arrange for, at its expense, the services of an approved independent testing laboratory satisfactory to the Engineer to perform the testing utilizing recognized standard procedures and criteria.
 - 2. If the project includes the MnDOT Schedule of Materials Control Section, the Contractor shall employ and arrange for, at its expense, the services of an approved independent testing laboratory satisfactory to the Engineer to perform the testing utilizing recognized standard procedures and criteria for all testing listed under Quality Control, Contractor, or Producer testing in the Schedule of Materials Control regardless of what the individual sections of this specification state.
- B. Reports and Certificates
 - 1. The Contractor shall submit reports and certificates of all inspections and test to the Engineer in duplicate. The reports and certificates become the property of the Owner.
- C. Sample Materials

1. The Contractor shall furnish all sample materials required for these tests and shall deliver the same without charge to the testing laboratory or other designated agency when and where directed by them.

D. Additional Tests

1. In addition to those tests required by the individual technical specifications and/or referenced specifications:
 - (a) Additional tests required beyond those required under this specification may be ordered by the Engineer to settle disagreements with the Contractor regarding quality of work done. If the work is defective, the Contractor shall pay all costs of the additional tests and shall correct the work. If the work is satisfactory, the Owner will pay for the additional tests.
 - (b) The Owner may perform televised inspection of any and/or all under construction included in this project, at its own expense, at any time prior to final payment. All deficiencies discovered in the course of such investigation shall be corrected at the Contractor's expense and, to the Owner's satisfaction, prior to final payment.

1.4 ENGINEER'S REPRESENTATIVES AND TESTING

- A. The Engineer may provide a Resident Project Representative (RPR) to ascertain that the work is accomplished properly and in accordance with the plans and specifications. The RPR shall have full access to the work and shall be given full cooperation. The RPR shall have the authority, subject to the final decision of the Engineer, to reject any defective work or material. The RPR shall have no authority to permit any deviation from the plans and specifications except on written order from the Engineer.
- B. The presence of the Engineer or any RPRs, however, shall not relieve the Contractor of the responsibility for the proper execution of the work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Engineer or any RPRs.

1.5 SITE INVESTIGATION AND CONTROL

- A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the work due to his failure to comply with this requirement.
- B. The Contractor shall inspect related and appurtenant work and shall report in writing to the Engineer any conditions, which will prevent proper completion of the work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair or replacement caused by unsuitable conditions shall be performed by the Contractor at his sole cost and expense.

1.6 RIGHT OF REJECTION

- A. The Engineer, acting for the Owner, shall have the right, at all time and places, to reject any articles or materials to be furnished hereunder which in any respect, fail to meet the requirements of these specifications, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the work at the site. If the Engineer or RPR, through an oversight or otherwise, has accepted materials or work which is defective or which is contrary to the specifications, such material, no matter in what stage or condition of manufacture, deliver, or erection, may be rejected by the Engineer for the Owner.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

******END OF SECTION******

SECTION 01550 - MAINTENANCE OF HAUL ROADS & TEMPORARY ACCESS

PART 1 -- GENERAL

1.1 MAINTENANCE

- A. The Contractor shall notify and obtain the approval of the local governmental authority for the use of all haul roads and construction easement areas within the City limits not specifically noted below. The Contractor will be required to deliver new materials and dispose of all excavated material plus removal items only on designated haul roads. This also applies to equipment entering and leaving the project site such as backhoes and front end loaders.
- B. Allowable City street and project haul roads are to be determined by the City Engineer for each individual project.
- C. The Contractor shall confine all operations, ingress and egress to the haul roads designated by the City Engineer. The Owner may **assess a fee in the amount of \$ 500 per day for each day** that the Contractor occupies or travels on non-designated haul roads. The fee shall be in addition to damages assessed against the Contractor to repair damage caused to the roadway.
- D. The Contractor shall maintain and repair any damage to haul roads. Maintenance shall include, but not be limited to, the following: blading, patching, signing, graveling and dust control. This work will be at the Contractor's expense, without any direct compensation being made other than the payment received for Contract items.
- E. The Contractor shall be responsible for all roadbed maintenance over backfilled trenches and roadbed subgrade during the construction period.

1.2 REFERENCED SPECIFICATION

- A. MnDOT 1513, Restrictions on Movement and Storage of Heavy Loads and Equipment.
- B. MnDOT 1515, Control of Haul Roads
- C. MnDOT 2051, Maintenance and Restoration of Haul Roads.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Reclaimed bituminous and salvaged aggregate base may be used for temporary access surfacing. No additional compensation shall be granted for the installation, removal and disposal of materials utilized in this way.

****END OF SECTION****

SECTION 01555 - MAINTENANCE AND CONTROL OF TRAFFIC

PART 1 -- GENERAL

1.1 SUMMARY

A. Traffic Control

1. All traffic control methods shall conform to the provisions of the latest edition of the Minnesota Manual of Uniform Traffic Control Devices (MN MUTCD), including its supplements and Part VI, "Field Manual for Temporary Traffic Control Zone Layouts", the "Guide to Establishing Speed Limits in Highway Work Zones", the Minnesota Flagging Handbook, the provisions of MnDOT 1404 and 1710, the Minnesota Standard Signs Manuals Parts I and II, the Traffic Engineering Manual Chapter 8 Appendixes 8-8.02 and 8-8.03, the Traffic Control Layouts/Typical Traffic Control Layouts in the Plans.
2. The Contractor shall furnish, install, maintain and remove all traffic control devices including, but not limited to, construction signs, barricades and barricade weights, traffic marking tape, and warning lights which are needed for the guidance, warning and control of traffic adjacent to and through this project.
3. The Contractor shall provide sufficient surveillance of the traffic control devices to insure compliance during the entire construction period. The Contractor shall furnish names, addresses, and phone numbers of at least two local individuals capable of immediate response who will be responsible for the site security and traffic control devices to:

The Engineer
The Owner
Local Law Enforcement Agencies

4. The Contractor shall respond with sufficient personnel, equipment and/or materials and conduct the required work or be subject to a \$100 per hour deduction from the time of notification for non-attention to project security and safety.
5. The Contractor shall schedule the work to cooperate fully with residential and business property owners abutting the project to minimize the time of restricted access to their property during the construction period. Driveway access to any property adjacent to the construction zone shall be restricted no more than seven days to allow for curing of the concrete curb and driveway pavement.
6. The cost of maintaining vehicular and pedestrian traffic on temporary aggregate surfaced drives, walkways, including the eventual removal of the aggregate material, shall be considered incidental to traffic control.
7. If it is necessary to enter upon a right-of-way controlled by the County or Minnesota Department of Transportation, the Contractor shall notify the appropriate agency before commencing construction within the right-of-way.
8. In the event that any of the above right-of-way require traffic to be detoured around the construction zone, the Contractor shall prepare the detour route with the appropriate Agency representatives. The Contractor shall provide and maintain all signing and other traffic control required. The affected Agency shall be notified by the Contractor before re-routing traffic. Dust control and road maintenance of the by-pass route shall be the Contractor's responsibility.
9. The Contractor shall be responsible for securing a site for storage of construction equipment and materials.

B. General Construction and Traffic Requirements

1. The parking of Contractor's Vehicles that obstruct any traffic control devices will not be permitted.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. When no bid item is provided in the Schedule of Unit Prices, Traffic Control shall be considered incidental to the project and no compensation will be granted.
- B. When a bid item is provided in the Schedule of Unit Prices for Traffic Control, Traffic Control shall be measured by the LUMP SUM and paid in accordance with the following schedule.
 - 1. On the first partial estimate that shows work performed on at least one major contract item, 25 percent of the amount bid for Traffic Control will be paid, but not more than 3 percent of the original Contract amount.
 - 2. On subsequent partial estimates, payment shall be made at the same percentage as the value of work completed to date relative to the original Contract amount, except that payment shall not be reduced from the original 25 percent. Materials on hand shall be excluded from the payment ratio computation.
 - 3. At such time that 95 percent of the original Contract amount is earned, full payment for Traffic Control shall be made.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall notify the Engineer in writing at least 72 hours prior to the start of any construction operation that will necessitate lane closure or internal traffic control signing.
- B. The traffic control devices required along the project corridor shall be delivered and installed prior to the start-up of the work.
- C. The Contractor shall maintain traffic through the intersections whenever possible.
- D. The Contractor shall monitor and maintain all traffic control devices.

******END OF SECTION******

SECTION 01562 - AIR, LAND AND WATER POLLUTION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary for the prevention of air, land and water pollution as indicated on the plans or as specified herein or as directed by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Payment for the prevention of air and land pollution shall be incidental to the project and no separate compensation will be granted
 - 2. Payment for all work associated with the prevention of water pollution and erosion control shall be incidental to the project and no separate compensation will be granted, unless payment for such work is specifically identified in Section 02370 "Erosion and Sediment Control" of this Project Manual.
- B. SPECIFICATION REFERENCES
 - 1. MnDOT 1717 shall apply to the prevention of air, land and water pollution.
 - 2. MnDOT 2573 shall apply to storm water management.
 - 3. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 GENERAL

- A. The Contractor shall provide and maintain all sanitary accommodations for use by employees.
- B. All solid waste material shall be disposed by the Contractor in accordance with the local and State solid waste disposal regulations.

3.2 DUST CONTROL

- A. The Contractor shall perform dust control operations necessary to proactively prevent the production of dust in amounts to cause nuisance or damage to property, vegetation, animals, or persons in the vicinity of the construction.
- B. The Contractor shall suspend construction or haul traffic when the Contractor cannot prevent airborne dust until such time as dust control can be re-established to the required levels.
- C. The Contractor shall be responsible for any damage resulting from dust originating from the construction. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility under these Contract provisions.
- D. Requests by the Owner or Engineer for additional dust control shall be accomplished within 4 hours of notification and shall also include evenings and weekends as required or deemed necessary by the Owner or the Engineer. **Failure to perform the work requested within the 4 hours may result in the Owner or Engineer arranging for dust control by others. A contract deduction shall be made equal to the total of all costs to perform dust control so arranged, including not limited to labor, materials, equipment and administrative costs.**

3.3 USE OF CHEMICALS

- A. Reference Storm Water Pollution Prevention Plan (SWPPP).

****END OF SECTION****

SECTION 01770 - PROJECT CLOSEOUT

PART 1 -- GENERAL

1.1 FINAL INSPECTION

- A. After the cleaning up of the work, premises, and all other areas and structures connected with the performance of the contract, the work as a whole, shall be examined by the Engineer and Owner; and, any workmanship or materials found not meeting the requirements of the specifications shall be identified and included on a punch list given to the Contractor.
- B. The Contractor shall, at its own expense, promptly remove, replace, repair, or otherwise correct the deficiencies with good and satisfactory workmanship and material to the satisfaction of the Owner and Engineer.
- C. In the event that the Contractor does not satisfactorily remove, replace, repair, or otherwise correct the deficiencies within thirty calendar days after receipt of the punch list, the Owner reserves the right to employ the services of other contractors and/or service organizations to conduct the necessary work and deduct any and all associated costs from final payment to the Contractor. The entry of such other agents on the project to perform this work will not relieve the Contractor from any of its warranty, maintenance or start-up obligations.

1.2 PROJECT ACCEPTANCE

- A. The project shall be accepted after the final examination has been conducted and all settlement, defects, damages, etc., discovered during the previous examination have been remedied.
- B. Unless otherwise stated in the supplementary conditions to the contract or other special provisions provided at the time of bidding, the Contractor shall warranty the work for two years from the date of final payment and project closeout.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

****** END OF SECTION ******

STANDARD TECHNICAL SPECIFICATIONS
FOR
PUBLIC INFRASTRUCTURE IMPROVEMENTS

City of Jordan, MN

SECTION 02220 - REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the removal of pavement and miscellaneous structures as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
1. Remove Sanitary Sewer Service Pipe, and/or Water Service Pipe – No direct payment shall be made for removal of service pipes. Removal shall be considered incidental to the related items of work for construction of the project.
 2. Remove Sanitary Sewer Pipe, Watermain Pipe, and/or Storm Sewer Pipe – The contract unit price bid per linear foot shall be compensation in full for all equipment, materials and labor required to remove the pipe regardless of size and type encountered including but not limited to excavation, saw cutting pipe, bulkheading pipe to be abandoned in place, removal, disposal, backfill, compaction, etc. The work associated with maintaining service and working around existing pipe to be removed, until removal is approved by the Engineer, shall be incidental to the Contract, unless otherwise specified or approved.
 3. Remove Manhole – The contract unit price bid per each shall be compensation in full for all equipment, materials and labor required to completely remove manholes as specified and directed including not limited to excavation, removal and disposal of the structure, removal and disposal of interior and exterior piping and equipment, importation of backfill and compaction of suitable material to fill the void remaining from structure removal, etc.
 4. Abandon Manhole – The contract unit price bid per each shall be compensation in full for all equipment materials and labor required to abandon structures as specified and directed including but not limited to excavation, removal and disposal of interior and exterior piping and equipment, removal and disposal of top sections of structure and top slab, saw cutting structure walls if required, bulkheading pipe perforating base and structure walls, filling structure with sand and compacting, importing, placing and compacting suitable material to fill void from removed structure, etc.
 5. Remove Curb & Gutter, Remove Bituminous Pavement, Reclaim Bituminous Surface, Salvage Existing Pavers, Sawing Bituminous Pavement, and Sawing Concrete Pavement
 - (a) No exception to the referenced specification is made.
 6. Remove Concrete Pavement (Walks, Driveways, Street, and Alleys)
 - (a) The unit price bid per SQUARE YARD for concrete pavements shall include all costs for removal and disposal of concrete steps. At locations of steps, the area of concrete removed shall be measured and paid based on the landing area.
 7. Remove Sign
 - (a) Removal of signs shall include all costs for removing and disposing of the sign panels, brackets, and posts.
 - (b) No other exception to the referenced specification is made.
 8. Salvage & Reinstall Mailbox
 - (a) The Contractor shall attempt to protect mailboxes throughout the project area. No direct payment shall be made for protection of mailboxes.

- (b) Where mailboxes must be relocated, either due to conflicts with proposed improvements or use of reasonable construction techniques, if a bid item is provided on the Schedule of Unit Prices the amount bid per EACH mailbox shall be full compensation for carefully salvaging the mailbox, storing it in a secure location, reinstalling the mailbox per the plan detail.
 - (c) If no bid item is provided on the Schedule of Unit Prices, no direct payment shall be made for salvaging and reinstalling mailboxes. All associated costs shall be considered incidental.
- 9. Abandon Pipes
 - (a) The amount bid shall include all costs of filling the pipe to be abandoned with blown-in sand or flowable fill to the satisfaction of the engineer and bulkheading the pipe on each end upon completion.
- 10. The UNIT PRICE bid for all other removal items shall include all costs of labor, materials, equipment and ultimate disposal required to complete the work, as specified.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated removal and excavation items. Such items of work include but are not limited to:
 - 1. Saw cutting - bituminous and/or concrete, driveways, sidewalks, pavements, curb & gutter, and other impervious surfaces.
 - 2. Removing storing and reinstalling mail boxes, street/traffic signs or similar structures which must be moved to construct the project.
 - 3. Off-site disposal of excess excavated material and debris.
 - 4. Removal and off-site disposal of bituminous or concrete, unless designated for salvaging.
 - 5. Removing, salvaging and storing, or disposing of manhole and catch basin castings.
 - 6. Loading, hauling, stockpiling and placing as directed (i.e., leveling) designated salvage items to a location directed by the Owner.
 - 7. Fees and permits for the disposal of materials.
 - 8. Removal and disposal of existing sanitary sewer pipe, storm sewer pipe, watermain, and service pipes.
 - 9. Bulkheading the ends of existing pipes designated by the Engineer to be abandoned in place.
 - 10. Protection from damage of structures or other surface improvements that are not to be removed, and subsequent repair and/or replacement if damaged by Contractor operations.

1.3 SPECIFICATION REFERENCES

- A. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- B. MnDOT 2104 shall apply to the removal of pavement and miscellaneous structures, except as modified herein.

1.4 SUBMITTALS

- A. No exception to the referenced specification is made.

PART 2 -- PRODUCTS

- 2.1 No exception to the referenced specification is made.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Remove existing bituminous, curb and gutter, walks, drives, steps and other specified items where shown on the plans and/or required for the construction of the project.
- B. Saw cut bituminous and concrete surfaces prior to excavation, to produce a clean-cut breakage joint.
- C. Dispose of all concrete and bituminous removal items, rubbish and debris outside of the construction zone. It shall be the Contractor's responsibility to secure all required permits and pay all fees associated with the disposal of the material and to secure the disposal site.
- D. Remove existing mailboxes, street/traffic signs and similar structures that must be removed to construct the project. Restore these facilities to the original location or a location designated by the Owner, when work has progressed past the location of the structure.
- E. The Contractor shall take full responsibility to protect structures or other surface improvements from damage that are not to be removed. If damage to these facilities occurs due to the construction of the project, the Contractor shall replace or repair them.
- F. The Owner will designate which existing hydrants, valves and boxes, manhole castings and other items removed as part of the construction, are to be salvaged. All other items shall be disposed by the Contractor.
- G. All existing watermain, sanitary sewer and storm sewer pipe being removed and replaced by new improvements shall be considered as debris and removed during the construction process.
- H. Where existing pipes are to be abandoned in place, the exposed pipe ends shall be bulkheaded shut with a watertight non-shrink concrete grout at a thickness of not less than one pipe diameter.
- I. Pump flowable fill through bulkheads constructed for placement of two 2-inch PVC pipes or use other suitable construction methods to contain flowable fill in lines to be abandoned. Contractor shall utilize pipes as injection points or vents for placement of flowable fill.
- J. Structure removal shall include removal and disposal of all interior and exterior piping and equipment including but not limited to top slabs, base slabs, cone sections, manhole sections, castings, rings, drop pipe, base elbows, valves, meters, fittings, pipe, pipe supports, electrical components, etc. At the discretion of the Owner, any material to be removed shall be salvaged and delivered to a location selected by the Owner. No additional compensation will be made for salvaged items or delivery thereof.

The entire structure shall be removed from ground surface through base slab. Complete removal is required such that no concrete, steel, brick, etc. material is buried on site. All inlet and outlet piping to be abandoned in place shall be bulkheaded, and abandoned as specified.

- K. Structure abandonment shall include removal and disposal of all internal piping and equipment including but not limited to valves, meters, fittings, pipe, pipe supports, electrical components, etc.

The structure shall be abandoned by removing and disposing of castings, hatches, top slabs, structure sections, exterior piping and appurtenances, etc. to an elevation of a minimum of 5 feet below finished grade. Removal of structure sections to the nearest joint or saw cutting may be required as directed. The bottom of the structure remaining in place shall be perforated as directed to allow drainage of groundwater. The remaining structure shall be filled with granular material and compacted to 100% standard proctor density throughout. All exterior piping components such as drop sections shall be abandoned as specified.

- L. Suitable onsite material shall be placed and compacted to fill the void created by structure removal and abandonment. When suitable onsite material is not available, suitable offsite material shall be imported. The

Contractor shall make his own determination of the quantity of material needed to fill voids, and the availability of suitable onsite material.

- M. The Contractor shall remove miscellaneous structures, rubble and debris encountered during construction. Miscellaneous structures, rubble and debris may include but are not limited to building foundations, cisterns, concrete rubble, bituminous rubble, trees, wood, tires, etc., that exists prior to construction, and are not suitable for reuse as backfill material, and are not considered cobbles or boulders as specified and directed. Miscellaneous structures, rubble and debris shall be completely removed and disposed of offsite. The Contractor shall completely remove and dispose of all material encountered as necessary to construct the proposed work, and as directed. Filling of the resulting void with suitable material, as directed, shall be considered incidental to the Contract. It shall be the Contractor's responsibility to secure all required permits and pay all fees associated with the disposal of the material and to secure the disposal site(s).

******END OF SECTION******

SECTION 02230 - CLEARING AND GRUBBING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to clearing and grubbing trees, stumps and brush as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. No exception to the referenced specification is made.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for clearing and grubbing. Such items of work include but are not limited to:
 - 1. Permits and fees for the disposal of materials.
 - 2. Protecting existing improvements from damage.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2101 shall apply to clearing and removing trees, stumps and brush, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Tree clearing shall be limited to November 1 to March 31, where environmental review requirements of the project dictate such removals.
- B. Prior to tree trimming to remove overhanging branches, the Contractor shall inspect the branches to be trimmed for occupied bird nests and/or hollows that may be used by birds or bats.
 - 1. If absent, tree trimming may be completed without time restrictions.
- C. If present, the Contractor shall document with photos to the best of their ability and contact the Engineer before initiating tree trimming. Tree trimming may not proceed until authorized in writing by the Engineer
- D. All trees, stumps, brush, seed, grass, roots or other undesirable material within the construction limits shall be disposed of by the Contractor.
- E. Disposal methods shall be approved by the Engineer and shall meet all Local, State and Federal regulations.
- F. Burning or burial will not be allowed within city limits.

*******END OF SECTION*******

SECTION 02240 - DEWATERING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the dewatering of trenches as necessary to construct the elements shown on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. No measurement or direct payment will be made for Dewatering. Payment for control of groundwater, surface water, or any other water present at the site, unless otherwise stated in the Schedule of Unit Prices. All costs of dewatering in this case shall be considered incidental to the related elements of work.
- B. When a bid item is provided in the Schedule of Unit Prices, the Lump Sum price bid for dewatering for the appropriate utility and at the utility depth identified, shall include all equipment materials and labor required to dewater utility and appurtenant service excavations to an extent that provides a stable and reasonably workable excavation bottom suitable for the proper installation of pipe and bedding materials in accordance with the plans, manufacturer requirements, as specified, and as directed by the Engineer.
 - 1. Dewatering methods (well points or wells, etc.) are the Contractor's option. Multiple dewatering techniques may be required. Dewatering methods selected shall be considered incidental to the price bid for dewatering.
 - 2. The project may require multiple stages of dewatering system installation, operation, and removal. No additional compensation shall be paid for multiple stages, setups, installation, operations and removal of dewatering systems.
 - 3. The project may require sub cutting dewatering equipment to achieve optimum dewatering depth. No additional compensation shall be paid for any equipment, materials and labor required to sub cut for dewatering.
 - 4. Dewatering manifold and discharge piping may require installation across streets, highways, driveways, etc. All dewatering piping shall be installed in a manner to maintain all traveled ways open to traffic. Trenching across with temporary aggregate surfacing and use of existing culverts, etc. will be allowed as approved by the appropriate governing agency. Ramping over piping with rock, soil, planks, etc. will not be permitted. All crossing methods shall be approved by the Engineer and/or governing agency.
 - 5. All equipment, materials, and labor required to cross maintain, remove, and restore traveled ways, including but not limited to highways, streets, driveways, etc. shall be considered incidental to dewatering.
 - 6. The Contractor shall be solely responsible for the application and fees for all permits required to perform dewatering operations including but not limited to DNR appropriations, discharge location and treatment, WMO's, etc. All costs associated therewith shall be considered incidental to dewatering.
 - 7. The Contractor shall be solely responsible for complying with all permit requirements including but not limited to dewatering volume, discharge piping, discharge treatment, temporary sedimentation control, additional erosion control, discharge piping needed to reach receiving areas, etc. The costs associated with permit compliance shall be considered incidental to dewatering.
- C. No dewatering payment will be made for dewatering consisting of placing pumps directly into the open trench.
- D. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the dewatering items, as indicated. Such items of work include but are not limited to:

1. Interference of other underground structures and utilities.
2. Protection of existing improvements from damage.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2451.3C shall apply to the dewatering of trenches, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. None

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall furnish and install all necessary discharge piping and obtain all permits, easements, rights-of-way, etc. to convey and discharge the water at a sufficient distance from the project area to eliminate recharge of the ground water at the project site.
- B. Water from dewatering operations shall not be discharged where it will pond or cause damage to cropland or personal property due to the presence of standing or flowing water.
- C. Unless otherwise provided in the contract documents; the Contractor shall be responsible for obtaining all necessary permits required for dewatering prior to beginning of dewatering. The Contractor shall provide a plan for the discharge showing the discharge location, energy dissipation, and water quality treatment to the Engineer for approval prior to beginning discharge. The discharge rate, location, and water quality shall be in compliance with all local, State, and Federal requirements.
- D. Existing and/or proposed sanitary system(s) shall not be used as an outlet for the dewatering operations.
- E. When dewatered volumes are anticipated to require State of MN permitting approval or when requested by the Engineer, the Contractor shall submit a dewatering plan to the Engineer and appropriate permitting agencies for approval. The dewatering plan shall include all pertinent information necessary to fully define the Contractor's intended plan to dewater the entire project as required, including but not limited to methods proposed, location of wells, well points, pumps, generators, engines, discharge piping, manifolds, discharge locations, treatment methods, receiving areas, pumping rates and estimated volumes from each location and discharged at each discharge point, etc. and any other information requested by the Engineer.
 1. Approval of the submitted dewatering plan shall not relieve the Contractor of his sole responsibility for providing adequate dewatering of the utility corridor as specified and as directed and complying with all permit requirements, and protection of existing features as specified.
 2. All costs associated with preparation of the dewatering plan, adding, deleting, adjusting the dewatering plan and methods and techniques used shall be considered incidental to dewatering.
 3. The Contractor shall protect all existing features above or below ground including but not limited to streets, buildings, private wells, utilities, septic systems, etc. from damage caused by dewatering activities including but not limited to settlements, cracking, reduction of well productivity or water quality, etc.
 4. Any and all damage caused by dewatering activities shall be repaired as directed by the Engineer at the Contractor's sole expense, unless otherwise approved by the Engineer. Repair items may include but are not limited to foundation and building restoration, driveway reconstruction, drilling new wells, septic system replacement, etc.
 5. The plans include a sheet that shows the approximate location and well log data available from the County Well Index GIS data base from MnDNR and MDH. This information is provided for informational purposes only to assist in the planning and design of the dewatering system. The Contractor shall

conduct his own research and field investigations necessary to design and implement a dewatering system that meets the requirements of these specifications and prevents damage to existing features.

******END OF SECTION******

SECTION 02310 - EXCAVATION & EMBANKMENT - SITE GRADING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the excavation and embankment of the site improvements as indicated on the drawings or as specified herein.

1.2 DEFINITIONS

- A. Building Pad - The area under any proposed building, or an area delineated on the plans as the site for a future building.
- B. Building Pad Hold-Down - The elevation that the proposed building pad is to be constructed to. This elevation does not represent the finished grade elevation of the proposed building.
- C. Compacted Volume (CV) – The volume of material actually placed as determined by computing the difference between original and final cross-sections by the average end area method.
- D. Excavated Volume (EV) – The volume of material actually excavated as determined by computing the difference between original and final cross-sections by the average end area method.
- E. Excess Material - Material that is not needed to complete the earthwork balance.
- F. Structural Improvements - For the purposes of this specification, structural improvements shall refer to any roadway, sidewalk, trail, building, sign, or other improvements requiring suitable soil to support the anticipated loadings.
- G. Subcut - Excavation performed below the proposed subgrade or building pad hold-down elevation shown on the plans for the purposes of removing unsuitable material.
- H. Subgrade - The top surface of a roadbed upon which the pavement structure (including aggregate base and/or granular subbase) is to be constructed. This is also a general term denoting the soil foundation upon which a proposed improvement is to be placed.
- I. Suitable Material - Sand, silty sand or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.
- J. Topsoil - Any soil, generally black in color, containing organic material.
- K. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.

1.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Measurement and payment for Common Excavation shall be based upon the CUBIC YARD - PLANNED QUANTITY - CY (P), included in the Proposal. Common excavation is computed to the face of any retaining walls. Excavation required for construction of the wall shall be incidental to the unit price bid for retaining wall.
 - 2. Measurement and payment for Topsoil Borrow shall be based upon the CUBIC YARD - LOOSE VOLUME QUANTITY - CY (LV), included in the Proposal.
 - 3. Measurement and payment for Granular Borrow or Select Granular Borrow shall be based upon the TON or the CUBIC YARD – COMPACTED VOLUME INPLACE QUANTITY - CY (CV), as indicated in the Schedule of Unit Prices.
 - 4. Measurement and payment for Subgrade Excavation shall be based upon the CUBIC YARD - EXCAVATED VOLUME QUANTITY - CY (EV), included in the Proposal.

5. Measurement and payment for Stabilizing Aggregate shall be based upon the TON or the CUBIC YARD – COMPACTED VOLUME INPLACE QUANTITY - CY (CV), as indicated in the Schedule of Unit Prices.
 6. The quantities for Subgrade Excavation and Stabilizing Aggregate may be increased or decreased by any amount according to the conditions revealed. No direct compensation will be made for backfilling subcut areas with suitable material from the excavation.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated excavation items. Such items of work include but are not limited to:
1. Unless itemized in the Schedule of Prices, separating, salvaging, stockpiling, and spreading of topsoil, include in the price bid for common excavation.
 2. Unless itemized in the Schedule of Prices, subcutting the existing topsoil prior to placing embankment in all areas with proposed structural improvements, include in the price bid for common excavation.
 3. Salvaging and separately stockpiling suitable aggregate base material, as determined by the Engineer, include in the price bid for common excavation.
 4. Separating, salvaging, stockpiling and placing suitable material for use in embankment areas, include in the price bid for common excavation.
 5. Obtaining suitable material from areas with no proposed structural improvements to provide enough suitable material for embankments being constructed under proposed structural improvements, include in the price bid for common excavation.
 6. Restoring the borrow site by grading the area to drain properly to slopes not-to-exceed 6:1 and by restoring the topsoil to a minimum thickness of 6 inches, include in the contract unit price for common borrow.
 7. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading and/or other efforts necessary to repair the subgrade after satisfying the roll test and failing to protect the integrity of the subgrade, include in the price bid for common excavation.
 8. Over-excavation in cut areas to provide room for placement of topsoil, include in the price bid for common excavation.
 9. Earthwork balancing including adjustments for shrinkage loss, and excess materials resulting from the additional volume created from pipe bedding, utility pipe, and/or underground structures shall be included in the unit price bid for common excavation.
 10. The avoidance and protection of wetlands include in the price bid for common excavation.
 11. Protecting existing improvements and previously accepted in-process improvements from damage include in the price bid for common excavation.
 12. Test rolling, include in the price bid for common excavation.
 13. Gradation and compaction testing, and geotechnical inspection services to meet requirements of Source and Field Quality Control, if required, include in the price bid for common excavation.
 14. Farming, disking and/or drying suitable wet materials, include in the price bid for common excavation.
 15. Excavation required for construction of any retaining wall shall be included in the unit price bid for retaining wall.

1.4 SPECIFICATION REFERENCES

- A. MnDOT 2105 shall apply to the excavation and embankment for the site improvements, except as modified herein.
- B. MnDOT 2574 shall apply to the excavation and embankment for the site improvements, except as modified herein.

- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. All excess excavated material shall become the property of the Contractor and shall be removed from the site and disposed of at a location secured by the Contractor.
- B. Stabilizing aggregates for use in backfilling subgrade excavations shall be one of the following, as approved by the City Engineer:
 - 1. 2-inch dust free aggregate, 100% Crushed
 - 2. Class 5 Aggregate Base, 100% Crushed
 - 3. Coarse Filter Aggregate, 100% Crushed

PART 3 -- EXECUTION

3.1 GENERAL

- A. Excavated topsoil and suitable material for reuse in the project shall be segregated and stockpiled at a site selected by the Contractor.
- B. Frozen material will not be allowed for roadway or building pad construction. The Engineer shall approve locations for placement of frozen material.
- C. All excavations shall be kept free of water during the placement of fill.
- D. The Contractor shall utilize methods and equipment for excavating that will minimize the disturbance to the subgrade. The use of backhoes rather than scrapers or front-end loaders may be required to minimize repeated passes of equipment over wet subgrade soils.
- E. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheepsfoot rollers, tractor tires and tracked equipment, and roll the surface with a steel wheel or rubber tired roller.
- F. Sufficient common excavation shall be utilized by the Contractor to replace the soil shrinkage from excavation which occurs through the course of construction handling and compaction. The Contractor shall make his own estimate of the amount of shrinkage that will occur.
- G. Topsoil
 - 1. Topsoil shall be salvaged and stockpiled in locations shown on the plans or in areas requiring final turf establishment, as approved by the Engineer.
 - 2. Once the salvaged topsoil is stockpiled, the Contractor shall make an estimate of any potential shortage or surplus of topsoil possible in meeting the other provision of this Contract and notify the Engineer of the estimate.
 - 3. The first priority in re-distributing the topsoil on site shall be to meet the minimum depths required over the entire project area.
 - 4. In areas requiring final turf establishment with no proposed or anticipated structural improvements (building pads, etc.), topsoil shall be spread uniformly to a minimum depth of 6.0-inches, unless otherwise indicated in the plans.
 - 5. In areas requiring final turf establishment with proposed or anticipated structural improvements (building pads, etc.), topsoil shall be spread to a depth of 2.0 to 4.0-inches.
 - 6. In areas not requiring final turf establishment with proposed or anticipated structural improvements, no topsoil shall be placed.

- H. Material suitable for curb backfill shall be segregated and stockpiled at a site selected by the Contractor. Following curb construction, the material shall be placed behind the curb, allowing for a minimum of 6-inches of topsoil, unless otherwise indicated in the plans.
- I. In areas where filling above the existing grade is necessary to establish the final designed elevation, the Contractor shall fully remove the topsoil and organic material to the level of stable underlying sand or clay prior to backfilling with suitable embankment material.
- J. The Contractor shall make his own determination as to whether the proposed grading has been completed according to the plans. When the Contractor determines that the grading has been completed, he will notify the Engineer. Neither the Owner nor the Engineer will provide any intermediate acceptance of the grading improvements until all of the grading has been completed and all topsoil has been spread.

3.2 EXCAVATION AND EMBANKMENT IN AREAS WITH PROPOSED STRUCTURAL IMPROVEMENTS.

- A. All vegetation, topsoil, organic, or other unsuitable materials shall be excavated from the area below the structural improvement. Due to the variability of soils, the depth of the excavation in these areas is expected to vary significantly throughout the site. The excavated area shall be inspected by the geotechnical engineer as specified in Field Quality Control.
- B. Subcut excavations shall be laterally oversized a distance of 1.0-foot beyond the edges of the proposed structural improvement for each foot of excavation depth (1:1 oversizing). The extents of the structural improvement areas shown on the plans do not necessarily show this 1:1 oversizing.
- C. Fill placed from the bottom of the subcut to the subgrade or building pad hold down elevation shall be selected material from the excavation or borrow material. Such material shall consist of suitable material as defined above. Clay fill shall be moisture-conditioned to within 2 percent above or below the optimum moisture content determined from the Standard Proctor compaction test.
- D. The embankment material shall be spread in 6.0 to 8.0-inch loose lifts.
- E. In all roadway and pavement areas, the Contractor shall perform a roll test on the subgrade prior to placing any portion of the pavement structure. The roll test shall be performed with a fully-loaded tandem axle truck. Soils which rut or deflect 1.0-inch or more shall be corrected by scarifying, drying, and recompacting the soils. Subgrade excavation shall only be performed as directed by the Engineer.
- F. Subgrade excavation shall be performed only when the Engineer and the Contractor both agree that the in-place soil cannot be made suitable by scarifying, drying, and recompacting. Such excavation shall be backfilled with suitable excess common excavation material, stabilizing aggregate, granular borrow or select granular borrow, as directed by the Engineer. If the Contractor proceeds without approval from the Engineer, all work and material to restore the roadbed to the proper grade shall be at the Contractor's expense.

3.3 EXCAVATION AND EMBANKMENT IN AREAS WITH NO PROPOSED STRUCTURAL IMPROVEMENTS

- A. Topsoil or unsuitable material may be used to construct embankments in areas with no structural improvements.

3.4 COMPACTION

- A. All embankment grading shall be compacted using:
 - 1. Under areas with proposed paved or structural improvements, Specified Density Method:
 - (a) 100 percent Standard Proctor dry density within 3.0-feet of the proposed sub-grade or building pad hold-down elevation.
 - (b) 95 percent of the maximum Standard Proctor dry density below 3.0-feet from the proposed sub-grade or building pad hold-down elevation.
 - 2. Under areas with no proposed paved or structural improvements, Quality Compaction Method.

3.5 SOURCE QUALITY CONTROL

- A. The following testing must be performed:
 - 1. One (1) gradation test per each 500 tons or 275 cubic yards (CV) of select granular borrow.
 - 2. One (1) gradation test per each 500 tons or 275 cubic yards (CV) of stabilizing aggregate.
- B. All testing shall be performed by an independent testing laboratory approved by the Engineer.

3.6 FIELD QUALITY CONTROL

- A. The following testing and inspections, with written certification, must be performed:
 - 1. Areas with Proposed Structural Improvements:
 - (a) One compaction test (including Standard Proctor) per each 500 SY per each 3.0-foot of depth of embankment.
 - (b) Building Pads shall have a minimum of one compaction test (including Standard Proctor) per each 3.0-foot of depth of embankment for each pad.
 - (c) Inspection following the removal of unsuitable material and prior to placement of embankment material to insure that all topsoil and unsuitable material has been removed, and that the exposed subgrade has sufficient bearing capacity for the anticipated structural improvement.
- B. The Contractor shall notify the Engineer 24 hours prior to completing the removal of topsoil and unsuitable material in areas with proposed structural improvements to ensure that appropriate inspection may be performed.
- C. All testing shall be performed by an independent testing laboratory. All inspection shall be performed under the direct supervision of a licensed Geotechnical Engineer who shall provide written certification of the results.
- D. Samples for testing shall be taken from material in place, in building sites and/or paved areas. All sampling methods shall be approved by the Engineer.
- E. The Contractor shall coordinate the site grading and inform the Engineer when the roadway subgrade is ready for test rolling, prior to installing any aggregate base. The Engineer may order some subgrade correction prior to allowing the installation of aggregate base.
- F. Should any of the specified tests or inspections fail, the Contractor may arrange and pay for additional tests or inspections as may be necessary to satisfy the Engineer that the specified requirements have been met.

*****END OF SECTION*****

SECTION 02315 - APPLICATION OF WATER

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the application of water as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. No direct payment is made for water required.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2130 shall apply to the application of water, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall secure his own source of water, unless the use of fire hydrants is approved by the Jordan Public Works Department.
- B. The Contractor must receive the written approval of the Public Works Director, pay any required fees or deposits, and implement any required metering prior the use of any City fire hydrants.
- C. The Contractor shall apply water as may be required to obtain proper compaction for all dust control, street construction, and embankment construction.
- D. The Contractor shall NOT apply water in quantity or rate sufficient to cause erosion.

******END OF SECTION******

SECTION 02320 - TRENCH EXCAVATION, BEDDING AND BACKFILL

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to maintenance of utility service, trench excavation, bedding and backfill necessary for the construction of underground utilities and structures, as indicated on the drawings or as specified herein.

1.2 DEFINITIONS

- A. Excess Material - Material that is not needed to complete the earthwork balance.
- B. Suitable Material - Sand, silty sand or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.
- C. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.
- D. Flexible Pipe Materials – For the purposes of this specification section, flexible pipe materials shall include the following:
 - 1. Polyvinyl chloride (PVC) pipe – solid wall and profile wall pipe.
 - 2. Polypropylene profile wall pipe.
 - 3. High density polyethylene pipe – solid wall and profile wall pipe.
 - 4. Corrugated steel or aluminum pipe.
 - 5. Centrifugally cast, glass-fiber-reinforced, polymer mortar (CCFRPM) pipe.
- E. Rigid Pipe Materials – For the purposes of this specification section, rigid pipe materials shall include the following:
 - 1. Reinforced concrete pipe.
 - 2. Reinforced concrete box culverts.
 - 3. Ductile iron pipe.

1.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Items specifically identified in the Schedule of Unit Prices will be compensated in accordance with the description of measurement and payment contained in the section applicable to the individual item. Otherwise, no direct compensation shall be granted for compliance with the provisions contained herein.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the individual pipeline items associated with the stated specific item or work effort. Such items of work include but are not limited to:
 - 1. Interference with other above and underground structures and utilities.
 - 2. The removal and restoration, or protection of existing structures and utilities that are shown on the plans and for which there is no bid item for removing and restoring, or working around the utility.

3. Unless separately itemized in the Schedule of Unit Prices, any dewatering necessary for construction.
4. Foundation materials placed in lieu of performing necessary dewatering.
5. Bulkheading of existing pipes to be abandoned in place.
6. Granular foundation, granular bedding and granular encasement materials.
7. Granular foundation materials used in lieu of bedding materials in the specified bedding zone, where specified.
8. Granular foundation materials used in unstable trench conditions.
9. The removal and disposal of native materials that are unsuitable for bedding and/or backfill.
10. Providing and maintaining utility service.
11. The replacement of all material displaced due to shrinkage or loss during the excavation and backfilling operations.
12. The removal of excess materials above the original topography the resulting from the additional volume created from pipe bedding, utility pipe, and/or underground structures.
13. Delays due to other utility conflicts that result during the course of construction.
14. Protecting existing improvements and previously accepted elements of this construction from damage.
15. Protecting the inverts of other utility pipes from the accumulation of debris and soil, the removal of blockages that threaten to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil that accumulated during the construction.
16. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping / control of storm water flows around the construction zone, include in the price bid for the associated items being installed.
17. The use of special construction techniques such as trench boxes, sheeting, shoring, etc., include in the price bid for the associated items being installed.
18. Compaction testing and compaction, if required, include in the price bid for the associated items being installed.

1.4 SPECIFICATION REFERENCES

- A. Reference CEAM 2600 shall apply to excavating, installing bedding and backfilling all trench excavation construction necessary for the completion of work, except as modified herein.
 1. All references to MnDOT specifications shall mean the specific edition, including Supplemental Specifications and Technical Memoranda as identified in Section 01420 "Specification Reference" of this Project Manual.
 2. CEAM 2600.3.A5 Removal of Surface Improvements - All rubble and debris to be disposed of off-site, shall be disposed of at a location secured by the Contractor and in a manner in compliance with applicable Local, State and Federal regulations.
 3. CEAM 2600.3.B3 Excavation Limits and Requirements - OSHA limitations shall also apply to the top of trench width determination. The 7-day written notice is waived if changing soil conditions and OSHA compliance apply.
 4. CEAM 2600.3.C Trenchless Pipe Installation is hereby deleted. If trenchless pipe installation is included in this project, refer to applicable specification sections in these specifications
 5. CEAM 2600.4 Method of Measurement Paragraphs B and C are hereby deleted. See applicable sections of these Specifications.

- 6. CEAM 2600.5 Basis of Payment – The last three paragraphs of 2600.5 are hereby deleted. See applicable sections of these Specifications.
- B. MnDOT 2451 shall apply to granular materials for foundation, bedding and encasement of utility line construction, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.5 SUBMITTALS

- A. No exception to the referenced specification is made.

PART 2 -- PRODUCTS

2.1 GRANULAR MATERIALS

- A. Granular Bedding and Granular Encasement – No exception to the referenced specification is made.
- B. Granular Backfill - No exception to the referenced specification is made.

PART 3 -- EXECUTION

3.1 EXCAVATION AND PREPARATION OF TRENCH

- A. Interference and Protection of Underground Structures
 - 1. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor shall be required to remove and restore, or protect the utility.
 - 2. The inverts of existing sewers (storm & sanitary), culverts, subdrains, etc. shall be protected during construction. The Contractor is responsible to inspect and clean, if necessary, all lines which have become compromised by the construction operations.
- B. Excavation Limits and Requirements
 - 1. The trench for all flexible pipe shall be undercut 6.0-inches below the pipe barrel to permit the installation of granular bedding or foundation material.
 - 2. The trench for all rigid pipe shall be undercut three-inches below the pipe barrel, or as shown in the bedding detail, to permit the installation of granular bedding or foundation material.
 - 3. The Contractor shall install and operate a dewatering system to maintain all trenches free of water wherever necessary. The Contractor shall make his own subsurface investigations and determine what dewatering methods to utilize to prevent such damage.
 - 4. The Contractor shall be responsible for any damage to adjacent structures or buildings caused by the dewatering operations
 - 5. Use of granular foundation material in lieu of performing dewatering is permitted.
 - 6. All excess excavated material shall become the property of the Contractor and shall be removed from the site and disposed of at a location secured by the Contractor.

3.2 INSTALLATION OF PIPE AND FITTINGS

- A. The Contractor shall keep accurate records as to the location of the service connections, field tile, utility crossings, etc. either constructed or encountered during the construction. Measurements to service lines shall be taken from the two nearest permanent structures (i.e., hydrants, valves, manholes, buildings). Final payment for the project will not be made until the information is in the possession of the Owner.
- B. When connection to an existing conduit is required at an existing or proposed manhole, the Contractor shall expose and verify the elevation of the existing conduit prior to laying any pipe toward, or away from, the

connection point. If the elevation of the existing conduit does not match the elevation shown on the plans, the Contractor shall notify the Engineer, at which time the Engineer may adjust the proposed grades.

C. Sewer Pipe at Structures

1. The pipe end(s) shall be extended inside the structure a maximum of 3.0-inches unless approved otherwise by the Engineer or shown on the plans.

D. Connection and Assembly of Joints

1. For sanitary sewer, watermain, forcemains, and culverts, all joints shall be water tight.
2. For storm sewers and subdrains, all joints shall not permit the intrusion of soil or backfill materials.
 - (a) If reinforced concrete pipe is used, the Contractor may at its own discretion choose to wrap each joint with a geotextile filter fabric, as specified, rather than place mastic in the joint.

E. Bulkheading Open Pipe Ends

1. The Contractor shall furnish, install and maintain a temporary, water-tight plug adequately blocked in place to prevent flooding of the existing downstream sewer system. The plug shall be placed at the beginning of the project or at the end of each working day at the end of the day's operation.
2. When flows are diverted from an existing sewer or tile to be abandoned in place, the Contractor shall construct a water-tight plug on the open end of the abandoned pipe.
3. Permanent watertight plugs shall be constructed with concrete grout with a thickness of not less than 1 pipe diameter.

3.3 BEDDING AND BACKFILLING OPERATIONS

- A. Backfill material around all manholes, catch basins, valve boxes, curb boxes, and hydrants shall be compacted with hand machines. The maximum lift thickness shall be 6-inches.

B. Flexible Pipe Materials

1. Unless otherwise shown on the plans, the pipe shall be bedded and backfilled with granular material compacted to 95 percent Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser, from 6.0-inches below the bottom of the pipe to 12.0-inches above the top of the pipe the full width of the trench. The Contractor shall bed and backfill the pipe as shown on the plan details.
2. Where the trench foundation has been found to be unstable and not suitable for bedding, the trench shall be undercut until acceptable conditions are found. The Contractor shall then install compacted foundation material to meet the line and grade specified on the plan.
3. Unless otherwise shown on the plans, select native material may be used as a trench backfill above the granular bedding up to the bottom of the subgrade except in those conditions where the top of the pipe is less than 12-inches from the bottom of the subgrade in which case granular material compacted to 100 percent Standard Proctor Density shall be used as trench backfill the full width of the trench to the bottom of the subgrade excavation zone.

C. Rigid Pipe Materials

1. Unless otherwise shown on the plans, in ordinary or stable trench conditions, the bottom of the trench shall be first excavated to a depth of approximately 15 percent of the outside pipe diameter below the established grade for the bottom of the pipe. Then the bottom of the trench shall be further excavated to allow for the placement of 6.0-inches of granular bedding for a width of at least 60 percent of the outside diameter of the pipe. Pipe shall be placed on the bottom of the pre-shaped excavated trench. The bottom of the excavated trench shall be shaped to fit the circumference of the pipe up to 0.15 of the outside diameter of the pipe. The Contractor shall encase the pipe from the 0.15 outside diameter

to the 0.60 diameter height of the pipe with granular material compacted to 95 percent Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser.

2. Where the trench foundation has been found to be unstable and not suitable for bedding, the trench shall be undercut until acceptable conditions are found. The Contractor shall then install compacted foundation material to meet the line and grade specified on the plan.
 3. Unless otherwise shown on the plans, select native material may be used as trench backfill above the granular bedding up to the bottom of the subgrade except in those conditions where the top of the pipe is less than 12.0-inches from the bottom of the subgrade in which case granular material compacted to 100 percent Standard proctor Density shall be used as trench backfill the full width of the trench to the bottom of the subgrade excavation zone.
- D. Structures
1. All manholes, catch basins, valve boxes, water vaults, headwalls and miscellaneous structures shall be backfilled with granular backfill material and shall be compacted with a hand operated motorized compactor.
- E. All trench backfill shall be compacted in accordance with the Specified Density Method:
1. Under areas with proposed paved or structural improvements:
 - (a) 100 percent Standard Proctor from the proposed pavement subgrade elevation down 3.0-feet.
 - (b) 95 percent Standard Proctor from the bottom of excavation up to 3.0-feet below the subgrade elevation
 2. Under areas with no proposed paved or structural improvements:
 - (a) 95 percent Standard Proctor

3.4 SOURCE QUALITY CONTROL

- A. The following testing must be performed:
- (a) One gradation test per each 500 tons or 275 cubic yards (CV) of granular material.

3.5 FIELD QUALITY CONTROL

- A. The following testing must be performed:
1. One compaction test (including Standard Proctor) on subgrade per each 300 lineal feet of trench per 3.0-feet of depth
- B. The Contractor shall cooperate fully with the individuals performing the tests.
- C. Samples for testing shall be taken from material in place, in the trench at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.
- D. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

*****END OF SECTION*****

SECTION 02330 - EXCAVATION AND EMBANKMENT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to the excavation and embankment for roadways and pavements and construction of storm water detention facilities as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Common Excavation:
 - (a) Measurement and payment for Common Excavation shall be based upon the CUBIC YARD, PLAN QUANTITY - CY(P).
 - (b) Common excavation is computed to the face of any retaining walls. Excavation required for construction of the wall shall be incidental to the unit price bid for retaining wall.
 - 2. Measurement and payment for Granular Borrow or Select Granular Borrow shall be based upon the TON or the CUBIC YARD – COMPACTED VOLUME INPLACE QUANTITY - CY (CV), as indicated in the Schedule of Unit Prices.
 - 3. Subgrade Excavation:
 - (a) All excavation directed by the Engineer below the common excavation zone or limits indicated in the typical sections or cross sections in the plans shall be considered Subgrade Excavation.
 - (b) Measurement and payment for Subgrade Excavation will be by the CUBIC YARD, EXCAVATED VOLUME - CY (EV) based on the dimensions of the excavated area.
 - (c) The quantities for Subgrade Excavation is strictly an estimate and may be increased or decreased by any amount with no adjustment in unit price according to the conditions revealed.
 - 4. Backfill for Subgrade Excavations:
 - (a) No direct compensation will be made for backfilling subcut areas with suitable material from the excavation.
 - (b) Where suitable on-site material is unavailable, Stabilizing Aggregate shall be used for backfill of Subgrade Excavations.
 - 5. Measurement and payment for Stabilizing Aggregate shall be based upon the TON or the CUBIC YARD – COMPACTED VOLUME INPLACE QUANTITY - CY (CV), as indicated in the Schedule of Unit Prices.
 - 6. The quantities for Subgrade Excavation and Stabilizing Aggregate may be increased or decreased by any amount according to the conditions revealed. No direct compensation will be made for backfilling subcut areas with suitable material from the excavation.
 - 7. Rock Excavation:
 - (a) Measurement and payment for Rock Excavation shall be by the CUBIC YARD.
 - (b) The amount bid shall be compensation in full for all costs of excavating, removing and disposing, if necessary, all continuous bedrock materials encountered in the course of trench excavation.
 - 8. Topsoil Borrow:

- (a) No direct compensation will be made for salvaging, stockpiling and replacing topsoil salvaged from within the construction limits.
 - (b) Measurement and payment for furnishing and installing topsoil borrow shall be based upon the CUBIC YARD, LOOSE VOLUME - CV (LV).
 - (c) The quantities for topsoil borrow are strictly estimates and may be increased or decreased by any amount with no adjustment in unit price according to the extent of existing topsoil salvaged and other conditions revealed.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for work. The costs shall be included in the unit price bid for the associated excavation items. Such items of work include but are not limited to:
 - 1. Reclaiming existing bituminous material, mixing with underlying granular material, loading and temporarily stockpiling the mixture (unless specifically identified as a separate bid item).
 - 2. Disposal of bituminous/aggregate reclamation material that is determined by the Engineer to be unsuitable for re-use.
 - 3. Salvaging, separating, separately stockpiling and re-spreading topsoil material in turf areas to the depths specified or indicated on the plans.
 - 4. Salvaging and separately stockpiling suitable aggregate base material, as determined by the Engineer.
 - 5. Separating, salvaging, stockpiling and replacing clay borrow in roadway, structure, and embankment areas.
 - 6. Earthwork balancing including adjustments for shrinkage loss, and excess materials resulting from the additional volume created from pipe bedding, utility pipe, and/or underground structures shall be included in the unit price bid for common excavation.
 - 7. Protecting existing improvements and previously accepted in-process improvements from damage.
 - 8. Protecting infiltration areas.
 - 9. The avoidance of wetlands.
 - 10. Subcutting the existing topsoil prior to placing embankment in all roadway, patio and trail locations.
 - 11. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading and/or other efforts necessary to repair the subgrade for failing to protect the integrity of the subgrade after it has been accepted (test rolled).
 - 12. Restoring the borrow site by grading the area to drain properly to slopes not-to-exceed 6:1 and by restoring the topsoil to a minimum thickness of 6 inches, include in the contract unit price for common borrow.
 - 13. Shaping, stockpiling, & seeding of all disposal sites shall be included in the price bid for common excavation.
 - 14. Gradation and compaction testing and geotechnical inspection services to meet requirements of source and field quality control, if required

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2105 shall apply to excavation and embankment, except as modified herein.
- B. MnDOT 2574 shall apply to excavation and embankment, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. All excess excavated material shall become the property of the Contractor and shall be removed from the site and disposed of at a site secured by the Contractor.
- B. Frozen material shall be considered unsuitable material unless otherwise authorized in writing by the Engineer.
- C. Excavated material unsuitable for embankment and backfill construction shall become the property of the Contractor and shall be removed from the site and disposed of at a site secured by the Contractor.
- D. Stabilizing aggregates for use in backfilling subgrade excavations shall be one of the following, as approved by the City Engineer:
 - 1. 2-inch dust free aggregate, 100% Crushed
 - 2. Class 5 Aggregate Base, 100% Crushed
 - 3. Coarse Filter Aggregate, 100% Crushed

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers, tractor tires and tracked equipment, and roll the surface with a steel wheel or rubber tired roller except in those areas designated to be protected from compaction.
- B. Subgrade excavation shall be performed, as directed by the Engineer, for the removal of any unstable soils that may be encountered. Such excavation shall be backfilled with suitable excess common excavation material or stabilizing aggregate as directed by the Engineer. If the Contractor proceeds without approval from the Engineer or Owner, all work and material to restore the roadbed to the proper grade shall be at the Contractor's expense.
- C. Once the subgrade has been successfully test rolled, no traffic or construction equipment shall be permitted to operate directly on the subgrade without the prior approval of the Engineer. The subgrade shall be relatively smooth prior to the placement of aggregate base. All equipment shall be restricted to operating only in areas where the aggregate base has been installed to its full design depth.
- D. Material suitable for curb backfill shall be segregated and stockpiled at a site selected by the Contractor. Following curb construction, the material shall be placed behind the curb to the subgrade level of the topsoil.
- E. The Contractor shall salvage and stockpile all topsoil removed during the course of the construction. This topsoil shall be used where required for turf establishment as directed by the Engineer.
- F. Sufficient excavated material shall be utilized by the Contractor to replace loss volume due to soil shrinkage from trench excavation that may occur through the course of construction. The Contractor shall make his own determination of the amount of shrinkage that will occur.
- G. All embankment shall be compacted using the Specified Density Method:
 - 1. Under areas with proposed paved or structural improvements:
 - (a) 100 percent Standard Proctor from the proposed pavement subgrade elevation down 3.0-feet.
 - (b) 95 percent Proctor from the bottom of excavation up to 3.0-feet below the subgrade elevation.
 - 2. Under areas with no proposed paved or structural improvements:
 - (a) 95 percent Standard Proctor.

- H. Topsoil unsuitable for pond or channel bottom construction may be used as embankment material above the designated high water level in the plans.
- I. If the subgrade is unstable and the instability is due to excessive moisture, the subgrade shall be scarified and dried over a reasonable time period. When the material has reached acceptable moisture limits, the material shall be returned and compacted into place to the proper elevation. If the material continues to be unstable, the Engineer may authorize the removal of the undesirable material as subgrade excavation.

3.2 SOURCE QUALITY CONTROL

- A. The following testing must be performed:
 - 1. One gradation test per each 500 tons or 275 cubic yards (CV) of select granular borrow.
 - 2. One gradation test for stabilizing aggregate.
- B. Samples for testing shall be taken from material in stock at locations approved by the Engineer. All sampling methods shall conform to MnDOT standards.

3.3 FIELD QUALITY CONTROL

- A. "Blue top" stakes shall be provided by the Contractor at 100.0-foot intervals to confirm that the subgrade is constructed to the required grades and elevations. Methods other than "blue top" staking may be allowed, if approved by the Engineer.
- B. The following testing must be performed:
 - 1. One compaction test (including Standard Proctor) on subgrade per each 500 SY of roadway per each 3.0-feet of subgrade excavation depth.
- C. All testing shall be performed by an independent testing laboratory approved by the Engineer.
- D. The Contractor shall cooperate fully with the individuals performing the tests.
- E. Samples for testing shall be taken from material in place, in the roadway at locations approved by the Engineer. All sampling methods shall conform to MnDOT Standards.
- F. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the specified requirements.

******END OF SECTION******

SECTION 02335 - SUBGRADE PREPARATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to the subgrade preparation as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Unless a bid item is provided in the Schedule of Unit Prices for Subgrade Excavation, no direct payment shall be made for subgrade preparation. Costs shall be included in the unit prices bid for the various excavation and embankment items.
 - 2. When a bid item is provided in the Schedule of Unit Prices, no exception to the referenced specification is made.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the various excavation items. Such items of work include but are not limited to:
 - 1. Drying and adding water to the subgrade.
 - 2. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading and/or other efforts necessary to repair the subgrade after satisfying the rolling test and failing to protect the integrity of the subgrade.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2112 shall apply to the subgrade preparation, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the end of each day, and prior to the placement of aggregate base, the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.
- B. The Contractor shall disc, scarify, shape and compact the street subgrade or existing base, adding water or drying as may be necessary to give uniform and desired density.
- C. If the subgrade is unstable and the instability is due to excessive moisture, the subgrade shall be scarified and dried over a reasonable time period. When the material has reached acceptable moisture limits, the material shall be returned to the roadbed and compacted into place to the proper elevation. The roadbed will once again be test rolled. If the material continues to be unstable, the Engineer may authorize the removal of the undesirable material as subgrade excavation.
- D. Once the subgrade has been test rolled and accepted by the Engineer, no traffic or construction equipment shall be permitted to operate directly on the subgrade without the prior approval of the Engineer. All

equipment shall be restricted to operating only in areas where the aggregate base has been installed to its full design depth. In the event that inclement weather occurs after a test roll, and prior to placement of the aggregate base or first course of bituminous, the test roll shall be voided and a new test roll shall be performed.

- E. The subgrade shall be compacted in accordance with the Specified Density Method:
 - 1. Under areas with proposed paved or structural improvements:
 - (a) 100 percent Standard Proctor from the proposed pavement subgrade elevation down 3.0-feet.
 - (b) 95 percent Standard Proctor from the bottom of excavation up to 3.0-feet below the subgrade elevation.
 - 2. Under areas with no proposed paved or structural improvements:
 - (a) 95 percent Standard Proctor.

3.2 FIELD QUALITY CONTROL

- A. "Blue Top" stakes shall be provided by the Contractor at 50.0-foot intervals to confirm that the subgrade is constructed to the required grades and elevations. Methods other than "Blue Top" staking may be allowed, if approved by the Engineer.
- B. The compacted subgrade shall be test rolled using a fully loaded aggregate truck (tandem) in a pattern approved by the Engineer. The subgrade stability shall be considered adequate when the surface shows less than 1.0-inch of yielding or rutting after one pass, or as otherwise approved by the Engineer.
- C. The following testing must be performed:
 - 1. One compaction test (including Standard Proctor) on subgrade per 500 SY of roadway.
- D. All testing shall be performed by an independent testing laboratory approved by the Engineer.
- E. The Contractor shall cooperate fully with the individuals performing the tests.
- F. Samples for testing shall be taken from material in place, in the roadway at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.
- G. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

SECTION 02340 - GEOTEXTILE FABRIC - ROAD CONSTRUCTION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to geotextile fabric - road construction as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Geotextile Fabric – Road Construction shall be measured by the SQUARE YARD in place and shall be paid at the unit price bid.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated geotextile fabric - road construction items. Such items of work include but are not limited to:
 - 1. No exception to the referenced specification is made.

1.3 SPECIFICATION REFERENCES

- A. Reference MnDOT 3733 shall apply to the geotextile fabric - road construction, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. The fabric to meet the requirements of MnDOT 3733, Type 5 (Type V), unless otherwise shown on the plans.

2.2 SOURCE QUALITY CONTROL

- A. The Contractor shall furnish certified copies of manufacturer's test results on geotextile samples indicating conformance to the required specifications. The test results shall be furnished to the Engineer at least 10-days prior to the intended installation date.
- B. Non-conforming products will be subject to rejection.
- C. Approved materials will be accepted on the basis of brand name labeled on the geotextile itself or its container.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Prior to installing geotextile fabric, the prepared subgrade surface shall be relatively smooth and free of stones, sticks or other debris or irregularities that could puncture the geotextile.
- B. If multiple pieces of geotextile are required, adjacent strips shall be field or factory sewn per the manufactures recommendation.
- C. Wrinkles and folds in the geotextile shall be removed by stretching and staking, as required.
- D. The geotextile shall be secured to prevent displacement during subsequent operations.

- E. No traffic or construction equipment will be permitted to operate directly on the geotextile.
- F. Once the geotextile is placed and prior to the placing of aggregate cover, the Contractor shall allow the Engineer sufficient time to conduct a personal observation of the geotextile to determine that no holes, rips, tears or similar defects have occurred and that sewing/overlap have been properly installed. All defects determined during the observation shall be patched or replaced prior to placing aggregate cover.
- G. The aggregate cover shall be end dumped onto the geotextile. The initial deposit of material may be graded to the design thickness but at no time shall equipment be allowed on the geotextile with less than 8.0-inches of aggregate cover. Following compaction of the initial layer, all remaining material shall be placed as specified.
- H. Construction shall be conducted parallel to road alignment. Vehicular turning shall not be allowed on the first lift of cover material, unless approved by the Engineer. All ruts that form during the construction shall be immediately filled to maintain the minimum aggregate cover.
- I. Unless otherwise shown on the plans, the geotextile fabric shall be placed to the back of the curb or to the inside edge of the edge drain filter trench, whichever is closest to the centerline of the roadway.

******END OF SECTION******

SECTION 02370 - EROSION & SEDIMENT CONTROL

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to storm water management as indicated on the plans, as specified herein or as directed by the Engineer.
- B. The Contractor and Owner shall identify a person(s) knowledgeable and experienced in the application of erosion and sediment control Best Management Practices (BMPs) who will oversee the implementation of the SWPPP.
- C. Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001)
 1. The **Owner** has developed a **Storm Water Pollution Prevention Plan (SWPPP)** in accordance with Part III (Storm Water Discharge Design Requirements) of the National Pollutant Discharge Elimination System (NPDES)/State Disposal System Permit. The SWPPP is included in the project plans.
 2. As a condition of the Award, the Contractor shall be a co-permittee and assume the role of "**Operator**" under the NPDES Permit.
 3. The Contractor will initiate the permit and pay the required fee and submit the NPDES Permit.

Owner/Permittee Information:

Owner Name	City of Jordan
Business Type	Local Government
Contact Name	Scott Haas, Public Works Director
E-Mail Address	HaasS@jordanmn.gov
Business Phone	952-492-2535
Complete Mailing Address	210 First Street E, Jordan MN 55352

Routine Contact for Owner/Permittee Information:

Full Name	(Request from City Engineer)
E-Mail Address	(Request from City Engineer)
Business Phone	(Request from City Engineer)

4. **Permittee(s)** shall ensure that their **SWPPP** meets all terms and conditions of this permit and that their activities do not render ineffective another party's **erosion prevention and sediment control BMPs**.
5. The Contractor shall maintain copies of the SWPPP on the project site at all times and comply with all provisions contained therein, including performing the required inspections of the erosion control devices and maintaining an Inspector's Log for the MPCA Storm Water Permit. An Inspector's Log form is attached at the end of this Section.
6. The Contractor shall be responsible for keeping the on-site SWPPP documents current and updated to reflect changing conditions as construction progresses.
7. Process Summary:
 - (a) Owner issues *Notice of Award* to Contractor.

- (b) The Contractor shall review the SWPPP and may propose changes or a new SWPPP to the Engineer and Owner for review, comment, and Authorization. Changes may be recommended by the Contractor, Engineer, and/or Owner at any time during the construction period to address changing conditions.
 - (1) The responsibility for SWPPP amendments proposed by the Contractor lies with the Contractor. If the Engineer and/or Owner authorize the revisions with no exception taken, such action shall not absolve the responsibilities of the Contractor in any way.
 - (2) During the review and modification period, on-site Erosion Control shall comply with or exceed the current SWPPP. Pending review by the Engineer and/or Owner shall not alleviate the Contractor's responsibility to install necessary BMPs to address site issues.
 - (3) Once a SWPPP is modified and/or amended, the Contractor shall distribute new copies to the Owner, the Engineer, the on-site project supervisor and the resident project representative.
- (c) Contractor acknowledges the Notice of Award and provides the Owner with the contact information for the Contractor's designated SWPPP contact to be used by the Owner for the on-line Stormwater Permit Application. Required information includes; Name, Title, Business Mailing Address, Phone Number and Email for the designated individual.
- (d) Within 7 days of acknowledgement of the Notice of Award by the Contractor, the Contractor shall submit the On-line Stormwater Permit Application to the MPCA.
- (e) No earth disturbing work shall begin until the permit coverage date shown on the Coverage Card issued by the MPCA.
- (f) Work shall follow the sequence of major activities outlined in the SWPPP.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for erosion and sediment control shall be paid according to the referenced specification or as modified below:
 - 1. Payment for all work associated with Erosion and Sediment Control shall be at the contract unit price bid for that item and shall be considered full compensation for furnishing, installing, maintaining and utilizing storm water best management practices and any work specified in conjunction therewith as well as removing temporary sediment control devices when no longer necessary.
 - 2. For temporary erosion control best management practices, (80%) of payment shall be made upon installation. The remaining 20% shall be made upon complete removal of the control measure, removal of any accumulated sediment and surface restoration.
- B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated erosion control and excavation items. Such items of work include but are not limited to:
 - 1. Complying with the Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001) – Reference Storm Water Pollution Prevention Plan (SWPPP) included in the Appendix or in the drawings.
 - 2. Providing trained Construction SWPPP Manager and BMP Installer.
 - 3. Inspect, maintain, repair, and remove (if necessary) temporary surface stabilization practices throughout the duration of the project.
 - 4. Maintaining clean exit areas or roads from the site.
 - 5. Sweeping adjacent streets clean of excess soil.

6. Cleaning storm sewers, drain tiles and culverts that have been partially or completely obstructed by sediment that originated from the site.
 7. Geotextile fabric for rock installation.
 8. Geotextile fabric to wrap prefabricated inlet protection devices.
 9. Aggregate to anchor and act as a filter for prefabricated inlet protection devices.
 10. Aggregate associated with the construction of temporary sediment traps.
 11. Emergency erosion control mobilization.
 12. Construction, maintenance and removal of rock construction entrance.
 13. Changing the type of inlet protection for different phases of construction.
- C. No additional payment shall be made for Erosion Control BMPs necessary to accommodate Contractor phasing of the project.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 1717 – Air, Land and Water Pollution
- B. MnDOT 2573 – Stormwater Management.
- C. MnDOT 2574 – Soil Preparation
- D. MnDOT 2575 – Establishing Turf and Controlling Erosion
- E. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

- A. SWPPP Plan Amendments
- B. Contact information and training documentation for Construction SWPPP Manager and BMP Installer,
- C. Weekly Erosion and Sediment Control Schedule meeting the requirements of MnDOT 1717.
- D. Site Management Plans meeting the minimum requirements of MnDOT 1717. An updated Site Management Plan shall be submitted as needed to reflect changes to:
 1. Types and/or Locations of BMPs
 2. Material Storage and Spill Response
 3. Fueling Plans
 4. Locations for Stockpiles, Concrete Washout, and Sanitation Facilities and
 5. Project Phasing
- E. PDF copies of all SWPPP Documentation including but not limited to:
 1. Field Copy of the SWPPP. If the Field Copy has been replaced during Construction with an updated SWPPP, a copy of both the final Field Copy and all intermediate copies shall be provided.
 2. Inspection Logs including all supporting documents.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. For all materials not specifically discussed below no exceptions to the referenced specification are made.
- B. Bale checks shall not be used.

PART 3 -- EXECUTION

3.1 GENERAL

- A. Construction and/or installation of all appropriate erosion & sediment control devices shall be completed prior to any soil disturbing activities.
- B. Prior to construction, the Contractor shall observe and document the existing storm water outfall system and discharge area. Sediment deposits not documented prior to the construction may be assumed to have originated from the project site and be required to be removed and disposed of by the Contractor.
- C. Prior to construction, the Owner, Engineer and Contractor shall review the project to identify critical areas that could require rapid stabilization during the construction process, and develop mitigation and rapid stabilization plans to be incorporated into the SWPPP.

3.2 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall provide one or more trained Construction SWPPP Manager(s). The Construction SWPPP Manager shall be a knowledgeable and experienced in the application of erosion prevention and sediment control BMPs and will oversee the implementation of the SWPPP, and the installation, inspection and maintenance of the erosion prevention and sediment control BMPs. A Construction SWPPP Manager must be available for an on-site inspection within 72 hours upon request by the Owner and/or MPCA. Failure to provide a trained Construction SWPPP Manager or failure of the Contractor to rectify the situation within 24 hours of written notice if the provided Construction SWPPP Manager fails to adequately perform the duties of Construction SWPPP Manager may result in the Owner or Engineer arranging for performance of these duties by others.
- B. If Contractor fails to install and/or perform the appropriate erosion and sediment control practices, as determined by the Engineer, the Engineer may issue a written order to the Contractor. Failure to perform this work within 24 hours of written notification may result in the Owner or Engineer arranging for completion of the work by others.
- C. When the Engineer determines that the erosion and/or sediment control practices installed by the Contractor have failed, the Contractor shall correct the cause and alleviate all sediment deposition, to the fullest extent possible. If the corrective action is not taken in a timely manner, the Engineer may issue a written order to the Contractor. Failure to perform this work within 24 hours of notification of non-compliance may result in the Owner or Engineer arranging for completion of the work by others.
- D. A contract deduction shall be made equal to the total of all costs incurred by the Owner due to failure of the Contractor to take corrective action within the timeframe of any written notice of non-compliance. Such costs include but are not limited to: labor, materials, equipment and administrative costs.

3.3 TRAINING

- A. Contractor shall ensure the individual(s) designated by the Contractor for this project to perform the Construction SWPPP Manager and Installation Supervision duties have been trained in accordance with Minnesota Pollution Control Agency (MPCA) General Storm Water Permit for Construction Activity (MN R100001) training requirements.
- B. Documentation incorporated by the Contractor into the SWPPP must include either:
 - 1. Proof of a current certification through the University of Minnesota Erosion and Stormwater Management Certification Program, or
 - 2. Documentation of training satisfactory to the MN Pollution Control Agency showing training is commensurate with the individual's job duties.

3.4 TERMINATION OF COVERAGE

- A. Upon completion of all final stabilization, the Contractor shall provide the Engineer a signed MN MPCA Notice of Termination (NOT) form and a PDF copy of the SWPPP Documentation. Final payment shall not be made for the project until the NOT is submitted and the SWPPP Documentation is received.
- B. The NOT form is available on the MPCA website at: <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html>

******END OF SECTION******

STORM WATER POLLUTION PREVENTION PLAN - INSPECTION LOGProject Title: Project Title, Owner: City of Jordan, Permit ID: C000_____

General Contractor : _____

The Contractor is REQUIRED to maintain this record throughout the project.

Inspectors should enter their initials, type, date, and time of the inspection in the blanks provided. After inspecting each shaded area, inspectors should check each box, and make any necessary comments regarding their findings in the blanks provided below and on the back of this sheet.

Refer to the MPCA's Compliance Guide for Erosion and Sediment Control during inspection.

Name of Inspector	Type of Inspection		Date and Time of Inspection				Weather		Areas to be Inspected			
	Routine Weekly	24 Hr after rain event	Month	Day	Year	Time (AM/PM)	Temperature (degrees Fahrenheit)	Rainfall Amount (inches)	All erosion and sediment control BMPs	Temporary Sedimentation Basins	Drainage ditches and other waters of the State	Construction Site Exits
Comments:												
Comments:												
Comments:												
Comments:												

(A digital version of this form is available by request to the Engineer)

SECTION 02377 - RIPRAP

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to construct the rip-rap and geotextile fabric as indicated on the drawings or as specified herein.

1.2 METHODS OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Payment for riprap shall be by TON based on actual weigh tickets. The amount bid shall be compensation in full for all costs of excavating, removing and disposing, if necessary, all materials encountered in the course of riprap placement.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated rip-rap items. Such items of work include but are not limited to:
 - 1. Granular filter material and/or geotextile fabric.
 - 2. Excavation required to place rip-rap.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2511 and all MnDOT Sections referenced therein shall apply to the construction of rock rip-rap, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. The material to be used shall be the class rip-rap and fine filter aggregate shown on the plans as specified in MnDOT 3601.
- B. The geotextile fabric shall meet the requirements of MnDOT 3733, Type 4, unless otherwise shown on the plans.
- C. The Contractor may choose the type of filter material, except as restricted for geotextile filters, unless the type is specified on the plans.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. No exception to the referenced specification is made.

*******END OF SECTION*******

SECTION 02445 - JACK & AUGER STEEL CASING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of a steel casing as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
1. Boring: The contract unit price bid per LINEAL FOOT (LF) for the appropriate carrier pipe size and type shall be compensation in full for all equipment, materials and labor required to install steel cased borings as shown on the plan and as specified including but not limited to boring method used for horizontal and vertical alignment control, casing pipe, carrier pipe, rails and/or other pipe supports and grade establishment devices, bulkheading casing pipe, installation and removal of annular space fill and vent tubes, filling the annular space as specified, etc.
 2. Set Up Boring Pit: The contract unit price bid per EACH for the appropriate size of carrier pipe shall be compensation in full for all equipment materials and labor required to set up boring pits as specified including but not limited to sheeting, shoring, trench boxes, slide rail systems, excavation, additional dewatering, boring pit base material, protection and support of existing utilities, installation and removal of boring equipment, safety fencing, excavation, backfill, compaction, and all appurtenances required to set up boring pits, as specified. Receiving pits shall be considered incidental to the Contract.
 3. Boulder Removal: Payment for Boulder Removal shall be at the contract unit price bid per EACH (EA) for the removal of boulders from the boring, and shall be compensation in full for all equipment, materials, and labor required to remove, dispose, adjust boring methods, etc to account for boulders encountered in cased borings, in excess of the number per boring to be anticipated, as specified.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated jacking and augering items. Such items of work include but are not limited to:
1. Excavation, dewatering and preparation of the jacking pit.
 2. Furnishing and placing all equipment necessary to jack and auger the casing pipe at the elevation and grade designated.
 3. Furnishing and placing the casing pipe, sand fill, carrier pipe support material, grout seals, and PVC riser pipe and associated PVC adaptors.
 4. Backfilling and compacting the jacking pit.
 5. Disposal of surplus and waste materials.
 6. Protecting existing improvements from damage.
 7. Performing a second attempt if the first attempt is unable to be completed because of equipment problems, soil conditions or rocks.
 8. Blowing the abandoned pipe and/or hole full of sand, if the first attempt is unsuccessful.
- C. The casing diameter used shall be the Contractor's option.

- D. The boring method used shall be the Contractor's option. The boring method used shall provide a completed carrier pipe at the horizontal line and grade shown on the plans and within the tolerances specified. Acceptable boring methods include water guided, laser guided boring, pilot boring, pipe pounding, and micro tunneling techniques. Other proposed methods require approval of the Engineer.
- E. Boring pits and receiving pits shall be designed by a licensed professional engineer in the State of Minnesota. Pit designs shall include consideration of all information provided in the plans and specifications, removal limits, sheeting, shoring, trench boxes, necessary to confine excavation limits, etc. The Contractor shall acquire any and all additional information necessary to properly design pits and borings at his sole expense. All costs associated with boring and pit design shall be considered incidental to the contract.

1.3 SPECIFICATION REFERENCES

- A. See MnDOT 2105 for Quality Compaction Methods.
- B. See Section 02520 "Underground Utility Location System" of this Project Manual.
- C. MnDOT Utility Accommodation Policy and Procedures. A copy of the document is available at:
<http://www.dot.state.mn.us/policy/operations/op002.html>
- D. CEAM 2600.3.C - Trenchless Pipe Installation shall apply, except as modified herein or as shown on the plans.
- E. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. RAILROAD CROSSINGS

- 1. The casing shall be new welded or seamless steel pipe conforming to the Standards of ASTM A53, Grade B with a yield strength of 36,000 psi. The wall thickness for the pipe to be bid shall be in accordance with the permit granted by the railroad or the following table, whichever is greater:

Nominal Pipe Diameter	Minimum Wall Thickness	Nominal Pipe Diameter	Minimum Wall Thickness
Inches	Inches	mm	mm
Under 14	0.250	Under 355	6.3
14 and 16	0.282	355 and 406	7
18	0.312	457	8
20	0.344	508	8.8
22	0.375	558	10
24	0.406	609	10
26	0.438	660	11
28 and 30	0.469	711 and 762	12
32	0.500	813	13
34 and 36	0.531	863 and 914	13.5

B. STREET AND HIGHWAY CROSSINGS

- 1. Casing pipe shall be welded steel pipe, new material with minimum yield strength of 35,000 PSIG (pounds per square inch gauge). The following minimum wall thickness shall be used:

Outside Casing Diameter (inches)	Minimum Wall Thickness (inches)
12 to 24	0.250
30	0.375
36 to 42	0.500

C. RESTRAINED JOINT CARRIER PIPE

1. The following restrained joints for the appropriate carrier pipe material shall be approved for use on this project:
 - (a) PVC Gravity Sewer
 - (1) Bell clamps with tie rods
 - (2) "Certa-Lok" as manufactured by CertainTeed or equal
 - (3) "Eagle Loc" as manufactured by JM Eagle or equal
 - (4) "Diamond Lok" as manufacture by Diamond Plastics, or equal.
2. All carrier pipes shall have restrained joints unless otherwise approved by the Engineer. The costs associated with providing restrained joints shall be considered incidental to the contract.
3. All carrier pipes shall have the same strength classification as the adjoining open cut pipe or stronger.
4. Unless otherwise approved by the City Engineer, carrier pipe spacers on gravity pipes shall be stainless steel casing insulator skids as manufactured by Pipeline Seal and Insulator, Inc. - Model S 8, stainless steel casing spacers by Cascade Waterworks Manufacturing Company - Model CSS, or equal, unless otherwise shown on the plans.

- D. Cellular grout shall be used to fill annular space on all gravity sanitary sewer pipe lines. Flowable silica sand shall be used for annular space surrounding all other public pipelines, unless otherwise approved by th Engineer.

E. Cellular Grout:

1. Low density cellular grout (foam grout) for the annular space between the carrier pipe and steel casing shall be a lightweight cementitious material that contains stable air or gas cells uniformly distributed throughout the mixture and with a minimum air percentage of 20 percent. Foam backfill grout mix shall be designed in accordance with the requirements of ACI 523.1R, ACI 523.3R, and the additional requirements herein. A tentative mix shall be designed and tested in accordance with ASTM C796 for each consistency intended for use.
2. Portland cement and water slurry blended with a high stability pre-generated foaming agent. Adjust proportions as necessary to meet compressive strength requirements.
3. Fluid (10-inch slump), pumpable.
4. Wet Density: 45 to 60 pounds per cubic foot. Adjust proportions as necessary to meet compressive strength requirements.
5. 28-day Compressive Strength: 20 to 50 pounds per square inch.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall jack and auger a steel casing using equipment that encases the hole as the earth is removed. Boring without the concurrent installation of the casing pipe will not be permitted. All joints in the casing pipe shall be welded throughout the full circumference of the casing.
- B. Casing pipe shall be installed in such a manner that will not disrupt traffic.

- C. The introduction of water into the excavation is prohibited.
- D. Casings shall be installed such that the line and grade at any point within the carrier pipe shall not vary by more than the following from the line and grade shown on the plans.
 - 1. Elevation: A maximum of inch above grade and a maximum of 1 inches below grade, provided the conditions of 3 below are maintained.
 - 2. Alignment: A maximum of 1 foot from plan location.
 - 3. The maximum permitted deviations shall be such as to permit installation of carrier pipe to the line and grade specified or without intermediate high or low points that may inhibit gravity flow in the pipe after installation, both in the casing and upstream or downstream of the casing.
- E. Following the installation of the carrier pipe in the casing, place 4" minimum PVC riser pipes at both ends of the casing pipe and extend the PVC risers to the surface. Fill annular space at both ends with an appropriate bulkhead and concrete grout to form a watertight seal. The casing pipe and riser pipes shall be completely filled with silica sand or cellular grout. Riser pipes shall then be cut off a minimum of 1' below finished grade. Fill remaining riser pipe with silica sand or cellular grout, and glue PVC caps to the top of each riser pipe.
- F. Grout all voids developed outside the casing during boring operations immediately and simultaneously with boring operations.
- G. The total volume of annular space fill installed shall be measured and compared to the anticipated volume required to completely fill the annulus. In the event of a discrepancy in fill volumes, as determined by the Engineer, additional annulus fill shall be required as directed by the Engineer at the sole expense of the Contractor.
- H. The Contractor shall provide key personnel with experience in the proposed method(s) of boring and associated pipe installation, including pipe at least as large as the largest casing diameter and length as those proposed for use on this project. Key personnel include field supervisor and operators of proposed boring equipment, including position monitoring and steering equipment.
- I. The pipe borings should anticipate that the face of the boring will encounter various soil types, cobbles and boulders. The loose sands and various soil interfaces may cause a tendency to lose ground at the face if the face is left unsupported for any given time. Settlement at the surface may occur if ground loss occurs in the pipe boring excavations.
- J. The pipe boring methods and equipment used shall be designed to accommodate transitions between soil types and densities, occasional boulders and nests of cobbles in the boring alignment, and prevent surface settlements.
- K. Boulders are defined as particles of rock that cannot be made to pass a 12-inch square opening when rotated in any orientation (Modified from ASTM D 2487). When a boulder diameter is listed in these Specifications, the diameter shall be defined as a boulder that can be made to pass the listed size square opening, even if the boulder is larger in some dimension.
- L. Cobbles are defined by ASTM D 2487 as particles of rock that will pass a 12-inch square opening and be retained on a 3-inch U.S. standard sieve.
- M. Nested cobbles are defined as cobbles and boulders in contact or close proximity to each other.
- N. The Contract unit price bid for the appropriate boring item shall include costs associated with the removal of cobbles and nested cobbles encountered as defined herein.

3.2 TRACER WIRE INSTALLATION

- A. The installation of any non-conductive mains and/or services that will not extend in a straight line between manholes, catch basin or other surface structures shall include the installation of tracer wire in accordance with the details shown on the plans.
- B. At junctions of non-conductive pipe materials with conductive pipe materials, the Contractor shall electrically connect the conductive material with the tracer wire adjacent to the non-conductive material.
- C. Unless otherwise shown on the plan, the tracer wire riser shall be a cast iron valve box and have a maximum spacing of 500 feet.
- D. Approximately 1% slack shall be maintained in the wire by installing 101 feet of wire for each 100 feet of pipe length.
- E. The wire shall be electrically tied to each valve by extending the wire to ground surface inside the valve box and attaching it to the valve box with stainless steel screws. The wire shall be electrically tied to each hydrant assembly by extending the wire up the hydrant and securely attaching it to one of the break-off flange bolts. All connections shall receive a coat of an approved bituminous rust preventative material such as Koppers 505, or equal.
- F. The Contractor shall successfully locate the installed tracer wire system prior to final acceptance.
- G. Carrier pipe shall have two (2) tracer wires installed on opposite sides of the carrier pipe. Wires shall be securely taped to the carrier pipe every twenty (20) feet.

3.3 SETTLEMENT MONITORING

- A. Settlement monitoring is required for all crossings of:
 - 1. City of Jordan major collector roadways
 - 2. County and State highways
 - 3. Railroads
 - 4. Structures
- B. The Owner or permitting agencies may direct the Engineer to perform an elevation survey of the surface of the ground above each pipe centerline before, before and after the jacking or drilling operations.
- C. Cross section surveys will be completed perpendicular to the pipe centerline with cross sections being located 50 feet each side of the pipe centerline at all edges of pavement, centerline of the road or pair of lanes, center of medians, curb lines, etc. or as directed.
- D. Survey data shall be recorded in such fashion to provide both horizontal coordinates and elevation for each point surveyed such that subsequent monitoring survey points can duplicate the location of the original survey points.
- E. If settlement reaches or exceeds 75 percent of the specified limits allowed by permitting agencies, the contractor shall immediately develop plans for mitigating settlements. The Contractor shall stop jacking or auger boring work or other excavation work if settlements exceed specified limits and not resume until authorized by the Engineer and permitting agencies. The settlement limit shall be as defined by the right of way authority.
- F. Settlement Repair:

1. All settlements shall be repaired to a condition equal to or better than that which existed prior to construction. Repair methods used shall be as directed by the appropriate permitting agency and/or Owner. Potential repair methods that may be required include but are not limited to: mud jacking, mill and overlay, reconstruction of a roadway section, skin patch, etc. All work associated with repairing settlements shall be considered incidental to the contract.
2. Use materials, methods, equipment that conform to permitting agency standards for such work.
3. Traffic control is the responsibility of the contractor and must meet the requirements of the Minnesota Department of Transportation or other roadway OWNER.
4. Furnish submittals of all materials, methods, equipment and schedule for review by UPRR, Scott County, and Engineer.
5. If required by the right of way authority, coordinate and schedule a final inspection of the work by the right-of-way authority.
6. Promptly replace damaged pavement and structures at the ground surface above the jacked or drilled pipe. Restore pavement around entry and exit pits as soon as work specified in this section is completed, even if this pavement will later be removed by other Work, unless otherwise approved by permitting agency or Engineer.

*******END OF SECTION*******

SECTION 02446 - TRENCHLESS PIPELINE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to trenchless pipeline construction. Various methods will be considered, providing they can generally follow the design profile in constructing the pipeline from the starting access point to the ending access point without the need to excavate an intermediate access.
- B. The INSTALLER for all forms of trenchless pipeline installation shall meet or exceed the experience requirements as stated in CEAM 2600.3.C2.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
- B. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Trenchless construction of casing pipe shall be paid by the LINEAR FOOT (LF) furnished and installed. The amount bid shall be full compensation for all costs associated with completely installing the required pipe diameter at the line and grade shown on the plan.
 - 2. The carrier pipe inside the casing will be paid by the LINEAR FOOT (LF) furnished and installed.
- C. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. These costs shall be included in the unit price bid for various pipeline items within the Schedule of Prices. Such items of work include but are not limited to:
 - 1. Any costs associated with drilling or re-drilling to correct for poor alignment or encountering obstructions (including rock), back reaming, or other required methods, as well as the cost of furnishing and installing a replacement pipe, if necessary
 - 2. Interference of other underground structures and utilities.
 - 3. The removal and restoration, or protection of existing utilities which are shown on the plans and for which there is no bid item for removing and restoring, or working around the utility.
 - 4. Maintaining, tracking, reporting and documenting the actual alignment of the conduit achieved during the construction process include in the price bid for the appropriate pipeline construction and installation and documenting all post installation field quality control procedures specified, including but not limited to televising the interior of the conduit.
 - 5. Excavating, backfilling, compacting and restoring the surface improvements, unless itemized in the Schedule of Prices, of jacking pits, boring pits, launching pits, etc., as needed.
 - 6. Any dewatering necessary for the appropriate pipeline construction
 - 7. Foundation materials placed in lieu of performing necessary dewatering.
 - 8. Locating and connecting to an existing manhole or pipeline
 - 9. Removing the existing pipe.
 - 10. Foundation, bedding and encasement materials.
 - 11. Maintenance of utility service during construction.

12. The replacement of all material displaced due to shrinkage or loss during the excavation and backfilling operations.
13. Compaction, deflection and hydrostatic testing.
14. Delays due to other utility conflicts which result during the course of construction, include in the price bid for the appropriate pipeline construction and installation.
15. Protecting existing improvements from damage.
16. Repairs to any existing improvements damaged.
17. Protecting the inverts of other utility pipes from the accumulation of debris and soil, the removal of blockages which threaten to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil which accumulated during the construction.
18. The removal and disposal of defective materials and joints from the job site, include in the unit price bid for the appropriate pipeline construction and installation.
19. Any increased depth required for structures, risers or services required for failure to meet specified alignment and grade.
20. Any additional structures required for failure to meet tolerances.
21. Excavating, backfilling, compacting and restoring the surface improvements, of any spot verification pits required by the Engineer, as specified.
22. Removal and disposal of excess drilling fluid at the drilling surface, or in the drilling pit, prior to backfilling the pit.
23. Furnishing and placing the casing pipe, sand fill, carrier pipe support material, grout seals, riser pipe and associated PVC adaptors.
24. Avoiding interference with the proposed bridge improvements, including bridge piling.
25. Post construction televising, include in the price bid for the carrier pipe.
26. Furnishing and installing underground utility location system.

1.3 SPECIFICATION REFERENCES

- A. Except as modified herein or as shown on the plans, Reference CEAM Specifications shall apply:
 1. See Section 02520 "Underground Utility Location System" of this Project Manual.
 2. CEAM 2600 Trench Excavation and Backfill/Surface Restoration
 3. CEAM 2611 Watermain and Service Line Installation
 4. CEAM 2621 Sanitary Sewer and Storm Sewer Installation
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

- A. The diameter, wall thickness and type of material to be used for each trenchless installation. Pipe strength determination shall include calculations based on new material properties and long term properties.
- B. The manufacturer's certificates of compliance with provisions of the referenced standards and these specifications.
- C. Construction Profile
 1. The Contractor shall monitor and plot the constructed pipeline profile to scale throughout the length of the trenchless construction.

- (a) The horizontal profile shall be on a consistent scale where 1.0-inch measures no more than 100.0-feet.
 - (b) The Contractor shall note on the profile any deviations (horizontal or vertical) from the planned alignment which encroach on the separation space as required by CEAM 2600.3.A2.
 - (c) The Contractor shall note on the profile any horizontal deviations in excess of 4.0-feet from the planned alignment.
 - (d) The vertical profile shall be on a consistent scale where 1.0-inch measures no more than 10.0-feet.
2. Two copies of the profile shall be submitted.
- D. Final DVD and log of post construction televised inspection.

PART 2 -- PRODUCTS

2.1 CASING PIPE

A. STEEL CASING PIPE

1. Casing pipe shall be welded steel pipe, new material, with a minimum yield strength of 35,000 PSIG (pounds per square inch gauge). The following minimum wall thickness shall be used:

Outside Casing Diameter (Inches)	Minimum Wall Thickness (Inches)
12 to 24	0.250
30	0.375
36 to 42	0.500

- B. Gasketed reinforced concrete pipe meeting MnDOT specifications and of class appropriate for the specified bury depth shall be acceptable upon approval of the City Engineer.

2.2 CARRIER PIPE

- A. Pipe materials shall comply with one of those allowed in section 2510 of these specifications trenchless installation.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS:

A. FUSING/FABRICATION

1. The pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint prior to insertion. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations and specifications.
2. Threaded or solvent welded joints or connections are not permitted.
3. Fusing shall be performed by personnel certified as fusion technicians by the manufacturer of the pipe and/or the fusing equipment.
4. The butt-fused joints shall maintain true alignment and shall have uniform roll-back beads from the fusing process. The joint shall be watertight and shall have a tensile strength equal to that of the pipe.
5. Adequate cooling time shall be allowed prior to the release of the pressure from the fusing unit.
6. All joints shall be subject to acceptance by the Engineer prior to insertion.
7. All defective joints shall be cut out and replaced.

B. BLOCKING AND ANCHORING OF PIPE

1. A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Pre-cast concrete thrust blocks and other restraining devices such as adjustable rods or cables shall be provided at all bends or wherever the pipe changes direction.
- C. INSTALLATION OF PIPELINES THROUGH CASINGS
1. The Contractor shall install the carrier pipe through the casing pipe using supports or cradles constructed of permanent materials to support the entire length of the carrier pipe in the casing. Support material shall be uniformly spaced and located on three sides of the carrier pipe to prevent shifting of the pipe as detailed on the Plans. The line and grade at any point within the carrier pipe shall not vary by more than 0.5-foot from the horizontal plan line and 0.2-foot from the vertical grade.
 2. Following the installation of the carrier pipe in the casing, place 4.0-inch PVC riser pipes at both ends of the casing pipe and extend the PVC risers to the surface. Fill annular space at both ends with an appropriate concrete grout to form a watertight seal. The casing pipe and riser pipes shall be completely filled with sand. Riser pipes shall then be cut off 1.0-foot below finished grade. Glue PVC caps to the top of each riser pipe.
- D. TRENCHLESS METHODOLOGY
1. The remaining specifications in this section pertain to directional drilling techniques as the most common type of trenchless technology. Other trenchless technologies may also be used, provided that the Contractor submits a set of specifications for the proposed alternate technology.
 - (a) DRILLING EQUIPMENT
 - (1) The installation shall be by a steerable drilling tool capable of installing continuous runs of pipe, without intermediate pits for a minimum distance of 350.0-feet.
 - (b) DRILLING
 - (1) The Contractor shall initially drill a pilot hole that follows the route of the pipeline to be constructed.
 - (2) The Contractor shall monitor the route taken by the drilling unit utilizing the downhole survey calculation methods discussed in API Bulletin D20 entitled *Directional Drilling Survey Calculation Methods and Terminology*. A surface monitoring system may be allowed in lieu of the downhole calculation method. Approval of surface monitoring shall be at the discretion of the Engineer based on the Engineer's evaluation of the particular system proposed for use.
 - (3) The Contractor shall provide the Engineer with an "as-built" profile of the pilot hole prior to the back reaming and pipe insertion as which time the Engineer shall review it for tolerance compliance.
 - (4) The back reamer shall be designed to create a void in the surrounding soil through which the new pipe may be threaded.
 - (5) The size of the reaming tool shall be in accordance with the manufacturer's specifications to achieve the sizing indicated on the plans, or in the Schedule of Unit Prices.
 - (6) Upon commencement, pipe insertion shall be continuous and without interruption from one structure to another, except as approved by the Engineer.
 - (c) INSERTION
 - (1) Drill holes shall only be allowed at locations approved by the Engineer.
 - (2) In so far as possible, the equipment used shall be located in such a way as to minimize the noise impact on surrounding properties.
 - (3) The Contractor shall utilize a disconnect swivel which shall be set to limit the stress within the pipe to less than its elastic limit.

- (4) The Contractor shall install all necessary pulleys, rollers, bumpers, alignment control devices and other equipment necessary to protect the pipe from damage during insertion. Dragging the pipe on the ground is not permitted. All break over bends should be made with a radius long enough to insure that the pipe is not overstressed.
- (5) Lubrication, as recommended by the manufacturer, may be used during installation.
- (6) Buoyancy control may be used during pull back.
- (7) The manufacturer's recommended cooling/relaxation time, but not less than 4 hours, shall pass after insertion is complete and before the connection of services, sealing of the annular space, and/or the backfilling of the insertion pit. A sufficient excess of new pipe, but not less than 4.0-inches shall protrude into terminating structures.
- (8) The annular space at each structure shall be sealed with a material recommended by the manufacturer for a minimum of 8.0-inches to form a smooth, uniform, watertight joint.
- (9) Under no circumstance shall the pipe be stressed beyond its elastic limit.

3.2 FIELD QUALITY CONTROL

A. TOLERANCES

1. General

- (a) Terminating connections to existing structures and conduits shall be made with a smooth grade for the adjacent 50.0-feet and shall permit the appropriate hydraulic operation at the conduit connection.
- (b) Periodically, the Engineer may require the Contractor to excavate a verification pit to expose the conduit for the Engineer to determine compliance with the line and grade specified. As long as tolerances are being met, as determined by the Engineer, the frequency shall not exceed 2 excavations in each 500.0-feet or be required in obviously inaccessible locations. The Contractor shall then backfill, compact and restore the surface of the excavation.

2. Pressure Systems

- (a) Horizontal alignment of the finished profile shall be within 0.5-feet of the planned alignment.
- (b) Vertical alignment of the finished profile shall be within 0.5-feet of the planned vertical alignment but in no event shall the invert elevation be closer to the existing ground surface or the future proposed ground surface, whichever is lower, than the minimum bury depth shown on the plans.
- (c) The final vertical alignment shall not conflict with future proposed gravity conduit grades shown on the plans, if any.
- (d) The final vertical alignment of forcemains shall not have high points that could permit the development of air locks at any location other than those identified on the plans.

3. Gravity Systems

- (a) Horizontal alignment of the finished profile shall be within 0.5-feet of the planned alignment.
- (b) Vertical alignment of the finished profile shall be within 0.2-feet of the planned vertical alignment but in no event shall the invert elevation prevent the appropriate hydraulic operation with upstream or downstream conduits.
- (c) The final vertical alignment shall not have sags that could permit sediment to accumulate at any location.
- (d) The final vertical alignment shall not conflict with future proposed gravity conduit grades shown on the plans, if any.

- (e) The final vertical alignment of gravity conduits (storm and sanitary) shall not be shallower than the basement elevations of adjoining properties less adequate vertical distance to allow gravity piping from the basement to reach the installed conduit.

B. POST TELEVISIONING

1. Televising is required after the installation and backfill are complete and prior to the placement of roadway aggregate base or pavement.
2. Immediately prior to televising pipes installed on a smooth grade, the televisor shall discharge sufficient clear water into the pipe to clean the pipe and assist in identifying sags and mis-alignment.
3. Televising shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by close circuit television. All televising video shall be in color. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may indicate improper installation
4. A DVD and suitable log shall be kept of all televising and later submitted to the Owner. Each individual reach of pipe shall be identified as a 'chapter' on the DVD.

C. PRESSURE TESTING

1. Trenchless conduit used as carrier pipe:
 - (a) Watermain – Refer to the requirements in Section 02510 "Domestic Water Systems" of this Project Manual.
 - (b) Gravity Sewer - The Contractor shall to perform a hydrostatic pressure test as specified in CEAM 2611.3G to a pressure of 100 psi.
2. Trenchless conduit is used as a host pipe (electrical conduits, casings, etc.):
 - (a) Casings – No pressure test required.

******END OF SECTION******

SECTION 02510 - DOMESTIC WATER SYSTEM

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to watermain and service line construction as indicated on the drawings or as specified herein.

1.2 METHODS

- A. Trench excavation, bedding and backfill, see Section 02320 "Trench Excavation, Bedding and Backfill" of this Project Manual.
- B. Trenchless installation, see Section 02446 "Trenchless Pipeline" of this Project Manual.
- C. Within casing, see Section 02445 "Jack & Auger Steel Casing" of this Project Manual.

1.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
1. Watermain
 - (a) No exception to the referenced specification is made.
 2. Hydrants
 - (a) No exception to the referenced specification is made.
 3. Hydrant Extensions
 - (a) Hydrant extensions shall be measured and paid per each of the length as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid.
 4. Valves and Valve Boxes
 - (a) No exception to the referenced specification is made.
 5. Fittings
 - (a) Unless otherwise noted on the plans, watermain fittings will be measured by the pound without joint accessories. The standard weight of watermain fittings, for payment purposes, shall be as published in AWWA C-153, as follows:

Bends, Caps, Plugs & Sleeves							
Size	Fitting Weights, lbs. (AWWA C153)						
	Bends – MJ x MJ, (degrees)				Caps MJ x MJ	Plugs MJ x MJ	Sleeves ¹ MJ x MJ
	90	45	22.5	11.25			
3	19	16	15	14	8	8	18
4	25	22	18	16	9	10	20
6	39	32	31	30	15	16	33
8	57	46	46	42	22	26	46
10	89	70	64	58	32	36	62
12	108	86	80	67	42	46	76
14	210	160	136	93	66	75	140
16	264	202	172	148	92	95	170
18	335	250	255	205	114	121	200

20	400	305	310	245	125	135	255
24	565	405	412	315	166	175	335
¹ Weights are based on the use of long sleeves.							

Tees, Crosses & Reducers									
Run	Branch	Fitting Weights, lbs. (AWWA C153)			Run	Branch	Fitting Weights, lbs. (AWWA C153)		
		Tee	Cross	Reducers			Tee	Cross	Reducers
		MJ x MJ	MJ x MJ	MJ x MJ			MJ x MJ	MJ x MJ	MJ x MJ
4	4	32	40	-	18	6	275	-	-
6	4	46	62	24	18	8	295	-	190
6	6	56	75	-	18	10	315	-	195
8	4	60	84	32	18	12	335	-	180
8	6	72	98	36	18	14	380	-	190
8	8	86	105	-	18	16	405	-	195
10	4	78	98	46	18	18	435	-	-
10	6	90	121	47	20	6	315	-	-
10	8	105	135	50	20	8	345	-	-
10	10	120	145	-	20	10	370	-	220
12	4	94	119	58	20	12	395	-	205
12	6	110	138	58	20	14	440	-	200
12	8	125	149	57	20	16	465	-	200
12	10	140	187	61	20	18	505	-	225
12	12	160	213	-	20	20	535	-	-
14	4	172		-	24	6	415	-	-
14	6	182	210	100	24	8	445	-	-
14	8	206	231	100	24	10	470	-	-
14	10	228	255	100	24	12	500	-	305
14	12	234	269	100	24	14	550	-	310
14	14	280	299		24	16	580	-	320
16	6	228	250	124	24	18	625	-	305
16	8	248	264	124	24	20	660	-	300
16	10	264	286	124	24	24	720	-	-
16	12	280	312	112					
16	14	316	-	140					
16	16	322	385	-					

- (b) The weight for fittings not listed in the tables above shall be in accordance with AWWA C153. The weight for fittings not listed in the tables above or in AWWA C153 shall be the actual weight of the fitting(s) furnished and installed based on acceptable documentation provided by the Contractor.

6. Corporation Stops & Curb Stops

- (a) No exception to the referenced specification is made.

7. Water Service Lines

- (a) The quantities for water service line items shown in the proposal are approximate. Since the extent of service line work that will be required is unknown, the Owner reserves the right to increase or decrease the quantities by any amount with no adjustment in unit price.

8. Cut in Tee
 - (a) Payment for cutting in a new tee in an existing watermain, under pressure, shall be measured and paid per each of the size tee specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid.
9. Polystyrene Insulation (2 inch thickness)
 - (a) Polystyrene insulation shall be measured by the SQUARE YARD in place and shall be paid at the unit price bid.
 - (b) Since the extent of insulation work that will be required is unknown, the Owner reserves the right to increase or decrease the quantities by any amount with no adjustment in unit price.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the water system items, as indicated. Such items of work include but are not limited to:
 1. Furnishing and installing underground utility location system.
 2. The furnishing and installing polyethylene encasement material, include in the price bid for watermain.
 3. Concrete blocking or metal ties, include in the price bid for watermain.
 4. Valve umbrella anchorage assembly, include in the unit price bid for valves.
 5. Locating and connecting to an existing watermain or a hydrant, include in the price bid for watermain.
 6. Locating and connecting to an existing water service line, include in the price bid for watermain.
 7. Compaction, hydrostatic, leakage, disinfecting, coliform bacteria and conductivity testing, include in the price bid for watermain.
 8. Furnishing and installing thrust block, tie rods, joint restraints and sacrificial zinc anode caps as shown on the plans and as specified.
 9. Turning hydrant heads to a location as directed by the Engineer, include in the price bid for hydrants.
 10. If a separate bid item for temporary water service is NOT included in the Schedule of Unit Prices, providing continuous temporary water service to affected users, include in the price bid for watermain.
 11. The wood and/or metal parts necessary to identify the ends of the unattached service lines and curb stops are included in the price bid for water services.
 12. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping / control of storm water flows around the construction zone, include in the price bid for watermain.
 13. The painting or re-painting of hydrants with scratches and/or abrasions, include in the price bid for hydrants.
 14. Providing temporary corporations, copper pipe, plugs, etc. for hydrostatic watermain testing, include in the unit price bid for watermain.
 15. The cost to furnish and install copper water service couplings, include in the unit price bid for water service pipe.
 16. If the watermain is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand fill and grout seals, include in the unit price bid for watermain.

1.4 SPECIFICATION REFERENCES

1. Trench excavation, bedding and backfill, reference Section 02320 "Trench Excavation, Bedding and Backfill" of this Project Manual, except as modified herein.

2. See Section 02520 "Underground Utility Location System" of this Project Manual.
3. CEAM 2611 shall apply to the water main and service line construction, except as modified herein.
4. AWWA C-651 shall apply to the disinfecting of water mains, except as modified herein.
5. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.5 SUBMITTALS

- A. Work plan for temporary service.
- B. The CONTRACTOR must provide a complete an as-built record form, as provided in the appendix, for acceptance of each storm sewer and sanitary sewer structure, as well as each sanitary sewer and water service line. The completed report shall be submitted each week to the Engineer or the Engineer's designated representative at some mutually agreeable time. Failure to submit the required form shall render the structure or services subject to non-acceptance.

PART 2 -- PRODUCTS

2.1 OPEN CUT WATERMAIN MATERIAL

- A. The following water pipe materials will be allowed for use on this project:
 1. Ductile Iron Pipe, Class 52 with conductive gaskets or conductivity strips may be used.
 2. Pipe materials acceptable for trenchless installation will be considered acceptable for open cut installation upon approval of the City Engineer.

2.2 TRENCHLESS PIPE MATERIAL & STRUCTURAL REQUIREMENTS

- A. All pipe shall be made from virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
- B. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, and/or other deleterious faults.
- C. Any section of pipe with a gash, blister, abrasion, nick scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above may be cut out and butt-fused in accordance with the procedures herein.
- D. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from site.
- E. The actual inside barrel diameter of the pipe used for pressure pipe shall not be less than that of DIP, Class 52 for the corresponding nominal pipe size.
- F. The following materials will be acceptable for trenchless installation:
 1. DR 18 Fusible C900/C905 PVC
 - (a) All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784.
 - (b) Fusible polyvinylchloride pipe shall conform to AWWA C900, AWWA C905, ASTM D2241 OR ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.
 - (c) Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into this pipe.

- (d) Fusible polyvinylchloride pipe shall be manufactured in a standard 40' nominal length, or custom lengths as specified.
 - (e) Fusible polyvinylchloride pipe shall be blue in color for potable water use.
 - (f) Pipe for potable water use shall be certified per NSF-61G.
 - (g) Pipe shall be marked as follows;
 - (1) Nominal pipe size
 - (2) PVC
 - (3) Dimension Ratio, Standard Dimension Ratio, or Schedule
 - (4) AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable
 - (5) AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable
 - (6) NSF-61 mark verifying suitability for potable water service
 - (7) Extrusion production-record code
 - (8) Trademark or trade name
 - (9) Cell Classification 12454 and/or PVC material code 1120 may be included
 - (h) Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.
 - (i) Joints
 - (1) Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure. All fusion joints shall be completed as described in this specification.
2. C900/C905 Reinforced Joint (RJ) PVC Pipe
- (a) One of the following pipe materials may be used:
 - (1) Certa-Lok C900/RJIB Restrained Joint Integral Bell PVC Pipe, DR 18
 - (2) TerraBrute Cartridge Loaded, Restrained Joint C900 PVC Pipe, DR 18
 - (3) Approved equal
 - (b) Unless otherwise specified, cartridge-loaded, restrained joint polyvinyl chloride pipe lengths shall be assembled in the field using a gasketed, restrained joint. The Contractor shall follow the pipe supplier's written guidelines for joining the product.
 - (c) Cartridge-loaded, restrained joint polyvinyl chloride pipe shall be manufactured in a standard, 20 foot long nominal lay length, unless otherwise approved.
 - (d) Cartridge-loaded, restrained joint polyvinyl chloride pipe shall have an integral bell. Bell shall have the same wall thickness as the pipe barrel. It shall not contain any metallic components.
 - (e) The cartridge-loaded, restrained joint shall use a high deflection, profile gasket per ASTM F477. Standard gasket material shall be styrene-butadiene rubber (SBR). Optional, special order nitrile rubber gaskets shall be used where indicated in the construction documents. O-rings or similar gaskets shall not be allowed.
 - (f) Restrained Joint polyvinylchloride pipe shall conform to AWWA C900, AWWA C905, ASTM D2241 OR ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.
 - (g) The assembled restrained joint shall meet the requirements of ASTM D3139.

- (h) The assembled restrained joint shall allow for expansion and contraction within the joint.
 - (i) Restrained Joint polyvinylchloride pipe shall be blue in color for potable water use.
 - (j) Pipe for potable water use shall be certified per NSF-61G.
 - (k) Pipe shall be marked as follows;
 - (1) Nominal pipe size
 - (2) PVC
 - (3) Dimension Ratio, Standard Dimension Ratio, or Schedule
 - (4) AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable
 - (5) AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable
 - (6) NSF-61 mark verifying suitability for potable water service
 - (7) Extrusion production-record code
 - (8) Trademark or trade name
 - (9) Cell Classification 12454 and/or PVC material code 1120 may be included
 - (l) Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.
3. High Density Polyethylene (HDPE) Pipe & Fitting
- (a) The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE4710) conforming with the minimum structural standards of ASTM D3350 with cell classification 345434C. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34.
 - (b) The pipe to be used shall be (HDPE) pressure pipe conforming to the requirement of AWWA C-906 of a 160 psi working pressure. The grade used shall be resistant to aggressive soils or corrosive substances present. Unless otherwise specified, the dimensions and tolerances of the pipe barrel shall conform to ductile iron pipe size (DIPS) equivalent outside diameters.
 - (c) The dimension ratio (DR) shall be 11 DIPS. Nominal size 14.
 - (d) HDPE pipe shall have butt-fused joints.
 - (e) The Contractor shall verify the lengths of conduit necessary in the field before fabrication.
 - (f) Polyethylene fittings and adaptors shall be butt-fused, EHMW-HDPE, PE4710 meeting the same resin requirements as specified for the pipeline. In addition, the fittings shall meet the applicable requirements of ASTM D2513 and ASTM D3261.
 - (g) Mechanical joint pressure pipe joints shall be restrained using ductile iron clamps (series Ebaa Iron, Inc. or equal) supplied with a sufficient number of ductile iron bolts to restrain the working and test pressures for this application.
 - (h) Replacement Pipe Dimensions: The minimum length shall be that deemed necessary by the Contractor to effectively span the distance from the inlet to the outlet of the respective structures unless otherwise specified. The Contractor shall verify the lengths in the field before fabrication.
 - (i) All pipe shall be made from virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
 - (j) The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, and/or other deleterious faults.

- (k) Any section of pipe with a gash, blister, abrasion, nick scar, or other deleterious fault greater than 10 percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above, may be cut out and butt-fused in accordance with the procedures herein.

2.3 ANY SECTION OF PIPE HAVING OTHER DEFECTS SUCH AS CONCENTRATED RIDGES, DISCOLORATION, EXCESSIVE SPOT ROUGHNESS, PITTING, VARIABLE WALL THICKNESS OR ANY OTHER DEFECT OF MANUFACTURING AND/OR HANDLING SHALL NOT BE USED AND SHALL BE REMOVED FROM SITE. WATERMAIN FITTING MATERIALS

- A. The following pressure pipe fitting materials will be allowed for use on this project:
 - 1. Mechanical Class 350 ductile iron fittings shall be used. Adaptors, back-up rings, and oversize sleeves shall be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings shall be long mechanical joint.
 - 2. All fittings, valves, hydrants and restraining rods shall be protected by using sacrificial zinc anode caps, ASTM B418 6 oz. Large Zinc Anode Caps as manufactured by Trumbull Industries Inc., or an approved equal. Contractors shall supply 2 anode caps per mechanical joint gland installed.
 - 3. All fittings, valves, hydrants, etc. shall be secured utilizing COR-BLUE T-BOLTS as manufactured by NSS Industries or approved equal.
 - 4. Quality control of all fitting manufacturers shall conform to the requirements of International Organization for Standardization (ISO).

2.4 FIRE HYDRANTS

- A. Hydrants shall be Waterous Improved Pacer Style, Model WB67-250, UL, 250 psi rating, with safety flange and stem coupling. The bury length shall be 8.0-feet, unless otherwise noted on the plans. The break-off height install shall be 16.0-inches. The Contractor shall install the hydrant so that the center of the nozzle is 24 inches above the finished grade. The hydrant shall be painted red.
- B. All hydrants shall have been manufactured in the year of construction or prior two calendar years.
 - 1. All hydrant extensions shall be manufactured by the same manufacturer as the hydrant.
 - 2. The local fire department shall be contacted before ordering hydrants to obtain the correct nozzle threads and type of operating nut and cap bolts.

2.5 VALVE AND VALVE HOUSING

- A. All water valves shall have been manufactured in the year of construction or prior two calendar years.
- B. All nuts and bolts shall be 304 stainless steel.
- C. Valve Housing
 - 1. Cast-iron screw type valve boxes shall be installed where indicated on underground valves. The cast-iron valve boxes shall be of either the two-piece or three-piece style and shall be furnished with a stay-put cover with raised letters indicating "WATER." The shaft shall be 5¼-inch inside diameter.
 - 2. All valve box assemblies shall be furnished with a valve umbrella anchorage assembly. The valve umbrella anchorage assembly shall be manufactured by Adaptor, Inc., Oak Crest, WI, or equivalent.
 - 3. High Density Polyethylene valve housings will not be allowed on this project.
- D. Gate Valves
 - 1. All valves up to and including 12.0-inch diameter to be furnished and installed on the watermain shall be , non-rising stem, iron body, resilient-seated gate valves, with two-inch square opening nut rated for a 200 psi working pressure conforming to the current editions of AWWA C-509-or AWWA C-515. Double disc type valves (AWWA C-500) will not be allowed.
- E. Butterfly Valves

1. All valves greater than 12.0-inch diameter shall be butterfly valves conforming to the referenced specification.
2. All butterfly valves shall be manufactured with the rubber seat bonded to the body. Valve discs shall be furnished with 316 stainless steel seating edge.

2.6 WATER SERVICE PIPE AND FITTINGS

A. Service Pipe and Fittings

1. General
 - (a) Water service pipe and fittings shall conform to the provisions of 2611.2D, AWWA C800 and the following:
 - (b) Valves and fitting models to vary according to water main pipe size. See mfg. catalogue data.
 - (c) Saddles shall be provided for all corporation stops larger than 1½-inches if DIP pipe is installed
 - (d) Curb boxes shall be adjustable with Minneapolis Pattern. Stationary rods are required. Depth of curb boxes shall typically be 8.0-feet.
2. Copper Service Pipe Notes & Specifications:
 - (a) Copper pipe shall conform to ASTM B88, Seamless Copper Water Tubing, Type K, Soft Annealed Copper.
 - (b) Copper water service pipe connections shall be flared type at connections to new pipe.
 - (c) Copper water service pipe connectors shall be compression type at connections to existing pipe.
3. Polyethylene (PE) Service Pipe Notes & Specifications
 - (a) PE pipe shall conform to Grade PE-3408 or PE-4710 pipe and shall be rated for 200 PSI working pressure, SDR-9.
 - (b) PE pipe shall conform to ASTM D-1248 & D-2737 for Copper Tube Size, outside diameter controlled.
 - (c) PE water service pipe connections shall be compression type.
 - (d) PE pipe shall be permanently marked at 2' intervals indicating Mfg., PE Material Type, Date of Manufacture, etc.
 - (e) Type 304 stainless steel pipe inserts / stiffeners shall be furnished and installed in the ends of the PE pipe at all connections. Inserts shall meet requirements of AWWA C901 and ASTM 240-92B, unless otherwise shown on the plans.
 - (f) PE pipe shall not be allowed within the public right-of-way.
4. Tracer Wire
 - (a) Tracer wire shall be supplied when using PE water service pipe. Tracer wire shall be fastened to the underside of the top of the curb stop boxes with waterproof connections, unless otherwise indicated in the Engineering Plans or other as approved by the Owner.
5. The Utility should be contacted before ordering to verify the manufacturers' type and style. The water service materials style commonly used by the Utility are to be considered as a basis for quality are:

WATER SERVICE PIPE & APPURTENANCES		
ITEM:	SERVICE PIPE	FLARED TYPE Valves & Fittings For TYPE K COPPER PIPE
		MUELLER

	SIZE	MODEL #	
Corporation Stop		MUELLER	
	3/4"	B-25000-N	
	1"	B-25000-N	
	1.5"	B-25000-N	
	2"	B-25000-N	
Tapping Saddle		FORD	FORD
		for DIP WMN	for PVC WMN
	3/4"	F202	FS323
	1"	F202	FS323
	1.25"	F202	FS323
	1.5"	F202	FS323
	2"	F202	FS323
Curb Stop		MUELLER	
	3/4"	P-25154-N	
	1"	P-25154-N	
	1.5"	P-25154-N	
	2"	P-25154-N	
Curb Box	1.5" Diam. Base Tap for 3/4" to 1.25" Curb Stops	H-10300	
Curb Box	2" Diam. Base Tap for 1.5" to 2" Curb Stops	N/A	

WATER SERVICE PIPE & APPURTENANCES			
ITEM:	SERVICE PIPE SIZE	COMPRESSION TYPE Valves & Fittings For POLYETHYLENE PIPE	
		MUELLER MODEL #	
Corporation Stop		MUELLER	
	3/4"	B-25008-N	
	1"	B-25008-N	
	1.5"	B-25008-N	
	2"	B-25008-N	
Tapping Saddle		FORD	FORD
		for DIP WMN	for PVC WMN
	3/4"	F202	FS323
	1"	F202	FS323
	1.25"	F202	FS323
	1.5"	F202	FS323
	2"	F202	FS323
Curb Stop		MUELLER	
	3/4"	B-25155-N	
	1"	B-25155-N	

	1.5"	B-25155-N
	2"	B-25155-N
Curb Box	1.5" Diam. Base Tap for ¾" to 1.25" Curb Stops	N/A
Curb Box	2" Diam. Base Tap for 1.5" to 2" Curb Stops	N/A

2.7 RESTRAINED JOINT RETAINER GLANDS

- A. Where stainless steel is not used restrained joint retainer glands shall be coated with a 6-8 mil nominal thickness fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16 or approved equal.

2.8 POLYETHYLENE ENCASEMENT

- A. Where DIP watermain is installed, the Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Temporary Service

1. Before proceeding with the project, the Contractor shall establish a work plan and submit the plan to the utility personnel and Engineer for review and comment. The plan shall outline the method to be used to maintain service to the affected consumers and estimate the duration of any anticipated interruptions of service. The plan shall include provisions to fully disinfect all temporary piping, valves and fittings in accordance with CEAM Specification No. 2611. The Contractor is the sole party responsible to notify the Utility and consumers who may be affected by limitations and/or interruption of water service. Planned service interruptions shall not exceed 6 hours in any 72 hour period unless previously approved by the Utility.
2. The Contractor shall coordinate watermain shut-downs with the water utility at least 24 hours prior to the requested shut-down.
3. If the Contractor fails to provide water service to affected residents within the constraints specified above, an amount equal to \$500.00 shall be due to the City of Jordan each occurrence.

3.2 INSTALLATION OF PIPE AND FITTINGS

A. Aligning and Fitting of Pipes

1. The Contractor, together with the utility's personnel, shall jointly examine and operate all curb stops and mainline valves prior to final acceptance.
2. Anchoring of Pipe
 - (a) A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Restrained joint retainer glands shall be provided at all bends, tees, hydrants, valves and plugged crosses or wherever the watermain changes direction or dead ends

B. Polystyrene Insulation

1. The Contractor shall install polystyrene insulation in those areas where the watermain or services may be susceptible to frost or freezing, or as directed by the Engineer.
2. Rigid foam insulation shall be placed between the watermain and storm or sanitary sewer where adequate vertical clearance cannot be maintained. The insulation shall be placed on a bed of sand and sand shall be placed above the insulation to isolate the insulation from rocks and other sharp objects.

The ultimate thickness of insulation required shall be achieved by using 2 layers of insulation, the second layer shall be placed perpendicular to first layer and the joints shall be offset.

C. Water Service Installation

1. The Contractor shall imprint the concrete face of curb at the locations of the utility service locations in accordance with City standards.
2. The Contractor shall keep accurate records as to the location of the service connections, as specified in the referenced specification. Final payment for the project will not be made until the information is in the possession of the Owner.
3. No warranty is expressed or implied as to the location, size or material type of existing service lines. The Contractor shall furnish and install all fittings required to make the connections.
4. The Contractor shall install new service pipe, at 7.0-foot bury depth, from the corporation stop to the property line, or as shown on the plans, or as directed by the Engineer.
5. The water services shall be hydrostatically tested and disinfected.
6. All water services shall be verified as operative and the corporation stops shall be turned to open position prior to backfilling.

D. Polyethylene Encasement

1. Where DIP watermain is installed, the Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.

3.3 FIELD QUALITY CONTROL

A. Electrical Conductivity Test

1. Conductive Pipe Materials
 - (a) See CEAM 2611.3.F
2. Non-conductive Pipe Materials
 - (a) The conductivity requirements shall be deleted.

3.4 HYDROSTATIC TESTING

- A. Hydrostatic tests shall be conducted in accordance with the referenced specification. Individual tests from valve to valve are required. These tests shall be conducted prior to the bacteriological tests required with the disinfection of the main. No drop in pressure will be allowed during the last two hours of the pressure test.
- B. Water services, including corporation and curb stops, shall be tested.

3.5 DISINFECTION

- A. The Contractor shall disinfect the watermain in accordance with the provisions of AWWA C-651.
- B. Testing options A and B as described in AWWA C-651 and below shall be required for the bacteriological testing for total coliform analysis.

Option A: Before approving a main for release, take an initial set of samples after flushing and then resample again after a minimum of 16 hours using the sampling site procedures outlined. Both sets of samples must pass for the main to be approved for release.

Option B: Before approving a main for release, flush the main and let it sit for a minimum of 16 hours without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, two sets of samples a minimum of 15 minutes apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release.

- C. If the initial disinfection fails to produce satisfactory bacteriological results, or if other results indicate unacceptable water quality, the main may be re-flushed and shall be resampled. If check samples fail to produce acceptable results, the main shall be re-chlorinated by the continuous-feed or slug method until satisfactory results are obtained.
- D. No lines shall be placed in service until a satisfactory result is obtained.

******END OF SECTION******

SECTION 02530 - PIPE SEWERS - SANITARY

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to sanitary sewer and service lateral construction as indicated on the drawings or as specified herein.

1.2 METHODS

- A. Reference Section 02320 "Trench Excavation, Bedding and Backfill" of this Project Manual, except as modified herein.
- B. Reference Section 02446 "Trenchless Pipeline" of this Project Manual.
- C. Reference Section 02445 "Jack & Auger Steel Casing" of this Project Manual.

1.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Manholes
 - (a) Payment for all manholes shall be at the unit price bid per LINEAR FOOT of structure as measured from the invert of the outlet pipe to the top of the manhole casting. The amount bid includes all work and material required to complete the structure. Casting assemblies shall be paid separately for each assembly furnished and installed.
 - 2. Casting Assemblies
 - (a) Casting assemblies shall be measured per EACH, complete in place and paid at the unit price bid
 - 3. Sewer Pipe
 - (a) The contract unit price bid per LINEAL FOOT (LF) for the appropriate size, and type, shall be compensation in full for all equipment, materials and labor required to construct sanitary sewer pipe as specified, including but not limited to excavation, backfill, sub cutting, compaction, and all bedding.
 - 4. Wye Branches
 - (a) No exception to the referenced specification is made.
 - 5. Outside Drop Section
 - (a) Payment for the respective diameter outside drop connection shall be at the unit price per LINEAR FOOT of structure as measured from the invert of the lower pipe to the invert of the higher pipe.
 - 6. Connect to Existing Sanitary Sewer Pipe
 - (a) Payment for connecting a new sanitary sewer to an existing sanitary sewer pipe shall be measured and paid per EACH as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The bid shall include full compensation for locating the existing pipe, verifying the condition, and constructing a water tight joint.
 - 7. Connect to Existing Sanitary Sewer Service
 - (a) Payment for reconnecting a sanitary sewer lateral/service to the new sanitary sewer system shall be measured and paid per EACH as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The bid shall include full compensation for locating the existing pipe, verifying the condition and its use as an active service, and constructing a water tight joint.

8. Sewer Service Cleanout

- (a) The amount bid per EACH shall be full payment for furnishing and installing the PVC cleanout, complete with bends, cap, locating iron, bedding, and encasement materials. The use and location of cleanouts shall be identified in the field by the Engineer.

9. Outside Drop

- (a) The contract unit price bid per LINEAL FOOT (LF) for the appropriate size shall be compensation in full for all equipment, materials, and labor required to construct complete outside drops as specified.

The unit price bid shall include all drop section appurtenances including but not limited to vertical drop pipe, concrete horse shoes, horse shoe fill, base elbow, additional manhole base appurtenances for base elbow installation, upper tee, fittings, transition fittings, horizontal pipe from manhole to undisturbed soil, etc.

Measurement for payment shall be from the invert of the lower base elbow to the invert of the upper inlet pipe being dropped.

Manholes shall be measured and paid for separately at the appropriate unit price bid for manholes.

10. Manhole Marker Sign

- (a) The contract unit price bid per each shall be compensation in full for all equipment materials and labor required to furnish and install manhole marker signs and all necessary appurtenances as shown on the plans and specified.
- (b) Manhole marker signs shall be required where structures are located in the following areas:
 - (1) Within residential areas, where structures are located outside of roadways in areas not to be mowed or otherwise routinely maintained (long grass, wetland, etc.)
 - (2) Within commercial or industrial areas, all non-pavement areas unless otherwise approved by the City Engineer.

11. Sewer Service and Service Risers

- (a) The contract unit price bid per LINEAL FOOT (LF) for the appropriate size and type of service or riser pipe, shall be compensation in full for all equipment, materials, and labor required to furnish and install services and risers as shown on the plans and specified, including but not limited to pipe, bedding, blocking, fittings, tracer wire, wire connections, etc.
- (b) Service Pipe
 - (1) Measurement for payment for services with no riser shall be the horizontal distance from centerline of the sewer main, along the centerline of the service pipe, to the end of the service stub. Vertical length of service pipe shall be considered incidental to the price bid for services.
 - (2) Measurement for payment for services with a riser shall be the horizontal distance from center of the horizontal-vertical bend at the top of the riser, along the centerline of the service pipe, to the end of the service stub. Vertical length of service pipe shall be considered incidental to the price bid for services.
 - (3) The amount bid shall include all costs for furnishing a fully functional and complete tracer wire with access box for the full service and riser, as specified.
- (c) Riser Pipe
 - (1) Measurement for payment shall be the vertical distance from centerline of the sewer main, to the center of the horizontal-vertical bend, along the centerline of the riser pipe, to the

vertical-to-horizontal bend. Horizontal length of riser pipe shall be incidental to the price bid for risers.

(2) Payment shall be made for the final constructed service pipe and risers. Excess pipe and materials used during construction to accommodate maintenance of flow, construction methods construction staging, etc., including but not limited to riser stubs and subsequent adjustment of riser height for connection to service, temporary connections, etc. shall be considered incidental to the Contract.

(3) Where no pay item is included for riser pipe, the unit price bid for service pipe shall apply.

12. Sanitary Sewer Pipe Bedding & Foundation

(a) Bedding as required in the pipe bedding zone, as shown on the plan, generally described as from 6-inches above the pipe to 6-inches below the pipe as shown on the plan shall be considered incidental to the unit price bid for the appropriate pipe size and type, regardless of the use of suitable onsite granular materials or imported granular bedding material.

(b) Aggregate Pipe Foundation

(1) The contract unit price bid per TON shall be compensation in full for all equipment materials and labor required to furnish and install aggregate pipe foundation in locations where excavation bottoms are not suitable for bedding and base material for pipe, manholes, fittings, valves, etc., including but not limited to furnishing, placing, compacting, excavation, and disposal of unsuitable materials.

(2) Where no bid item is provided for aggregate pipe foundation, but such work is required by the Engineer in the field, such work shall be measured as paid as Stabilizing Aggregate.

(3) The use of aggregate pipe foundation material in lieu of providing adequate dewatering, shall be considered incidental, unless otherwise approved by the Engineer. No payment shall be made for foundation materials in this use.

(4) The use of aggregate foundation materials in lieu of specified manhole, valve, fitting, pipe, hydrant, bedding materials, etc., as specified shall be considered incidental, unless otherwise approved by the engineer. No payment shall be made for foundation materials in this use.

(5) The use of aggregate foundation materials shall be approved by the Engineer prior to use. Payment shall not be made for aggregate foundation materials installed without prior approval of the engineer.

(6) No payment shall be made for material lost, wasted, spilled, used for other work on the project, etc.

(c) The Contractor shall keep accurate records and weight tickets that show the actual amount of bedding and foundation material installed. The Contractor shall notify and coordinate with the Engineer all deliveries and placement amounts, and locations of placement at the time delivery and/or placement of materials is made. The Engineer reserves the right to deduct quantities of material installed submitted by the Contractor to reflect quantities lost, spilled, wasted, or used on other portions of the work. The final amount paid shall be at the sole discretion of the Engineer.

(d) The quantities included in the proposal for bedding items are estimates only. The exact locations and dimensions of bedding types used shall be determined in the field by the Engineer and Contractor. No adjustment of unit price will be applied as a result of increased or decreased quantities of bedding, foundation, and excavation items related to trench excavation, bedding, and backfill. Payment shall be made for the actual quantities used on the project, as specified, without any adjustment to unit prices bid allowed.

13. Buoyancy Collar

- (a) The contract unit price bid per EACH for the appropriate size manhole shall be compensation in full for all equipment, materials, and labor required to construct manholes that counteract the effects of buoyancy including but not limited to buoyancy calculations, structure design, submittals, revisions, buoyancy collar construction, additional invert weight and thickness, etc.
- 14. External Chimney Seal
 - (a) The contract unit price bid per EACH shall be compensation in full for all equipment materials and labor required to furnish, install, and adjust chimney seals as specified.
- 15. Bypass Pumping
 - (a) No direct payment for Bypass Pumping shall be made unless specifically listed in the Schedule of Unit Prices. All costs for providing bypass pumping shall be considered incidental to the related utility installation work.
 - (b) When listed in the Schedule of Unit Prices, Bypass Pumping shall be measured and paid per the Lump Sum amount bid which shall be compensation in full for all equipment materials and labor required to maintain existing sewer flows and service through and around the project area, as specified, including but not limited to installation, operation, monitoring, maintenance, and removal of pumps power systems, piping, etc., multiple set ups of various capacity pumping systems, temporary connections to existing pipe and services, etc. as shown on the Plans, as specified, and as directed.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the sanitary sewer items, as indicated. Such items of work include but are not limited to:
 - 1. Locating and connecting to an existing sanitary sewer pipe, include in the price bid for sanitary sewer.
 - 2. Dye water testing of all service lines encountered and the subsequent plugging of abandoned sewer services, include in the unit price bid for sanitary sewer.
 - 3. The costs of furnishing bends, adapters, cutting and removing the existing sanitary sewer pipe, include in the price bid for sanitary sewer.
 - 4. Locating and connecting to an existing sanitary sewer service laterals, include in the price bid for sanitary sewer.
 - 5. Adapters to adjust the diameter of the new service connections to match the existing service lines, include in the price bid for service connections.
 - 6. All work and material required to complete the outside drop manhole structure as shown on the Design Detail Plate, include in the price bid for outside drop section.
 - 7. Leakage, vacuum, air and deflection testing, include in the price bid for sanitary sewer.
 - 8. Post construction televising, include in the price bid for sanitary sewer.
 - 9. The wood and/or metal parts necessary to identify the ends of unattached service lines, include in the price bid for sanitary sewer services.
 - 10. Furnishing and installing tracer wire and electrical connections to intersecting services and/or tracer wires, include in the price bid for sanitary sewer.
 - 11. Adjustment of sewer service locations.

1.4 SPECIFICATION REFERENCES

- A. Reference Section 02320 "Trench Excavation, Bedding and Backfill" of this Project Manual, except as modified herein.
 - 1. See Section 02520 "Underground Utility Location System" of this Project Manual.

2. Reference CEAM 2621 shall apply to the gravity sewers and service laterals construction, except as modified herein.
3. Reference MnDOT 2506 shall apply to manholes and castings, except as modified herein.
4. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.5 SUBMITTALS

- A. Work plan for temporary service, including any plans for intended bypass pumping.
- B. Final DVD and log of post construction televised inspection.
- C. Reference Section 01330 of this Project Manual for Submittals, for additional requirements.
- D. The CONTRACTOR must provide a complete an as-built record form, as provided in the appendix, for acceptance of each storm sewer and sanitary sewer structure, as well as each sanitary sewer and water service line. The completed report shall be submitted each week to the Engineer or the Engineer's designated representative at some mutually agreeable time. Failure to submit the required form shall render the structure or services subject to non-acceptance.

PART 2 -- PRODUCTS

2.1 OPEN CUT SEWER PIPE AND FITTINGS

- A. All pipe and fittings must be laid on a continuous granular bed. Installation must comply with ASTM D2321
- B. Solid Wall Polyvinyl Chloride (PVC) Pipe
 1. 4.0-inch through 6.0-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D-3034 for the Standard Dimension Ratio (SDR) of 26, unless otherwise specified on the plans.
 2. 8.0-inch through 15-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D-3034 for the Standard Dimension Ratio (SDR) of 35, for depths of less than 20.0-feet, unless otherwise specified on the plans. The SDR for depths exceeding 20.0-feet shall be 26, unless otherwise specified on the plans.
 3. Over 15" Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM F679 with a minimum wall thickness for a minimum pipe stiffness of 46, for depths less than 20.0-feet, unless otherwise specified in the plans. A minimum SDR of 26 shall be used for depths exceeding 20.0-feet, unless, unless otherwise specified on the plans.
 4. WYES: All wyes shall be heavy wall and shall conform with the requirements of ASTM D-3034 for the Standard Dimension Ratio (SDR) of 26, unless otherwise specified on the plans.
 5. The connection shall be push-on with elastomeric gasketed joints, which are bonded to the inner walls of the gasket recess of the bell socket.
 6. The pipe grade used shall be resistant to aggressive soil and corrosive substances in accordance with the requirements of ASTM D-543.
- C. Ductile Iron Pipe (DIP)
 1. No exception to the referenced specification is made.

2.2 TRENCHLESS PIPE MATERIAL & STRUCTURAL REQUIREMENTS

- A. All pipe shall be made from virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
- B. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, and/or other deleterious faults.

- C. Any section of pipe with a gash, blister, abrasion, nick scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above may be cut out and butt-fused in accordance with the procedures herein.
- D. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from site.
- E. INTERNAL PIPE DIAMETERS
1. The actual inside barrel diameter of the pipe used for gravity pipe shall not be less than that of PVC – SDR 35 for the corresponding nominal pipe size.

ACTUAL INTERIOR PIPE DIAMETERS FOR VARIOUS GRAVITY PIPE MATERIALS					
Nominal	PVC – SDR 35	HDPE 4000 DR 11ductile sizes	HDPE 4100 DR 11steel sizes	PVC DR 181 Restrained Joint	Fusible PVC DR-18
8	7.92	7.375	6.963	8.044	8.05
10		9.041	8.679	9.866	9.87
12	11.78	10.750	10.293	11.734	11.73
14			11.301	12.444	13.60
15	14.426				
16		14.170	12.915	14.222	15.50
18	17.629	15.925	14.532		17.30
20		17.590	16.146		19.20
21	20.78				
22			17.760		
24	23.381	21.014	19.374		22.90
27	26.35				

F. WASTE WATER APPLICATIONS - GRAVITY SEWERS

1. Fusible C900/C905TM
- (a) As manufactured by Underground Solutions (www.undergroundsolutions.com). ASTM D 1784-02 with Cell Classification 12454. The formulation for extrusion of Fusible C-900™/C-905™/PVC™ shall be compounded to the specific proprietary recipe for Fusible pipe, and meet the requirements of PPI TR-2.
- (b) Butt joint fused PVC pressure pipe conforming to AWWA C900 for 150 psi pressure rating (SDR 18). However, structurally stronger pipe may be required to ensure resistance to pulling stresses.
- (c) Pipe fusing shall meet manufacturer requirements. See Paragraph 1.4.A, Items to be Included with the Bid.
- (d) A manufacturer's representative shall be present during fusing and installation.
2. Restrained Joint PVC Pipe and Fittings
- (a) Restrained Joint Polyvinyl Chloride (PVC) pressure pipe with a 150 psi working pressure. The working pressure dictates a maximum standard dimension ratio (DR) of 18, however, structurally stronger pipe may be needed to ensure resistance to damaging stresses relative to the trenchless

1 CertainTeed, Certa-Lok Restrained Joint Catalog, 1993, page 4.

construction technique. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D-543.

- (b) Restrained joints shall be Certa-Lok C900/RJ Restrained Joint PVC couplings as manufactured by Certain Teed, or equal.

3. HIGH DENSITY POLYETHYLENE (HDPE) PIPE

- (a) The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE3408) conforming with the minimum structural standards of ASTM D3350 with Cell Classification 345434C as manufactured by Chevron Phillips Chemical Company 4000/4100 Series, or equal. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34.
- (b) The pipe to be used shall be (HDPE) pressure pipe conforming to the requirement of AWWA C-906 of a 160 psi working pressure. The grade used shall be resistant to aggressive soils or corrosive substances present. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast iron pipe equivalent outside diameters.
 - (1) The dimension ratio (DR) shall be 11.
 - (2) HDPE pipe shall have butt-fused joints with the internal fusing bead removed.
 - (3) The Contractor shall verify the lengths of conduit necessary in the field before fabrication.

2.3 MANHOLES

A. Precast Concrete Manholes

- 1. Sanitary sewer manholes shall conform to the MnDOT Standard Plate No. 4007C, unless otherwise shown on the plans, including integral base sections and rubber gasketed tongue and groove joints. All pipe openings shall have integral cast watertight seal.
- 2. Reinforced polypropylene plastic steps shall be furnished for all sanitary sewer manholes eight or more feet in depth.

B. Outside Drop Manhole

- 1. All pipe materials used to construct the drop section and the incoming pipe shall be ductile iron, Class 52.
- 2. The DI pipe shall extend from the tee to 2.0-feet beyond the point where the elevation of the virgin soil becomes a uniform 6.0-inches below the invert elevation of the incoming pipe.

C. Castings

- 1. The type of casting assembly to be used shall be Neenah R-1733 solid lid with two concealed pickholes, 2.0-inch raised letters stamped "SANITARY SEWER" and Self-Sealing lid. The frame shall be Neenah R-1733.
- 2. All casting assemblies shall meet the certification requirements of the Minnesota Department of Transportation and be manufactured by a MnDOT approved source.

D. Chimney Seal

- 1. Chimney seals accepted for use, when shown in the plans, shall be one of the following listed as standard of quality:
 - (a) Infi-Shield (exterior only)
 - (b) Cretex (exterior only)
 - (c) Interior Chimney seals shall only be allowed with pre-approval by the City Engineer.

E. Adjusting Rings

1. HDPE adjusting rings manufactured by Ladtech, Inc. shall be used.
2. Concrete adjusting rings may be permitted in lieu of HDPE rings with approval of the City Engineer.

PART 3 -- EXECUTION

3.1 INSTALLATION OF PIPE AND FITTINGS

A. Sanitary Main Installation

1. No exception to the referenced specification is made.

B. Sewer Service Installation

1. The Contractor shall imprint the concrete face of curb at the locations of the utility service locations in accordance with City standards.
2. The Contractor shall dye water test all existing sanitary sewer service line connections cut, severed or encountered during the construction to determine whether they are still active. Those service lines which are no longer in use shall be abandoned by plugging the severed upstream end with a suitable watertight plug approved by the Engineer.
3. The exact number of service connections, i.e., new service lines or connection to existing service lines, is unknown. The quantities listed on the proposal are approximate. Final payment shall be based upon the number constructed for the various diameter of services constructed.
4. The Contractor shall keep accurate records as to the location of the service connections, manholes, cleanouts, wyes, bends, risers, and connections to existing structures, pipe and stubouts as constructed. Measurements to service line shall be taken from the two nearest permanent structures (i.e., hydrants, valves, manholes, buildings) as directed by the Engineer. Final payment for the project will not be made until the information is in the possession of the Owner.
5. The Contractor shall install new service pipe from the wye branch to the property line, as shown on the plans.
6. At the end of all services that are not immediately connected to working services, the Contractor shall furnish and install a wood or metal pole that extends to just below the ground surface. If wood is used, there shall be attached to the top of the pole a 6.0-inch x 2.0-inch metal piece, capable of being located by a metal detector from the ground surface.
7. Contractor shall collect photos as described in Section 01330 - Submittals, prior to backfilling.

3.2 MANHOLE STRUCTURE

A. Connect to Existing Sanitary Sewer

1. When connection to an existing sanitary sewer is made at an existing or proposed manhole, the Contractor shall expose and verify the elevation of the existing sewer prior to laying any sanitary sewer to, or from, the connection point. If the elevation of the existing sewer does not match the elevation shown on the plans, the Contractor shall notify the Engineer, at which time the Engineer may adjust the proposed grades.
2. Connections to existing sanitary sewers shall be watertight.
3. Connections to existing structures shall be watertight. The installation of Cor-N-Seal boots, or equal, shall be required.

B. Outside Drop Manhole

1. All pipe materials used to construct the drop section and the incoming pipe shall be PVC - SDR 26 with heavy-duty fittings.
2. The PVC pipe shall extend from the tee to 2.0-feet beyond the point where the elevation of the virgin soil becomes a uniform 6 inches below the invert elevation of the incoming pipe.

C. Raise / Lower Existing Manhole

1. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2.0-inch adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require: the removal of the manhole cone section or the concrete slab top; the addition, removal, or exchange of barrel sections; the replacement of the cone section or the concrete slab top; the installation of the proper number of adjusting rings; and the replacement of the manhole casting and frame. In some cases, the existing structure may require saw cutting.

D. Manhole Base

1. Pre-cast bases shall be used for all manholes.
2. Integral cast base is required unless otherwise shown on the plans or approved by the Engineer.
3. Manholes shall be set on a minimum of 6.0-inches of compacted foundation material.

E. Miscellaneous Work

1. If concrete adjusting rings are used, they shall be set with bituminous mastic or cement mortar and shall be plastered inside and out, with a minimum thickness of ½-inch of mortar. A maximum of 3 individual adjusting rings shall be used. Taller 6.0-inch or 12.0-inch rings shall be used where adjustment requires more than three 2.0-inch rings.
2. If HDPE adjusting rings are used, the sealant material and method shall be in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

A. Deflection test

1. No exception to the referenced specification is made.

B. Sanitary sewer leakage testing

Leakage tests shall be conducted as described in the referenced specification. However, leakage testing will not be necessary where existing services are connected directly to the new sewer as it is being constructed.

1. Air Testing
 - (a) No exception to the referenced specification is made.
2. Hydrostatic Testing
 - (a) Hydrostatic testing shall not be allowed on this project.

C. Televising

1. Televising is required after the installation and backfill are complete and prior to the placement of roadway aggregate base or pavement.
2. Immediately prior to televising, the televisor shall discharge sufficient clear water into the pipe to clean the pipe and assist in identifying sags and miss-alignment.
3. Televising shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by close circuit television. All televising video shall be in color. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may indicate improper installation. Each individual reach of pipe shall be identified as a 'chapter' on the DVD.
4. A DVD and suitable log shall be kept of all televising and later submitted to the Owner.

****END OF SECTION****

SECTION 02535 - FORCEMAIN

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to force main construction as indicated on the drawings or as specified herein.

1.2 METHODS

- A. Trench Excavation, Bedding and Backfill, see Section 02320 of this Project Manual.
- B. Trenchless Installation, see Section 02446 of this Project Manual.
- C. Jack and Auger Steel Casing, see Section 02445 of this Project Manual.

1.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Force main
 - (a) Force main shall be measured by the LINEAR FOOT and paid at the price unit bid. The amount bid for Force main shall include the costs of furnishing bends, adapters, granular materials for foundation, bedding, encasement and backfill.
 - 2. Air Relief Manholes
 - (a) Measurement and payment for air relief manholes shall be by EACH and paid at the price bid. The amount bid shall include work and material required to complete the structure, including precast manhole, crushed rock bedding material, casting, excavation and backfilling.
 - 3. Air Relief Valve Assembly
 - (a) The air release valve assembly shall be measured by the EACH and paid at the unit price bid. The amount shall include the air release valve, tapping saddle, corporation stop and all necessary piping and fasteners to complete the operational air release system as detailed in the plan set.
 - 4. Polyethylene Encasement and Underground Utility Location System
 - (a) Unless separately itemized in the Schedule of Unit Prices, the furnishing and installation of polyethylene encasement material and location system shall be incidental to the installation of force main.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the force main items, as indicated. Such items of work include but are not limited to:
 - 1. Furnishing and installing all bends, pipe restraints, blocking and fittings, include in the price bid for force main.
 - 2. Furnishing and installing underground utility location system, include in the price bid for force main.
 - 3. The furnishing and installing polyethylene encasement material, include in the price bid for force main.
 - 4. Concrete blocking or metal ties, include in the price bid for force main.
 - 5. Hydrostatic, leakage and continuity testing, include in the price bid for force main.

6. Delays due to other utility conflicts which result during the course of construction include in the price bid for force main.
7. Protecting existing improvements from damage, include in the price bid for force main.
8. Connecting to existing structures, include in the price bid for force main.
9. Valve operating nut extension rod(s), include in the unit price bid for valves.
10. If the forcemain is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand fill and grout seals, include in the unit price bid for forcemain.

1.4 SPECIFICATION REFERENCES

- A. Reference Section 02320 of this Project Manual for Trench Excavation, Bedding and Backfill, except as modified herein.
 1. See Section 02520 "Underground Utility Location System" of this Project Manual.
 2. Reference CEAM 2611 shall apply to the force main construction, except as modified herein.
 3. Reference CEAM 2621.3G for pipe deflection.
 4. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 OPEN CUT FORCE MAIN PIPE AND FITTING MATERIALS

- A. Pressure Polyvinyl Chloride (PVC) Pipe
 1. Force main pipe material shall be polyvinyl chloride (PVC) pipe having a cell classification of 12454.B as defined in ASTM Designation D-1784. The dimensions, physical requirements, test methods and extrusion quality shall meet the requirements of ASTM Designation D-2241 for dimension ratio (SDR) of 26, pressure Class 160 and shall have IPS outside diameter. Gasketed integral bells shall conform to ASTM Designation D-3139 "Standard Specification for Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals." Gaskets shall conform to ASTM Designation F-477, "Standard Specification for Elastomeric Seals (Gaskets) for Joint Plastic Pipe."
- B. Pressure Pipe Joint Restraint Clamps
 1. The clamps (Series 6500 Ebaa Iron, Inc.) shall be ductile iron and supplied with a sufficient number of ductile iron bolts to restrain working and test pressures for this application.
- C. Pipe Fitting Materials
 1. The following pressure pipe fitting materials will be allowed for use on this project:
 2. Mechanical Class 350 ductile iron fittings shall be used. Adaptors, back-up rings, and oversize sleeves shall be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings shall be long mechanical joint.
 3. All fittings, valves, hydrants and restraining rods shall be protected by using sacrificial zinc anode caps, ASTM B418 6 oz. Large Zinc Anode Caps as manufactured by Trumbull Industries Inc., or an approved equal. Contractors shall supply 2 anode caps per mechanical joint gland installed.
 4. All fittings, valves, hydrants, etc. shall be secured utilizing COR-BLUE T-BOLTS as manufactured by NSS Industries or approved equal.
 5. Quality control of all fitting manufacturers shall conform to the requirements of International Organization for Standardization (ISO).
- D. High Density Polyethylene (HDPE) Pipe and Fittings

1. The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE3408) conforming with the minimum structural standards of ASTM D3350 with cell classification 345464C for black pipe, 345464E for non-black & color, as manufactured by DriscoPlex 4200 (IPS) /4300 (DIPS) Series, or equal. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34 material.
2. The grade used shall be resistant to aggressive soils or corrosive substances present. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast iron pipe equivalent outside diameters (4300 series).
3. The dimension ratio (DR) shall be 17 for open trench installation.
4. HDPE pipe shall have butt-fused joints.
5. The Contractor shall verify the lengths of conduit necessary in the field before fabrication.
6. Polyethylene fittings and adaptors shall be butt-fused, EHMW-HDPE, PE3408 meeting the same resin requirements as specified for the pipeline. In addition, the fittings shall meet the applicable requirements of ASTM D2513 and ASTM D3261.
7. Mechanical joint forcemain joints shall be restrained using ductile iron clamps (series 15PF00 or 2000PV Ebaa Iron, Inc. or equal) supplied with a sufficient number of ductile iron bolts to restrain the working and test pressures for this application. Internal pipe stiffeners must be used.

2.2 TRENCHLESS PIPE MATERIAL & STRUCTURAL REQUIREMENTS

1. All pipe and fittings shall meet the quality requirements for the material types allowed in section 2510 of these specifications for potable watermain.

2.3 AIR RELIEF MANHOLES

A. Precast Concrete Manholes

1. Air relief manholes shall conform to the MnDOT Standard for the design type shown on the plans including integral base sections and rubber gasketed tongue and groove joints. All pipe openings shall have integral cast watertight seal.

B. Castings

1. The type of casting assembly to be used shall be Neenah R-1733 solid lid with two concealed pickholes, 2.0-inch raised letters stamped "SANITARY SEWER" and Self-Sealing lid. The frame shall be Neenah R-1733.
2. Chimney Seal
3. Chimney seals accepted for use, when shown in the plans, shall be one of the following listed as standard of quality:
 - (a) Infi-Shield (exterior only)
 - (b) Cretex (exterior only)
 - (c) Interior Chimney seals shall only be allowed with pre-approval by the City Engineer.

2.4 ADJUSTING RINGS

- A. Only concrete adjusting rings shall be permitted.

2.5 AIR AND VACUUM RELEASE VALVES

- A. The air and vacuum release valve shall be equal to APCO Model 402 with a 2.0-inch inlet. The air and vacuum release valve shall be equipped with blow-off valves, quick disconnect couplings, 6.0-feet of hose and a 2.0-inch shut-off valve. A 2.0-inch saddle shall be used on the force main for connection of the air and vacuum release valve.

2.6 POLYETHYLENE ENCASEMENT

- A. No exception to the referenced specification is made.

2.7 VALVE AND VALVE HOUSING

- A. All valves shall have been manufactured in the year of construction or prior calendar year.
- B. Valve Housing
1. Cast-iron screw type valve boxes shall be installed where indicated on underground valves. The cast-iron valve boxes shall be of either the two-piece or three-piece style and shall be furnished with a stay-put cover with raised letters indicating "SEWER." The shaft shall be 5¼-inch inside diameter.
 2. All valve box assemblies shall be furnished with a valve umbrella anchorage assembly. The valve umbrella anchorage assembly shall be manufactured by Adaptor, Inc., Oak Crest, WI, or equivalent.
 3. High Density Polyethylene valve housings will not be allowed on this project.
- C. Gate Valves
1. All valves up shall be gate valves conforming to the referenced specification.

PART 3 -- EXECUTION

3.1 INSTALLATION OF PIPE AND FITTINGS

- A. Blocking and Anchoring of Pipe
1. A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Pre-cast concrete thrust blocks and other restraining devices such as restrained joint retainer glands, shall be provided at all bends or wherever the force main changes direction, valves shall be tied to the nearest forcemain fitting.
- B. Polystyrene Insulation
1. The Contractor shall install polystyrene insulation in those areas where the force main may be susceptible to frost or freezing, or as directed by the Engineer.
- C. Polyethylene Encasement
1. Where DIP watermain is installed, the Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.
- D. Methods
1. Reference Section 02320 "Trench Excavation, Bedding and Backfill" of this Project Manual.
 2. Reference Section 02446 "Trenchless Installation" of this Project Manual.

3.2 FIELD QUALITY CONTROL

- A. No exception to the referenced Specification is made unless a non-conductive force main is installed, in which case the conductivity requirements, as specified are deleted.
- B. The Engineer may require the Contractor to demonstrate that the forcemain meets the requirements of CEAM Specification 2621.3G for pipe deflection.
- C. The Engineer may require the Contractor to perform a hydrostatic pressure test as specified in CEAM Specification 2611.3G to a pressure of 100 psi.

******END OF SECTION******

SECTION 02610 - PIPE CULVERTS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary to construct pipe culverts as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. No exception to the referenced specification is made.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated pipe culvert items, as indicated. Such items of work include but are not limited to:
 - 1. The placement of clay borrow as an anti-seepage collar, include in the price bid for pipe culvert.
 - 2. Connection to an existing pipe culvert, storm sewer pipe or subdrain, include in the price bid for pipe culvert.
 - 3. Use of geotextile fabric to wrap pipe joints in lieu of using mastic, include in the price bid for storm sewer.
 - 4. Maintenance of an appropriate storm water outlet during construction, include in the price bid for pipe culvert.
 - 5. If the culvert is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand fill and grout seals, include in the unit price bid for culvert.

1.3 SPECIFICATION REFERENCES

- A. Reference Section 02320 "Trench Excavation, Bedding and Backfill" of this Project Manual, except as modified herein.
- B. MnDOT 2501 shall apply to the construction of pipe culvert and appurtenance items, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 CULVERT PIPE AND FITTINGS

- A. Reinforced Concrete Pipe (MnDOT 3236)
 - 1. No exception to the referenced specification is made.
- B. Corrugated Steel Pipe
 - 1. No exception to the referenced specification is made.
 - 2. Corrugated Steel Pipe shall not be used for crossing of public roadways.
- C. Bituminous Coated Corrugated Steel Pipe
 - 1. No exception to the referenced specification is made.
 - 2. Bituminous Coated Corrugated Steel Pipe shall not be used for crossing of public roadways.

D. Corrugated Polyethylene (PE) Pipe

1. No exception to the referenced specification is made.
2. Corrugated Polyethylene (PE) pipe shall not be used for crossing of public roadways unless underlying soils are unable to support RCP and if approved by the City Engineer.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall install a clay (or an approved impermeable equal) collar around all culverts at a point approximately 4.0-feet from each apron. The collar shall fill the breadth and height of the trench for a minimum length of 3.0- feet.
- B. The CONTRACTOR must provide a complete an as-built record form, as provided in the appendix, for acceptance of each storm sewer and sanitary sewer structure, as well as each sanitary sewer and water service line. The completed report shall be submitted each week to the Engineer or the Engineer's designated representative at some mutually agreeable time. Failure to submit the required form shall render the structure or services subject to non-acceptance.

3.2 FIELD QUALITY CONTROL

- A. Deflection test - No exception to the referenced specification is made.
- B. Televising - No exception to the referenced specification is made.

*******END OF SECTION*******

SECTION 02620 - SUBSURFACE DRAINS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary to construct subsurface drains as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Subsurface Drains
 - (a) No exception to the referenced specification is made.
 - 2. Inspection Tees
 - (a) Inspection tee assemblies shall be measured per EACH type and style indicated, complete in place and paid at the price unit bid.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated subsurface drain items, as indicated. Such items of work include but are not limited to:
 - 1. Interference of other underground structures and utilities, include in the price bid for subsurface drains.
 - 2. The removal and restoration, or protection of existing utilities that are shown on the plans and for which there is no bid item for removing and restoring, or working around the utility.
 - 3. Unless separately itemized in the Schedule of Unit Prices, any dewatering necessary for subsurface drains construction, include in the price bid for subsurface drains.
 - 4. Foundation materials placed in lieu of performing necessary dewatering include in the price bid for subsurface drains.
 - 5. Connection to a proposed or existing pipe culvert, storm sewer pipe, catch basin, manhole or subdrain, include in the price bid for subsurface drains.
 - 6. Bulkheading of existing pipes to be abandoned in place, include in the price bid for subsurface drains.
 - 7. Bedding and encasement materials, include in the price bid for subsurface drains.
 - 8. Crushed rock foundation materials used in lieu of bedding materials in the specified bedding zone, include in the price bid for subsurface drains.
 - 9. Maintenance of service, include in the price bid for subsurface drains.
 - 10. The replacement all material displaced due to shrinkage or loss during the excavation and backfilling operations, include in the price bid for subsurface drains.
 - 11. Protecting existing improvements from damage include in the price bid for subsurface drains.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2502 shall apply to the subsurface drains, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 SUBSURFACE PIPE AND FITTINGS

- A. Perforated PVC drain pipe, SDR35 (ASTM D3034) shall be used along public roadways and in shared rear yard drainage systems.
- B. Perforated corrugated polyethylene drainage tubing, PE (ASTM D3350) shall be used where approved by the City Engineer.
- C. Cleanout caps on inspection tees shall be cast iron screw in type.

2.2 GRANULAR MATERIALS

- A. The filter aggregate shall conform to the requirements of MnDOT 3149 for coarse filter aggregate, unless otherwise shown on the plans.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Geo-textile fabric sock shall not be installed.
- B. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor shall be required to remove and restore, or protect the utility.
- C. The Contractor shall install and operate a dewatering system to maintain all trenches free of water wherever necessary. The Contractor shall be responsible for any damage to adjacent structures or buildings caused by the dewatering operations. The Contractor shall make his own subsurface investigations and determine what dewatering methods to utilize to prevent such damage.
- D. Existing inverts shall be protected during construction. If debris enters culverts or sewers, it shall be the responsibility of the Contractor to clean.
- E. Inspection tees shall be installed flush with the finished boulevard grade.
- F. Where subdrains are connected to catch basins or manholes, rodent protection shall be installed.

******END OF SECTION******

SECTION 02630 - PIPE SEWERS - STORM

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to storm sewer construction as indicated on the drawings or as specified herein.

1.2 METHODS

- A. Trenchless Installation, see Section 02446 of this Project Manual.

1.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Manholes
 - (a) Payment for all manholes shall be at the unit price bid per LINEAR FOOT of structure as measured from the invert of the outlet pipe to the top of the manhole casting. The amount bid includes all work and material required to complete the structure. Casting assemblies shall be paid separately for each assembly furnished and installed.
 - 2. Catch Basins
 - (a) Payment for all catch basins shall be at the unit price bid per EACH of structure installed. The amount bid includes all work and material required to complete the structure. Casting assemblies shall be paid separately for each assembly furnished and installed.
 - 3. Casting Assemblies
 - (a) Casting assemblies shall be measured per EACH, complete in place and paid at the unit price bid.
 - 4. Sewer Pipe
 - (a) No exception to the referenced specification is made.
 - 5. Aprons
 - (a) No exception to the referenced specification is made.
 - 6. Connect to Existing Drainage Structure
 - (a) Payment for connecting a new storm sewer to an existing storm drainage structure shall be measured and paid per EACH, as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The amount bid shall include removing the existing storm sewer pipe, enlarging the hole, removing the bench and reshaping the invert, if necessary to fit the proposed storm sewer pipe.
 - 7. Raise / Lower Existing Manhole
 - (a) Payment for raising or lowering an existing manhole shall be measured and paid per lineal foot based on the vertical difference between the existing and final rim elevations. The payment shall include all cost of labor, materials and equipment required to complete the work.
 - 8. Connect to Existing Storm Pipe
 - (a) The amount bid shall include all costs of locating the pipe and constructing the new drainage structure, paid separately, around the existing pipe. Adjustments to the drainage structure may be required and shall be included in the amount bid for connecting to the existing pipe.

- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the storm sewer items, as indicated. Such items of work include but are not limited to:
1. The costs of furnishing bends, adapters, cutting and removing the existing storm sewer pipe, include in the price bid for storm sewer.
 2. Locating and connecting to an existing storm sewer service laterals, include in the price bid for service connections.
 3. Use of geotextile fabric to wrap pipe joints in lieu of using mastic, include in the price bid for storm sewer.
 4. Maintenance of an appropriate storm water outlet during construction, include in the price bid for storm sewer.
 5. The cost of all labor, equipment and materials necessary for testing of storm sewer, if required, included in the price bid for storm sewer.
 6. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping / control of storm water flows around the construction zone, include in the price bid for the associated sewer items.
 7. If the sewer is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand fill and grout seals, include in the unit price bid for sewer.
 8. Furnishing and installing underground utility location system, include in the price bid for sewer

1.4 SPECIFICATION REFERENCES

- A. MnDOT 2506 shall apply to manholes, catch basins and castings, except as modified herein.
- B. Reference Section 02320 "Trench Excavation, Bedding and Backfill" of this Project Manual.
- C. Reference Section 02446 "Trenchless Pipeline" of this Project Manual.
- D. CEAM 2621 shall apply to construction of pipe sewers, except as modified herein.
- E. MnDOT 2503 shall apply to measurement and payment of pipe sewers, except as modified herein.
- F. MnDOT Standard Plates Manual with latest revisions.
- G. State of Minnesota Plumbing Code shall apply to all underground pipe sewers installed through areas to be occupied by buildings.
- H. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 OPEN CUT SEWER PIPE AND FITTINGS

- A. Reinforced Concrete Pipe (MnDOT 3236)
 1. No exception to the referenced specification is made.
- B. Solid Wall Polyvinyl Chloride (PVC) Pipe (MnDOT 3245) (Thermoplastic, TP)
 1. 4-inch through 15-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D3034 for the Standard Dimension Ratio (SDR) of 35.
 2. Over 15-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM F679 with a minimum wall thickness for a minimum pipe stiffness of 46.
 3. The connection shall be push-on with elastomeric gasketed joints, which are bonded to the inner walls of the gasket recess of the bell socket.

4. The pipe grade used shall be resistant to aggressive soil and corrosive substances in accordance with the requirements of ASTM D543.
- C. Profile Wall Polyvinyl Chloride (PVC) Pipe
1. Large diameter (21-inches through 48-inches) closed profile polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM F794. Pipe and fittings shall be made from polyvinyl chloride compounds which comply with the requirements for a minimum cell classification of 12364A as defined by ASTM D1784.
 2. All joints shall be of the bell and spigot type with elastomeric seals and conform to the requirements of ASTM-D3212. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe
 3. PVC pipe conforming to Contech A-2000 (ASTM F949) will not be allowed.
- D. Corrugated Polyethylene (CP) Pipe and Fittings (MnDOT 3247)
1. Smooth interior and corrugated exterior polyethylene pipe and fittings shall conform to the requirements of AASHTO M294 or ASTM F2648 and MnDOT 3247. All joints shall be installed using an approved watertight sleeve with gaskets meeting the requirements of ASTM F477.
 2. CP pipe shall not be allowed under paved roadways within the public right-of-way, except where specifically approved by the City Engineer under special conditions.
 3. CP pipe up to and including 30-inch diameter shall be allowed outside of paved areas.
- E. Flexible Pipe Jointing
1. Pipe joints for solid wall and profile wall polyvinyl chloride (PVC) pipe shall be in accordance with ASTM 3212. This includes the flexible elastomeric seals being rated at sustaining an internal pressure of 10.8 psi for 10 minutes.
 2. Pipe joints for high density polyethylene (HDPE) pipe shall be in accordance with ASTM D3261.
- F. Polypropylene Pipe
1. Pipe:
 - (a) Twelve- through 24-inch pipe shall have smooth interior and annular exterior corrugated polypropylene (PP) pipe meeting the requirements of ASTM F2736, ASTM F2881 or AASHTO MP-21-11, Type S, for respective diameters. The pipe supplied shall be watertight as defined in the joint performance requirements of this specification.
 - (b) Virgin material for 12- through 24-inch pipe and fitting production shall be an impact modified copolymer meeting the material requirements of ASTM F2736, ASTM F2881 and AASHTO MP-21-11, for respective pipe diameters.
 - (c) Pipe shall be ADS N-12® HP or pre-approved equal.
 - (d) Polypropylene pipe greater than 30-inch diameter will not be allowed.
 - (e) Polypropylene pipe shall not be allowed under paved roadways within the public right-of-way, except where specifically approved by the City Engineer under special conditions.
 2. Joints and Fittings:
 - (a) Watertight joints shall be bell-and-spigot meeting the watertight requirements of ASTM F2736 or ASTM F2881. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

- (b) Fittings: Fittings shall conform to ASTM F2736 or ASTM F2764. Joint shall meet watertight joint performance requirements of ASTM D3212. Bell & spigot connections shall utilize a spun-on, welded or integral bell and spigot with gaskets meeting ASTM F477.

2.2 TRENCHLESS PIPE MATERIAL & STRUCTURAL REQUIREMENTS

- A. All pipe shall be made from virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
- B. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, and/or other deleterious faults.
- C. Any section of pipe with a gash, blister, abrasion, nick scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above may be cut out and butt-fused in accordance with the procedures herein.
- D. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from site.
- E. INTERNAL PIPE DIAMETERS
1. The actual inside barrel diameter of the pipe used for gravity pipe shall not be less than that of PVC-SDR 35 for the corresponding nominal pipe size.

ACTUAL INTERIOR PIPE DIAMETERS FOR VARIOUS GRAVITY PIPE MATERIALS					
Nominal	PVC – SDR 35	HDPE 4000 DR 11 ductile sizes	HDPE 4100 DR 11 steel sizes	PVC DR 182 Restrained Joint	Fusible PVC DR-18
8	7.92	7.375	6.963	8.044	8.05
10		9.041	8.679	9.866	9.87
12	11.78	10.750	10.293	11.734	11.73
14			11.301	12.444	13.60
15	14.426				
16		14.170	12.915	14.222	15.50
18	17.629	15.925	14.532		17.30
20		17.590	16.146		19.20
21	20.78				
22			17.760		
24	23.381	21.014	19.374		22.90
27	26.35				

F. Gravity Sewers

1. Fusible C900/C905TM

- (a) As manufactured by Underground Solutions (www.undergroundolutions.com). ASTM D 1784-02, with cell classification 12454. The formulation for extrusion of Fusible C-900™/C-905™/PVC™ shall be compounded to the specific proprietary recipe for Fusible pipe, and meet the requirements of PPI TR-2.

- (b) Butt joint fused PVC pressure pipe conforming to AWWA C900 for 150 psi pressure rating (SDR 18). However, structurally stronger pipe may be required to ensure resistance to pulling stresses.
- (c) A manufacturer's representative shall be present during fusing and installation.

2. Restrained Joint PVC Pipe and Fittings

- (a) Restrained Joint Polyvinyl Chloride (PVC) pressure pipe with a 150 psi working pressure. The working pressure dictates a maximum standard dimension ratio (DR) of 18; however, structurally stronger pipe may be needed to ensure resistance to damaging stresses relative to the trenchless construction technique. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D-543.
- (b) Restrained joints shall be Certa-Lok C900/RJ Restrained Joint PVC couplings as manufactured by Certain Teed, or equal.

3. High Density Polyethylene (HDPE) Pipe

- (a) The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE3408) conforming with the minimum structural standards of ASTM D3350 with Cell Ceclassification 345434C as manufactured by Chevron Phillips Chemical Company 4000/4100 Series, or equal. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34.
- (b) The pipe to be used shall be (HDPE) pressure pipe conforming to the requirement of AWWA C-906 of a 160 psi working pressure. The grade used shall be resistant to aggressive soils or corrosive substances present. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast iron pipe equivalent outside diameters.
 - (1) The dimension ratio (DR) shall be 11.
 - (2) HDPE pipe shall have butt-fused joints with the internal fusing bead removed.
 - (3) The Contractor shall verify the lengths of conduit necessary in the field before fabrication.

2.3 MANHOLES & CATCH BASINS

A. Precast Concrete Manholes and Catch Basin Section

- 1. Storm sewer manholes shall conform to the MnDOT Standard for the design type shown on the plans.
- 2. Reinforced polypropylene plastic steps shall be furnished for all storm sewer manholes 8.0-feet or more in depth.

B. Castings

- 1. All casting assemblies shall meet the certification requirements of the Minnesota Department of Transportation and be manufactured by a MnDOT approved source.
- 2. The type of casting assembly to be used shall be Neenah R-1733 solid lid with two open lift holes and 2.0-inch raised letters stamped "STORM SEWER". The frame shall be Neenah R-1733.
- 3. The Type of curb and gutter catch basin casting assembly to be used shall be Neenah R-3067-V (Vane Grate).
- 4. The type of non-street / rear yard inlet casting assembly to be used shall be Neenah R-4342 stool grate.

C. Adjusting Rings

- 1. Only concrete adjusting rings shall be permitted.

D. Chimney Seal

- 1. None

2.4 GEOTEXTILE FABRIC

- A. MnDOT 3733, Type I, non-woven for use in wrapping joints in storm sewer.

PART 3 -- EXECUTION

3.1 MANHOLE AND CATCH BASIN STRUCTURES

A. Raise / Lower Existing Structure

1. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2.0-inch adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require: the removal of the manhole cone section or the concrete slab top; the addition, removal, or exchange of barrel sections; the replacement of the cone section or the concrete slab top; the installation of the proper number of adjusting rings; and the replacement of the manhole casting and frame.

B. Miscellaneous Work

1. If concrete adjusting rings are used, plaster all manhole adjusting rings installed inside and out, with a minimum thickness of ½-inch of mortar. A maximum of 3 individual adjusting rings shall be used. Taller 6.0-inch or 12.0-inch rings shall be used where adjustment requires more than three 2.0-inch rings.
2. If HDPE adjusting rings are used, the sealant material and method shall be in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

A. Deflection test - No exception to the referenced specification is made.

B. Televising

1. Televising is required on flexible pipes after the installation and backfill are complete.
2. Immediately prior to televising, the televisor shall discharge sufficient clear water into the pipe to assist in identifying sags and mis-alignment.
3. Televising shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by close circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions that may indicate improper installation. Each individual reach of pipe shall be identified as a 'chapter' on the DVD
4. A DVD and suitable log shall be kept and later submitted to the Owner.

- C. The CONTRACTOR must provide a complete an as-built record form, as provided in the appendix, for acceptance of each storm sewer and sanitary sewer structure, as well as each sanitary sewer and water service line. The completed report shall be submitted each week to the Engineer or the Engineer's designated representative at some mutually agreeable time. Failure to submit the required form shall render the structure or services subject to non-acceptance.

*******END OF SECTION*******

SECTION 02705 - MANHOLES & CATCH BASINS - ADJUST CASTING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to adjusting a casting assembly frame and ring or valve box as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Measurement and payment for adjusting existing manhole frame and rings, catch basin frame and rings, and valve boxes shall be paid per EACH scheduled adjustment, not caused by the Contractor's activities or delays.
 - 2. The initial installation and adjustment of the casting assembly for new manholes and valve boxes, whether to match the bituminous base course or the bituminous wear course shall be incidental to the installation of the item. Subsequent adjustments, not caused by the Contractor's activities or delays, shall be paid per EACH of the type of item indicated.
- B. Payment for raising or lowering an existing manhole shall be measured and paid based on the vertical difference between the existing and final rim elevations. The payment shall include all cost of labor, materials and equipment required to complete the work.
- C. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated adjustment items. Such items of work include but are not limited to:
 - 1. Saw cutting the wall of the existing structure, if necessary.
 - 2. Adjusting chimney seals on existing structures, if necessary.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2506 shall apply to adjusting frame and ring, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 ADJUSTING RINGS

- A. Only concrete adjusting rings shall be permitted.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall bring manhole castings and valve boxes to grade. The manhole casting shall be placed on a full mortar bed or bituminous mastic upon final setting. The inside and outside of the adjusted area shall be plastered with a minimum thickness of 1/2-mortar.
- B. All inverts of manholes and valves boxes shall be cleaned of debris and gravel which may have fallen into the structures as a result of construction.
- C. Finished grade of the casting or valve box in paved areas shall be according to the following, unless otherwise specified on the plans:

	Distance Below Adjacent Concrete Pavement (in)	Distance Below Adjacent Bituminous Pavement (in)	Distance Below Adjacent Gravel Surface/Green Area (in)
City Streets	1/8 to ¼	¼ to 3/8	1
County Highways	1/8 to ¼	¼ to 3/8	1
State Highways	1/8 to ¼	¼ to 3/8	1
Sidewalks	1/8 to ¼	1/8 to ¼	1
Parking Areas	1/8 to ¼	¼ to 3/8	1

- A. In no case shall the casting or valve box extend above the finished surface.
- B. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2.0-inch adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require the:
1. Removal of the manhole cone section or concrete slab top
 2. Addition, removal or exchange of barrel sections
 3. Replacement of the cone section or the flat slab top
 4. Installation of the proper number of adjusting rings
 5. Replacement of the manhole frame and casting.
 6. In some cases, the existing structure may require saw cutting.

*******END OF SECTION*******

SECTION 02720 - AGGREGATE BASE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to construct the aggregate base course as indicated on the drawings or as specified herein.

1.2 METHODS OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. No exception to the referenced specification is made.
 - 2. The quantities for aggregate base are strictly estimates and may be increased or decreased by any amount with no adjustment in unit price according to the extent of aggregate base used to backfill subgrade excavations and the extent of reclaimed material available.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated aggregate items. Such items of work include but are not limited to:
 - 1. Protecting existing improvements and previously accepted in-process improvements from damage.
 - 2. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading and/or other efforts necessary to repair the subgrade after satisfying the rolling test and failing to protect the integrity of the subgrade.
 - 3. The cost of all labor, equipment and materials necessary for meeting the testing requirements of field quality control, if required, include in price bid for Aggregate Base.
 - 4. Furnishing and installing blue tops for gravel surface.
 - 5. Test rolling of the compacted aggregate base using a fully loaded aggregate truck (tandem)..

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2211 shall apply to the construction of aggregate base, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. No exception to the referenced specification is made.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.
- B. The depth and class of aggregate base to be constructed shall be as shown on the plans. Aggregate base construction shall take place only after the street subgrade condition and grade has been examined by the Engineer.
- C. All aggregate base shall be compacted to 100 percent Standard Proctor Density using the Specified Density Method.

3.2 SOURCE QUALITY CONTROL

- A. The following testing shall be performed:
 - 1. One gradation test for each 500 tons or 275 cubic yards (CV) of each class of aggregate base.
 - 2. One percent crushing test.
 - 3. One aggregate quality test.
- B. Samples for testing shall be taken from material in stock at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.
- C. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

3.3 FIELD QUALITY CONTROL

- A. "Blue top" stakes shall be provided by the Contractor at 50.0-foot intervals to confirm that the base is constructed to the required grades and elevations. Methods other than "blue top" staking may be allowed, if approved by the Engineer.
- B. The following testing shall be performed:
 - 1. One compaction test (including Standard Proctor) for each 500 SY of each class of aggregate base.
- C. All testing shall be performed by an independent testing laboratory approved by the Engineer.
- D. The Contractor shall cooperate fully with the individuals performing the tests.
- E. Samples for testing shall be taken from material in place, in the roadway at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.
- F. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

SECTION 02740 - PLANT-MIXED BITUMINOUS SURFACING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of plant-mixed bituminous surfacing utilizing the MnDOT Gyratory Design Specification (2360) as indicated on the plans or as specified herein.
- B. This is a Certified Plant Project. The supplier shall have sufficient testing facilities and qualified personnel including Certified Technicians. All required plant and field tests shall be performed in a timely manner and with a good quality control program.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Payment for the accepted quantity of asphalt emulsion and cutback shall be at the Contract price per gallon for undiluted asphalt emulsion and neat cutback. Should the Contract fail to include a Contract Item covering payment for the bituminous material used for tack coat, all costs of furnishing and applying bituminous tack coat material will be included in the compensation provided for the bituminous mixture, with no measurement made of the bituminous material used and with no direct compensation being made therefore.
 - 2. Payment shall be at the unit price bid per TON of bituminous surfacing for the respective bituminous courses. The amount bid shall include all material and work required to mix and place the bituminous course specified.
- B. The maximum payment factor for density is 100 percent.
- C. No payment adjustment shall be made for density.
- D. This project is not subject to the provisions of MnDOT 2399.
- E. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated bituminous paving items. Such items of work include but are not limited to:
 - 1. Equipment and materials necessary for meeting the testing requirements of Source Quality Control for the bituminous tack coat, if required, include in price bid for bituminous tack coat.
 - 2. The cost of all labor, equipment and materials necessary to comply with plant and field testing requirements of MnDOT Specification 02360, include in price bid for Plant-Mixed Bituminous Surfacing.
 - 3. The cost of all labor, equipment and materials necessary for constructing clean, vertical, solid edge at the adjacent asphalt surface for both non-wear and wear courses, include in the price bid for Plant-Mixed Bituminous surfacing.
 - 4. Sawcutting the bituminous edges and removing of damaged bituminous just prior to the construction of the next lift of bituminous course.

1.3 SPECIFICATION REFERENCE

- A. Plant mixed asphalt pavement shall conform to the current MnDOT 2360 Plant Mixed Asphalt Pavement and Technical Memoranda in force 30 calendar days prior to bid date and referencing the use of English units of measure, except as modified in these Specifications.
- B. MnDOT 2357 shall apply to the construction of bituminous tack coat, except as modified herein.

- C. Aggregates for bituminous mixtures shall conform to the current MnDOT 3139 Graded Aggregate for Bituminous Mixtures. Copies of MnDOT's current specifications may be downloaded and printed from MnDOT's web site.
- D. Unless noted otherwise, the provisions in this Section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Bituminous Tack Coat:

1. The bituminous material for tack coat will be limited to one of the following kinds of emulsified asphalt. However, the Engineer may authorize the use of medium cure cutback asphalt (MC-250) during the early and late construction season when it is anticipated the air temperature may drop below 32 degrees Fahrenheit. Cutback asphalt shall be used only when approved by the Engineer.

(a) Emulsified Asphalt

- (1) Anionic SS-1, SS-1h
- (2) Cationic CSS-1, CSS-1h

(b) Cutback Asphalt:

- (1) Medium Cure Liquid Asphalt MC-250

2. Only Certified Sources are allowed for use. MnDOT's Certified Source List is located at the following link: <http://www.dot.state.mn.us/products/index.html>.

B. Bituminous material and aggregate shall be as shown on the typical sections in the plans.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Bituminous Tack Coat

1. The tack coat shall not be applied when the road surface or weather conditions are unsuitable as determined by the Engineer.
2. At the time of applying bituminous tack coat material, the road surface shall be dry and clean and all necessary repairs or reconditioning work shall have been completed as provided for in the Contract and approved by the Engineer.
3. Unless otherwise indicated in the Plans or provisions, the bituminous tack coat material shall be applied within the application rates shown in the table below as based on pavement type or condition and type of bituminous material. The Engineer shall approve the time and rate of application. Only a MnDOT certified asphalt emulsion supplier is allowed to dilute the emulsion. When diluted, the supplier shall provide asphalt emulsion diluted 1-part emulsion to 1-part water. Dilution of asphalt emulsion in the field is not allowed. The Engineer may waive the tack coat requirement when multiple lifts are paved on the same day.

Pavement Type or Condition	Application Rate - gallons/sy		
	Undiluted Emulsion SS-1, SS-1H, CSS-1, CSS-1H	Diluted Emulsion (1 part Emulsion to 1 part water) ¹ SS-1, SS-1H, CSS-1, CSS-1H	MC Cutback ² MC-250
New HMA	0.03 – 0.05	0.06 – 0.10	0.03 – 0.05
Aged HMA ³ or Un-milled PCC	0.05 – 0.08	0.10 – 0.15	0.05 – 0.08

Milled HMA or Milled PCC	0.07 – 0.10	0.14 – 0.20	0.07 – 0.10
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¹As provided by the asphalt emulsion supplier

²When approved by the Engineer

³Older than 1 year

4. The temperature of the bituminous material at the time of application shall be approved by the Engineer, within the limits specified following:
 - (a) SS-1, SS-1H, CSS-1, CSS-1H70 to 160 Degrees Fahrenheit
 - (b) MC-250165 to 220 Degrees Fahrenheit
- B. The bituminous wearing course shall be constructed in the construction season following the season in which the underground utilities, aggregate base and bituminous base course have been constructed.
- C. The Contractor is required to use the self-propelled pneumatic tire roller as an intermediate roller on the wearing courses.
- D. Cut the adjacent asphalt surface prior to construction of the bituminous surface course to obtain a clean, vertical, solid edge.
- E. Compaction of all bituminous mixtures shall be by the Maximum Density Method.
 1. Longitudinal Joint Cores:
 - (a) The first paragraph of 2360.3.D.1 of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted and replaced with the following:

D.1 Maximum Density

Compact the pavement to at least the minimum required maximum density values in accordance with table 2360 19, “required minimum lot density (mat)”.
 - (b) Table 2360-20 Longitudinal Joint Density Requirement of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted.
 - (c) 2360.3.D.1.h Mat Density Cores of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted and replaced with the following:

D.1.h Mat Density Cores

Obtain four cores in each lot. Take two cores from random locations as directed by the Engineer. Take the third and fourth cores, the companion cores, within 1.0-foot longitudinally from the first two cores. Submit the companion cores to the Engineer immediately after coring and sawing. If the random core location falls on an unsupported joint, at the time of compaction, (the edge of the mat being placed does not butt up against another mat, pavement surface, etc.) cut the core with the outer edge of the core barrel 1.0-foot away (laterally) from the edge of the top of the mat (joint). If the random core location falls on a confined joint (edge of the mat being placed butts up against another mat, pavement surface, curb and gutter, or fixed face), cut with the outer edge of the core barrel 6.0-inches ± 0.5-inch from the edge of the top of the mat (ex. center of 4.0-inch core barrel 8.0-inches ± 0.5-inches] from the edge of the top of the mat). Cores will not be taken within 1.0-foot of any unsupported edge. The Contractor is responsible for maintaining traffic, coring, patching the core holes, and sawing the cores to the paved lift thickness before density testing.

The Engineer may require additional density lots to isolate areas affected by equipment malfunction, heavy rain, or other factors affecting normal compaction operations.
 - (d) 2360.3.D.1.j Companion Core Testing of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted and replaced with the following:
 - (e) The Engineer will select at least one of the two companion cores per lot to test for verification

- (f) 2360.3.D.1.n Longitudinal Joint Density of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted.
- (g) 2360.3.D.1.p Shoulders of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted.
- (h) Table 2360-24 Payment Schedule for Longitudinal Joint Density (SP Wear and SP Shoulders, 4 percent Void) of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted.
- (i) Table 2360-25 Payment Schedule for Longitudinal Joint Density (SP Non-wear and SP Shoulders, 3 percent Void) of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted.
- (j) 2360.3.D.1.r Pay Factor Determination of the referenced MnDOT 2360 (Plant Mixed Asphalt Pavement) Specification is hereby deleted.

3.2 SOURCE QUALITY CONTROL

- A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current MnDOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project, and is approved by the Engineer. No bituminous mixture shall be placed without an approved mix design.
- B. Testing of the material bituminous tack coat may be required, if determined by the Engineer, that the material appears suspect.

3.3 FIELD QUALITY CONTROL

- A. If required by the Engineer, cores for mat density and for lift thickness verification shall be taken as specified in 2360.D.1.h of the referenced MnDOT Specification except that for daily production less than 300 tons, the Engineer may require that two cores are taken (one for Contractor testing and one companion core). Sample locations shall be designated by the Engineer and made with a drilling device that produces clean sharp, vertical edges.
- B. Lift Thickness Tolerances:
 - 1. Lift thickness tolerances shall be as specified in MnDOT 2360.
 - 2. If any cores indicate lift thicknesses outside of the specified tolerances, the Contractor may, at its own cost and expense, take additional core samples to further define the extent of the deficiency.
 - 3. The Engineer shall calculate deficient pavement areas using the locations and thickness results of all core samples and prorating the thickness profile.
 - 4. Reduction in payment for bituminous courses constructed to more than the maximum permissible thickness shall be in accordance with MnDOT 2360.3.E, except that the thickness tolerances specified herein apply.
- C. Testing:
 - 1. For projects with 2000 tons or less of a particular mix type, delete Tables 2360-10 and 2360-11 of the referenced MnDOT 2360 and substitute the following:

Production Test	Sampling and Testing Rates (each mix type)	Test Reference (Laboratory Manual unless otherwise indicated)	Spec Section
Bulk Specific Gravity	Divide the planned production by 500. Round up to the next whole number	1806	2360.2.G.7.b
Maximum Specific Gravity		1807	2360.2.G.7.c
Air Voids (calculated)		1808	2360.2.G.7.d
Asphalt Content		1853	2360.2.G.7.a

Add AC/Total AC Ratio (calculated)		1853	2360.2.G.7.a
Adj. AFT (Calculated)		1854	2360.2.E.7.e
Gradation	1 gradation per 500 tons or portion thereof (at least one per day)	1203	2360.2.G.7.f
Coarse Aggregate Angularity	1 test per 500 tons or portion thereof. If CAA >8 percent of requirement, 1 sample per day but test 1 per week.	1214	2360.2.G.7.g
Fine Aggregate Angularity (FAA)	1 test per 500 tons or portion thereof. If FAA >5 percent of requirement, 1 sample per day but test 1 per week.	1213	2360.2.G.7.h
Fines to Effective Asphalt Ratio (calculated)	Divide the planned production by 500. Round up to the next whole number	1203 & 1853	2360.2.G.7.f & 2360.2.G.7.a
TSR	As directed by the Engineer	1213	2360.G.7.i
Aggregate Specific Gravity	As directed by the Engineer	1204, 1205, and 181	2360.G.7.j
Mixture Moisture Content	Daily unless otherwise required by the Engineer	1805	2360.G.7.k
Asphalt Binder	As directed by the Engineer]	MnDOT Bituminous Manual 5-693.920	2360.G.7.l

2. For projects with more than 2000 tons of a particular mix type, testing shall be performed at the rates specified in Tables 2360-10 and 2360-11 of the referenced specification.
3. Contractor shall send a copy of the testing results to the Engineer.
4. Should any of the specified tests fail, the Contractor shall notify the Engineer immediately and shall arrange and pay for additional test as may be necessary to satisfy the Engineer that the requirements have been met.

*******END OF SECTION*******

SECTION 02741 - BITUMINOUS PATCH

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of bituminous street patches over areas of utility construction, ROW permitting, or private connections to existing street pavements.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Payment for bituminous patch shall be at the unit price bid per square yard (SY) of bituminous patch. The amount bid shall include all material and work required to construct the bituminous patch as specified on the plans, including:
 - (a) Removal and disposal of bituminous pavements.
 - (b) Common excavation
 - (c) Subgrade Preparation
 - (d) Aggregate Base Course
 - (e) Bituminous Base Course, if specified
 - (f) Bituminous Tack Coat
 - (g) Bituminous Wearing Course
 - (h) Constructing clean vertical edges on adjacent asphalt surfaces.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated bituminous patch. Such items of work include but are not limited to:
 - 1. No exception to the referenced specifications is made.

1.3 SPECIFICATION REFERENCE

- A. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- B. Removing Existing Bituminous Pavements
 - 1. MnDOT 2104 shall apply to the removal and disposal of bituminous pavement, except as modified herein.
- C. Common Excavation
 - 1. MnDOT 2105 shall apply to the common excavation, except as modified herein.
- D. Subgrade Preparation
 - 1. MnDOT 2112 shall apply to the subgrade preparation, except as modified herein.
- E. Aggregate Base Course
 - 1. MnDOT 2211 shall apply to the construction of aggregate base, except as modified herein.
- F. Bituminous Tack Coat
 - 1. MnDOT 2357 shall apply to the construction of bituminous tack coat, except as modified herein.
- G. Bituminous Paving Materials

1. MnDOT 2360, Bituminous Quality Assurance, shall apply to the construction of plant-mixed bituminous surfacing, except as modified herein.
 - (a) MnDOT 02360.6B4: The maximum payment factor for density is 100 percent.
 - (b) MnDOT 02360.7C (Pavement Smoothness Specification – IRI (International Roughness Index) is hereby DELETED.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Subgrade Preparation
 1. No exception to the referenced specification is made.
- B. Aggregate Base Course
 1. The material to be used shall conform to the requirements for Aggregate Base, Class 5.
- C. Bituminous Tack Coat
 1. The bituminous material for tack coat shall be CSS-1H.
- D. Bituminous Paving Materials
 1. Bituminous material and aggregates shall conform to the typical sections shown in the plans.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Unless otherwise shown in the project plans, the depth and class of aggregate base and bituminous surface to be constructed shall be:
 1. Bituminous Patch
 - (a) 2.0-inches Type SPWEA340C
 - (b) Bituminous tack coat
 - (c) Type SPNWB330C of thickness necessary to match the existing pavement thickness or 2 inches, whichever is thicker. Thickness greater than 3-inch lifts shall be installed and compacted in multiple lifts, each with a layer of bituminous tack installed between.
 - (d) MnDOT 2211 Aggregate Base, Class 5 of thickness to match the existing aggregate base thickness or 12 inches, whichever is thicker.
- B. The subgrade, aggregate and bituminous base courses of patches whose smallest dimension is less than the width of the compaction equipment shall be hand tamped.
- C. The subgrade shall be compacted using Quality Compaction Method. Prior to installing aggregate base, the prepared and compacted subgrade must be reviewed and approved by a City of Jordan representative.
- D. When the Contractor believes subgrade preparation is complete, he shall notify the City for a final examination. If the City requires it, the subgrade shall be test rolled with a fully loaded tandem truck to verify subgrade stability.
- E. Aggregate base construction shall take place only after the street subgrade condition and grade has been examined by a City of Jordan representative.
- F. Cut the adjacent asphalt surface prior to the Construction of the bituminous surface course to obtain a clean, vertical, solid edge.
- G. Compaction of the aggregate base courses shall be by the Quality Compaction Method.

- H. The bituminous tack coat shall be applied at the rate of 0.08 gallons per square yard.
- I. The contact surfaces of all fixed structures, the edge of the in-place mixture in all courses at transverse joints, and the wearing course at longitudinal joints shall be given a uniform coating of Liquid Asphalt or Emulsified Asphalt before placing the adjoining mixture. The bituminous material shall be applied by methods that will ensure uniform coating and in no case shall the application be excessive.
- J. The bituminous surfacing shall be constructed with maximum deviation of plus or minus ¼-inch from the planned compacted thickness.
- K. Compaction of all bituminous mixtures shall be by the Ordinary Compaction Method. A nuclear density meter and operator shall be provided by the Contractor, if requested by the Engineer.

3.2 FIELD QUALITY CONTROL

- A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current MnDOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project, and is approved by the Engineer. No bituminous mixture shall be placed without an approved mix design.
- B. Final line and grade of the wearing surface shall not exceed the following tolerances from the adjacent pavement surfaces:

	Distance Below Adjacent Bituminous Pavement (inch)
City Streets	1/8
County Highways	1/8
State Highways	1/8
Sidewalks	1/8
Parking Areas	1/4

******END OF SECTION******

SECTION 02749 - PAVEMENT MARKINGS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to the application of pavement markings as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Pavement markings of the specified width will be measured separately by LINEAL FOOT of each type constructed complete in place as specified. Broken line will be measured by the actual length of line marked and will not include the gap between the broken lines.
 - 2. Pavement messages will be measured separately by the number of EACH type constructed.
 - 3. Crosswalk blocks will be measured by the SQUARE FOOT for the actual area of paint and will not include the space between the blocks.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated pavement markings items. Such items of work include but are not limited to:
 - 1. All costs of preparing the surface, including sandblasting and removing of existing (old) pavement markings on existing pavement areas where a new marking layout is to occur.
 - 2. Controlling and protecting traffic.
 - 3. Maintaining the work, together with any other expenses incurred in completing the work that are not specifically included for payment under other Contract Items.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2581 shall apply to temporary, removable pavement markings, except as modified herein.
- B. MnDOT 2582, 3354, 3590, 3591 and 3592 shall apply to permanent and painted pavement markings, except as modified herein.
- C. MnDOT Pavement and Marking Specifications shall apply. These specifications may be found at <http://www.dot.state.mn.us/products/pavementmarkings/information.html>.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Interim Pavement Markings for application on bituminous base course prior to the construction of the bituminous wearing course shall be:
 - 1. High Solids Water Based Traffic Paints, in accordance with the referenced specification.
- B. Permanent Pavement Markings for application on the final bituminous wearing course shall be:
 - 1. Epoxy Resin Pavement Markings, ground in, in accordance with the referenced specification.
 - 2. Drop-On Glass Beads, in accordance with the referenced specification.

2.2 EQUIPMENT

- A. Application equipment for latex and epoxy resin systems shall consist of a machine of the spray type capable of applying the material under pressure at a controlled temperature through nozzles equipped with remotely controlled cutoff mechanisms and suitable line guides that will produce clean cut lines and prevent excessive material drift.
- B. For highway and street applications, the marking material shall be applied with truck mounted traveling units properly equipped to apply the stripes as required. Where two or more lines are to be applied closely spaced, the machine shall be equipped to apply those stripes simultaneously. For application of broken lines, the applying unit shall include an automatic feed to control device capable of being set to produce the specified stripe gap ratio.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the time of applying the marking material, the application area shall be free of contamination. The contractor shall clean the surface prior to the line application in a manner and to the extent required by the Engineer.
- B. The Contractor shall sandblast or otherwise remove existing (old) pavement markings on existing pavement areas where a new marking layout is to occur.
- C. Pavement markings shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface after cleaning and before the marking material can be applied.
- D. The filling of tanks, pouring of materials or cleaning of equipment shall not be performed on unprotected pavement surfaces unless adequate provisions are made to prevent spillage of the material.
- E. No striping operations will be permitted between sundown and sunrise without written permission from the Engineer.
- F. All material shall be placed in a workmanlike manner, which shall result in a clearly defined line.
- G. All pavement striping shall be 4.0-inches wide, unless noted otherwise on the plans.
- H. Application for the marking material shall be such as to provide uniform film thickness throughout the coverage area. Stripe ends shall be clean cut and square, with a minimum of material beyond the cutoff.
- I. All pavement markings not conforming to the requirements of the Contract shall be removed and replaced or otherwise repaired to the satisfaction of the Engineer. Removal of unacceptable work shall be accomplished with suitable blasting or grinding equipment unless other means are approved by the Engineer.

3.2 ACCEPTANCE

- A. The *Construction Striper Operations Report Form* shall be completed and submitted to the Engineer. The form can be found at the link below:

<http://www.dot.state.mn.us/products/pavementmarkings/information.html>

****END OF SECTION****

SECTION 02751 - CONCRETE PAVEMENT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of Portland cement concrete as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. **All measurements for payments for** Concrete Pavement items shall be based on the Unit Price bid per item.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated concrete paving items. Such items of work include but are not limited to:
 - 1. Furnishing and installing material, as specified, to seal the joints.
 - 2. Unless otherwise shown on the typical section, subcutting the excavation 3-inches below the bottom of the pavement, furnishing, placing and compacting 3.0-inches of aggregate base, Class 5, backfilling with topsoil and related work.
 - 3. Cold weather concrete protection methods and materials required.
 - 4. Provide adequate barricades and personnel to protect fresh concrete from pedestrian traffic and graffiti.
 - 5. Provide temporary walk ways spanning fresh concrete where required to maintain access into building entrances.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2301 shall apply to the construction of concrete pavement, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- C. MnDOT Standard Plan Sheets.

1.4 SUBMITTALS

- A. The mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor. A current mix design may be submitted and accepted, provided the aggregate source is the same as that being used for this project. Two copies of the certified mix design shall be submitted to the Engineer for review prior to the construction of the project.
- B. Test reports and certification by an approved testing laboratory hired by the Contractor that the following meet all of the requirements of these Specifications.
 - 1. MnDOT 3126, Fine Aggregate for Portland Cement Concrete.
 - 2. MnDOT 3137, Coarse Aggregate for Portland Cement Concrete.
 - 3. ASTM C-1260, Fine aggregate and cementitious material.
- C. In the event ready-mix concrete is used, the Contractor shall furnish the Engineer with numbered delivery tickets showing the date, time, place of delivery, number of cubic yards, the weight of cement, fine aggregate and coarse aggregates, and amount of mixing water in each load. At the end of each paving day, the Contractor shall obtain from the supplier a summary showing the average component amounts that day.

PART 2 -- PRODUCTS

2.1 MATERIAL

- A. The coarse aggregate shall contain a minimum of 50 percent of Class A material as specified in MnDOT 3137.
- B. The coarse aggregate designation shall be CA-35 from MnDOT Table 3137-2.
- C. The source of fine and coarse aggregates shall be one currently approved by the Minnesota Department of Transportation.
- D. Deformed tie bars shall be epoxy coated in accordance with MnDOT 3301.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The use of dimensional lumber as forms is permitted if the dimension of the lumber is within ½-inch of the specified dimension of the finished concrete.

- B. A bull float with 8-foot minimum width shall be used for finishing the concrete.

Transverse control contraction joints shall be sawed at 60.0 to 75.0-foot intervals within 24 hours of placing the concrete. Transverse contraction joints shall be sawed at approximately 15-foot intervals in accordance with the Plans.

- C. Additional reinforcing bars shall be placed in the concrete pavement around manhole castings as shown in the plan detail.
- D. Longitudinal, contraction and expansion joints shall be constructed as specified in MnDOT 2301.

3.2 FIELD QUALITY CONTROL

- A. The Owner may conduct various material tests throughout the construction to determine conformance with these specifications, including but not limited to:
 - 1. Air and slump cone tests.
 - 2. Beam and cylinder testing.
- B. The Contractor's shall cooperate with the individuals conducting the testing operations.
- C. If allowed by the Engineer in lieu of smoothness testing per reference MnDOT 2301.M3, a 10.0-foot straight edge or bull float with the capability of checking the deviation in any direction over the entire width of the fresh concrete shall be supplied by the Contractor during all concrete pavement installation. The Contractor shall check the pavement longitudinally in each driving and parking lane by placing the straight edge in a wheel track or center of panel, and moving the straight edge at 5.0-foot overlaps. The Contractor shall check the pavement transversely where directed by the Engineer. The acceptable deviation tolerance shall be a 1/8-inch dip or hump as measured in 10-feet. A 1/8-inch deviation in less than 10.0-feet shall be considered out of tolerance. There shall be no more than one 1/8-inch deviation in 25.0-feet. The Contractor may make corrections during placement while the concrete is still fresh. Otherwise, the Engineer may require corrective action after the concrete has cured. Dips shall be corrected by full panel replacement. Humps may be corrected by grinding as directed by the Engineer.

*******END OF SECTION*******

SECTION 02770 - CONCRETE CURBING AND DRIVEWAY PAVEMENT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This work consists of constructing cast-in-place concrete curbs, curb and gutter, medians, driveway pavement, pedestrian ramps, and other similar traffic delineation or service items as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Special curb and gutter sections shall be measured and paid for as a part of the design style of curb and gutter shown on the plans.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated concrete curb and gutter, and concrete driveway items. Such items of work include, but are not limited to:
 - 1. Aggregate base placed under pavements.
 - 2. Cold weather concrete protection methods and materials required.
 - 3. High early strength concrete.
 - 4. Provide adequate barricades and personnel to protect fresh concrete from pedestrian traffic and graffiti.
 - 5. Provide temporary walk ways spanning fresh concrete where required to maintain access into building entrances.
 - 6. Casting and curing concrete compressive test cylinders and the performance of compressive strength tests as specified.
- C. Slump and air entrainment testing.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2531 shall apply to the work under this section, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- C. MnDOT Standard Plates.

1.4 SUBMITTALS

- A. The mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor. A current mix design may be submitted and accepted, provided the aggregate source is the same as that being used for this project. Two copies of the certified mix design shall be submitted to the Engineer for review prior to the construction of the project.

1.5 MATERIAL

- A. Fifty percent of the coarse aggregate shall be Class A material as specified in MnDOT 3137.
- B. The coarse aggregate designation shall be CA-35 from MnDOT Table 3137-2.
- C. High early strength concrete shall be used for all driveway pavement in occupied properties.

1. For such properties, driveway pavement shall be installed within 2 calendars following curbing construction. A deduction equal to \$100 per property per calendar day shall apply for the contractor's failure to comply with this timeline.

PART 2 -- EXECUTION

2.1 CONSTRUCTION REQUIREMENTS

- A. The use of dimensional lumber as forms is permitted if the dimension of the lumber is within ½-inch of the specified dimension of the finished concrete.
- B. The width of all driveways shall be established in the field by the project Engineer or Owner.
- C. The joints in the driveway pavement shall match with the sidewalk and curb control joints. The Contractor shall be fully responsible for proper jointing patterns. Mismatched jointing will require removal and replacement of components in order to achieve the desired results. All removal and replacement of rejected construction shall be at the Contractor's expense.
- D. The tooling tolerances as outlined in MnDOT 2531 for surface uniformity, alignment and jointing shall be reviewed by the Contractor prior to the construction. Defects found during examinations will require the Contractor to remove and replace those areas. No deduction in unit price will be acceptable to satisfy defective areas found.
- E. Backfill along exposed edges of slabs and/or behind the curb with selected salvage material from the excavation to the elevation shown on the design detail plate.
- F. The Contractor shall imprint the concrete curb at the locations of the utility service locations if indicated and in accordance with the plans.
- G. When the pavement is placed directly on natural subgrade, earth check dams shall be constructed immediately after passage of the slip forms or removal of the forms to prevent water from flowing along the edge of the pavement and undermining the concrete. They shall not be spaced or be of a width to provide an approach over which a vehicle may be driven onto the pavement.

2.2 FIELD QUALITY CONTROL

- A. Testing
 1. The following material tests shall be conducted as determined by the Engineer throughout the construction to determine conformance with these specifications, including but not limited to:
 - (a) Air and slump cone tests.
 - (b) Beam and cylinder testing.
 2. The Contractor's shall cooperate with the individuals conducting the testing operations.
- B. Warranty Period
 1. Contractor shall warranty installation for two years from the date of project substantial completion. Necessary repairs shall include but not be limited to defects in concrete and workmanship such as cracking, pop-outs, spalling, improper joint placement and settlement.

*******END OF SECTION*******

SECTION 02775 - WALKS - CONCRETE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This work consists of constructing concrete or bituminous walks

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
- B. Payment for constructing pedestrian ramps shall be measured and paid per area at the unit price bid in the Schedule of Unit Prices, complete and in place.
- C. Payment for constructing truncated domes shall be measured and paid at the unit price bid per Square Foot (SF) in the Schedule of Unit Prices, complete and in place.
- D. Special walk sections shall be measured and paid for as a part of the design style of walk as shown on the plans.
- E. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated walks - concrete items. Such items of work include but are not limited to:
 - 1. Cold weather concrete protection methods and materials required.
 - 2. Provide adequate barricades and personnel to protect fresh concrete from pedestrian traffic and graffiti.
 - 3. Provide temporary walk ways spanning fresh concrete where required to maintain access into building entrances.
 - 4. Use of high early strength concrete where required.

1.3 SPECIFICATIONS REFERENCES

- A. MnDOT 2521 shall apply to the construction of concrete walks, except as modified herein.
- B. MnDOT Standard Plates.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

- A. Two copies of the certified mix design shall be submitted to the engineer for review prior to the construction of the project. The mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor. A current MnDOT Design Mix may be accepted provided the aggregate sources are the same as that being used for this project.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. CONCRETE
 - 1. Fifty percent of the coarse aggregate shall be Class A material as specified in MnDOT 3137.
 - 2. The coarse aggregate designation shall be CA-35 from MnDOT Table 3137-2.
- B. TRUNCATED DOME SYSTEMS FOR PEDESTRIAN CURB RAMPS.

1. The approved products are those listed on the MnDOT web site – No Stainless Steel ramps are allowed.
<http://www.dot.state.mn.us/products/detectablewarningsurfaces/index.html>.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The use of dimensional lumber as forms is permitted if the dimension of the lumber is within ½-inch of the specified dimension of the finished concrete.
- B. When the pavement is placed directly on natural subgrade, earth check dams shall be constructed immediately after passage of the slip forms or removal of the forms to prevent water from flowing along the edge of the pavement and undermining the concrete. They shall not be constructed to provide an approach over which a vehicle may be driven onto the pavement.

3.2 FIELD QUALITY CONTROL

A. Testing

1. The following material tests shall be conducted as determined by the Engineer throughout the construction to determine conformance with these specifications, including but not limited to:

- (a) Air and slump cone tests.
- (b) Beam and cylinder testing.

2. The Contractor's shall cooperate with the individuals conducting the testing operations.

B. Warranty Period

1. Contractor shall warranty installation for two years from the date of project substantial completion. Necessary repairs shall include but not be limited to defects in concrete and workmanship such as cracking, pop-outs, spalling, improper joint placement and settlement.

******END OF SECTION******

SECTION 02785 - BITUMINOUS SEAL COAT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of bituminous seal coating as indicated on the plans or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Measurement and payment for bituminous seal coat shall comply with MnDOT 2356.
 - 2. No exception to the referenced specification is made.
 - 3. Measurement of Seal Coat Aggregate, FA-2, shall be by the square yard and shall be paid at the unit price bid.
 - 4. If weigh tickets are supplied from an outside supplier upon the delivery of the aggregate to a temporary stockpile, a quantity will be deducted from the totals for material that is contaminated and/or not used on the project streets. The Engineer will examine, measure, and calculate the amount of material remaining in the temporary stockpile and deduct the amount from the total quantity supplied with the tickets.
 - 5. The Contractor shall notify the Engineer prior to exceeding the plan quantities as listed in the Schedule of Prices. Any materials delivered to the project in excess of the original planned quantities will not be paid for without first notifying and obtaining the Engineer's permission.
 - 6. Failing gradations will result in a price reduction. The Contract bid price for seal coat aggregate will be reduced 2 percent, for each 1 percent passing outside of the requirements for any sieve, except the 75 mm (#200) sieve. The 75 mm (#200) sieve will have 2 percent price reduction for each 0.1 percent outside of the specification. Deductions for all failing results will be cumulative.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated bituminous seal coat items. Such items of work include but are not limited to:
 - 1. Provide adequate barricades and personnel to control vehicular and pedestrian traffic.
 - 2. Locating and notifying vehicle owners to move their vehicles so the streets can be sealed.
 - 3. Protecting existing improvements from damage.
 - 4. Protecting of manhole castings and gate valve covers from being coated with bituminous material.
 - 5. Sweeping and removing all objectionable foreign material, including weed growth, prior to applying the seal coat material.
 - 6. Cleaning of gutters or other areas as necessary if the seal coat oil and rock get washed by rain into them prior to setup of the oil and rock. Re-sealing of areas that are washed is also required.
 - 7. Equipment and labor necessary to provide for a neat clean, and orderly stockpile of aggregate if a temporary stockpile is to be used.
 - 8. Maintaining seal coated roadways, including the removal of "wash boards" and leveling aggregate to provide a uniform surface thickness, and avoid bleeding up until the time of sweeping up the excess rock.

9. The cost of all labor, equipment and materials necessary for meeting the testing requirements of Source Quality Control, if required, include in price bid for Bituminous Seal Coat.
10. Cleanup of temporary aggregate stockpile location(s) following completion of the project.
11. Placing and removing "No Parking" signs, as specified.
12. Mobilization of equipment and personnel to and from the job site.

1.3 SPECIFICATION REFERENCE

- A. MnDOT 2356 shall apply to the construction of bituminous seal coat, except as modified herein.
- B. MnDOT 3127 shall apply to the aggregate material, except as modified herein.
- C. MnDOT 3151 shall apply to bituminous material, except as modified herein.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Seal Coat Aggregate:
 1. Seal coat aggregate shall be FA-2 with a modified gradation of 69 to 100 percent passing the No. 4 sieve per MnDOT 3127. The aggregate material shall be Class A rock per MnDOT 3137.2B
- B. Bituminous Material
 1. Bituminous material shall be CRS-2P (polymer added) conforming to the requirements of MnDOT 3151E. NOTE: Do not use anti-stripping additives with emulsions.

2.2 SOURCE QUALITY CONTROL

- A. The Contractor shall arrange for and pay all costs associated with having the following testing performed. The initial tests shall be completed, submitted to, and approved by the Engineer prior to the commencement of the project:
 1. Two gradation and two percent crushing tests from supplier stockpiles for FA-2 modified aggregate to be supplied for this project.
- B. A Certificate of Compliance from the refinery shall be provided with each transport load of bituminous material delivered to the job site. The Contractor shall also provide two clean, dry, one-gallon containers with tight covers for sampling each load. The Contractor shall assist the Owner in obtaining two samples from each load. If, in the opinion of the Owner, the seal coating surface appears defective, the Owner may order that some or all of the samples be laboratory tested in accordance with ASTM D9777, at the Contractor's cost and expense.
- C. All testing shall be performed by an independent testing laboratory approved by the Engineer.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall give the Owner adequate time to complete all necessary street patching prior to the bituminous seal coat application.
- B. If requested by the Contractor, the Owner will spray to kill weeds and grass on project streets prior to the Contractor coming to the site to perform the seal coat work. It is the Contractor's responsibility to notify the Owner prior to coming to the site. The Owner will spray the weeds if requested by the Contractor, but makes no guarantee that the weeds will die. It shall be the Contractor's responsibility to remove all weed or grass growth on the project streets prior to seal coating. This includes weeds and/or grass between the gutter lip and the bituminous pavement.

- C. The Contractor shall be aware of the weather forecast. Seal coating shall NOT be performed if rain is predicted within two hours of applying the seal coat.

3.2 NO PARKING DESIGNATION

- A. The Contractor shall post all streets in the project area for temporary no parking. Posting signs shall indicate the dates the no parking designation is in effect. Each street shall be posted a minimum of 48 hours prior to the designation starting date. The Contractor is solely responsible for the installation and removal of no parking signage. The Contractor shall coordinate street posting with the city staff.

3.3 CONSTRUCTION DETAILS

- A. No seal coating operations will be permitted until all necessary and required equipment is on site and functioning.
- B. Prior to any seal coating, the Contractor shall coordinate any necessary parking restrictions and provide barricades as needed to permit seal coating to proceed.
- C. The Contractor shall perform one complete sweeping of the areas to be seal coated immediately prior to beginning work, and will remove all objectionable foreign matter, including weed growth, on the road surface.
- D. The Contractor shall protect all manhole covers, valve box covers and catch basin castings by covering them with building paper or other suitable methods to prevent such items from being sprayed with bituminous material. Placing aggregate directly on these structures without a barrier is not acceptable.
- E. The Contractor shall exercise care to avoid over spraying on adjacent concrete walk, curb and gutter, and other structures. A minor overlap on the outside edge of the concrete gutter will be permitted. However, over spray on the remainder of the gutter, on the curb, on the walk or on other structures shall be removed at the Contractor's expense.
- F. The Contractor shall take the necessary precautions to prevent the seal coat aggregate from entering any manholes, catch basins or water valve boxes.
- G. Any aggregate spill and/or tracking shall be cleaned by the Contractor from the surface prior to the application of the bituminous seal coat material.
- H. The aggregate spreader shall be a self-propelled type mounted on pneumatic tired wheels located to operate on the freshly applied aggregate. Truck mounted spreaders are not acceptable.
- I. The Contractor shall comply with the requirements of MnDOT 2356 for rolling operations, including time limitations, required equipment type and number of rollers on site.
- J. Upon completion of the bituminous seal coat application, the Contractor shall remove all coverings and excess seal coat materials from manhole covers, catch basins, and water valve boxes and restore them to their original condition.
- K. The Contractor shall sweep the excess seal coat aggregate from the streets approximately 14 to 21 days following the application.
- L. Surplus aggregate shall be the property of the Owner and the Contractor shall stockpile the surplus at a location directed by the Owner.
- M. Application Rates:

	Aggregate Applic. Rate	Oil Rate CRS-2P¹ Emulsion
Granite (FA-2, Class A):	22-27 lbs/sy	0.34 – 0.37 gal/sy
¹ Applications rates measured at 60 degrees Fahrenheit (cold or net gallons used)		

- N. Seal coating shall not be applied before May 15 or after August 10, for the part of Minnesota located in the North and North-Central Road Spring Restriction Zone; or not before May 15 or after August 31, for the part of Minnesota located south of the North and North-Central Spring Road Restriction Zone.
- O. The Contractor shall maintain barricades and traffic control measures until the seal coat has cured adequately so that vehicles are not "tracking" the cover aggregate.
- P. In the event a second seal coat application is required, the second application shall not be made until the first has had adequate time to cure.
- Q. The Contractor shall maintain seal coated roadways. Maintenance shall include the removal of "wash boards" and leveling of aggregate to provide uniform surface thickness.
- R. If rain occurs prior to the seal coat oil and rock setting up on the project streets, and the rock and oil get washed into the gutters or other areas, the Contractor shall clean these areas to their original condition. Re-seal coating of various areas may also be required.
- S. In the event the Contractor chooses to temporarily stockpile the aggregate at a City facility, the Contractor shall adhere to the following conditions:
 - 1. The haul route shall be followed. The Contractor shall submit a proposed haul route. The Contractor shall document the condition of the haul route prior to beginning of hauling and shall repair all damage that is a result of use of a haul route at no cost to the Owner.
 - 2. A Contractor operated loader or dozer shall be present during the stockpiling operation to maintain a clean and orderly stockpile.
 - 3. All excess and/or contaminated material shall be removed by the Contractor immediately following the seal coat work and the site shall be re-graded to its original condition.
 - 4. All cleanup of the stockpile site shall be completed prior to final payment.
 - 5. The amount of aggregate remaining in the stockpile, or contaminated, wasted, and/or not used on the project shall be deducted from the totals shown on the weigh tickets.

******END OF SECTION******

SECTION 02820 - CHAIN LINK FENCE AND GATES

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of chain link fence and gate as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. The fence shall be paid at the unit price bid per linear foot, furnished and installed complete including wire fabric, posts, bracing, fittings, black vinyl coating, and any other materials or appurtenances required to complete the installation in accordance with the Plans and the requirements of this Specification.
 - 2. Gates of each width and type will be paid at the unit price bid per each gate furnished and installed complete including wire fabric, posts, bracing, fittings and any other materials or appurtenances required to complete the installation in accordance with the Plans and the requirements of this Specification.
- B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated fencing items. Such items of work include but are not limited to:
 - 1. No exception to the referenced specification is made.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2557 shall apply to fencing except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. CHAIN LINK FABRIC
 - 1. Wire for chain link fabric shall be helically wound and woven to a height shown on the plans. Chain link fabric shall meet the requirements of ASTM A392 for the following:
 - (a) Residential:
 - (1) 2¼-inch mesh
 - (2) 12 gauge wire
 - (3) Class 1 zinc coating (1.2 oz/sq. ft min.)
 - (b) Commercial/Industrial:
 - (1) 2.0-inch mesh
 - (2) 9 gauge wire
 - (3) Class 2 zinc coating (2.0 oz/sq. ft min.)
 - (c) Tennis Court:
 - (1) 1¾-inch mesh

- (2) 11 gauge wire
 - (3) Class 2 zinc coating (2.0 oz/sq. ft min.)
- 2. All selvages shall be knuckled unless otherwise specified or shown on the plans.
- 3. Farbric shall be vinyl coated black in color.
- B. POSTS FOR FENCING AND GATES:
 - 1. Posts shall be Group IC round steel pipe (Schedule 40) as specified in ASTM F1043. Pipe shall have Type A coating inside and out (1.8 oz./sq. ft. minimum average zinc coating in accordance with ASTM Specification F1083).
 - 2. Post diameters and lengths shall be as shown on the plans and details for the fence heights and gate widths to be provided.
- C. TOP RAIL AND BRACING
 - 1. Top rail shall be ASTM F1083, Type 1, (Schedule 40) round steel pipe. Pipe shall be hot-dipped galvanized inside and out with a minimum average zinc coating of 1.8 oz/sq.ft. surface area.
 - 2. Top rail dimensions shall be as follows, unless otherwise shown on the plans:
 - (a) Outside diameter: 1.66 inches (1½ to 5/8-inch O.D in fencing terminology)
 - (b) Wall thickness: 0.140-inch
 - (c) Weight: 2.27 pounds/foot
 - 3. Top rails shall pass through the bases of extension arms, which shall be provided on the top of each post, and shall form a continuous brace from end to end of each stretch of fence.
 - 4. Top rails shall be provided with expansion rail couplings and shall be securely fastened to gate and terminal posts by means of suitable hot-dip galvanized connections.
 - 5. End, gate and corner posts shall be suitably braced by means of 1-5/8-inch O.D. steel pipe weighing not less than 2.27 pounds per linear foot, set in horizontal position, with adjustable truss braces between terminal and first intermediate posts, complete with all fittings hot-dip galvanized.
 - 6. Terminal posts shall be laterally braced.
 - 7. Swing gates shall be provided with auxiliary side braces where necessary.
 - 8. Posts shall be vinyl coated black in color.
- D. GATES
 - 1. Gates shall be fabricated by the manufacturer of the fence in which they are installed.
 - 2. The gate frames shall be fabricated using the following framing materials:
 - (a) Perimeter gate frame:
 - (1) Outside diameter: 1.900 inches (2.0-inch O.D in fencing terminology)
 - (2) Wall thickness: 0.145-inches
 - (3) Weight: 2.72 pounds/foot
 - (b) Intermediate braces:
 - (1) Outside diameter: 1.66-inches (1-5/8-inch O.D in fencing terminology)
 - (2) Wall thickness: 0.140-inches
 - (3) Weight: 2.27 pounds/foot

3. The gates shall be filled with fabric to match the line fence fabric. Fabric shall be built into each gate frame by means of stretcher bars and adjustable bolt hooks.
4. Hinges shall be of heavy malleable iron, hot-dip galvanized. A hot-dip galvanized latch of the drop bar type, arranged for padlocking, shall be provided for each gate.
5. A heavy duty Schlage, Yale, Masterlock or equal padlock with not less than two keys shall be provided for each gate.

E. ACCESSORIES

1. Chain link fence accessories shall conform to ASTM F 626. Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.
2. Post caps:
 - (a) Formed steel or cast malleable iron weather tight closure cap for tubular posts. Provide one cap for each post. Cap to have provision for barbed wire when necessary.
 - (b) Where top rail is used, provide tops to permit passage of top rail.
3. Top rail and rail ends shall be pressed steel per ASTM F626, for connection of rail and brace to terminal posts.
4. Top rail sleeves shall be 7.0-inch expansion sleeve with a minimum 0.137-inch wire diameter and 1.80-inch length spring, allowing for expansion and contraction of top rail.
5. Wire ties shall be 9 gauge, 0.148-inch galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge for rails and braces. Hog ring ties of 12-1/2 gauge for attachment.
6. Brace and tension (stretcher bar) bands shall be pressed steel, minimum 300 degrees profile curvature for secure fence post attachment.
7. Tension (stretcher) bars shall be one piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16-inch x 3/4-inch. Provide tension (stretcher) bars where chain link fabric meets terminal posts.
8. Tension wire: Galvanized coated steel wire, 6 gauge wire with tensile strength of 75,000 psi. Zinc coating shall match that specified for the chain link fabric. Zinc coating shall match that specified for the chain link fabric.
9. Truss rods & tightener shall be steel rods with minimum diameter of 5/16-inch capable of withstanding a tension of minimum 2,000 lbs.
10. Barbed wire shall meet the requirements of ASTM A 121, Class 3, zinc coated steel wire double-strand, 12-1/2 gauge [0.099-inch twisted line wire with galvanized steel, 4 point barbs spaced approximately 5-inch on center.
11. Barbed wire supporting arms shall be pressed steel arms with provisions for attaching 3 rows or barbed wire. Arms shall withstand 250 lb. downward pull at the outermost end of arm without failure.
 - (a) Provide [3 strands, single arm] [6 strands double "V" arms].
 - (b) Provide intermediate arms with hole for passage of top rail.
12. Nuts and bolts shall be galvanized.
13. Privacy Slats shall be fabricated from a quality high density virgin polyethylene and contain ultraviolet inhibitors. Color shall be selected by the Owner from the manufacturers standard color palate.

F. CONCRETE

1. Concrete for post foundations shall be MnDOT Mix Designation 3B32 or approved equal. Two copies of the certified mix design shall be submitted to the engineer for review prior to the construction of the project. The mix proportions shall be determined by an independent certified testing laboratory

secured by the Contractor. A current MnDOT Design Mix may be accepted provided the aggregate sources are the same as that being used for this project.

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. All earth, brush or other obstructions that interfere with the proper alignment of construction of fences shall be removed and disposed of.
- B. Corner, brace and gate posts shall be set vertically plumb in circular concrete foundations as indicated on the plans. Corner posts shall be installed where the fence deflects 30 degrees or more. Place concrete around posts in a continuous pour. The top of the foundation shall extend above the ground surface and shall be crowned not less than one inch to provide adequate drainage away from the post. Trowel finish around post.
- C. All line posts shall be installed vertically plumb and spaced uniformly and intervals not exceeding 10.0-feet. Intermediate line posts shall be air driven to a depth of four feet unless otherwise indicated on the plans.
- D. The fence shall be so erected that the bottom of the fencing will follow the contour of the grade surface with 1.0-inch maximum clearance. The gate shall align with the top of the fence and shall have a 3.0-inch maximum clearance at the bottom.
- E. Bracing shall be provided at all end, gate and corner posts, the latter in both directions. Horizontal brace rails shall be set midway between top rail and ground running from the corner, end or gate post to first line post. Diagonal tension members shall connect tautly between posts below horizontal braces.
- F. The chain-link fabric shall be fastened on the side of the posts as shown or as designated by the Engineer. The fabric shall be stretched and securely fastened to the posts, and, between the posts, the top and bottom edges of the fabric shall be fastened to the top rail and tension wire, respectively. The tension wires shall be stretched tight with turnbuckles at the end and corner posts. The bottom tension wire shall be installed on a straight grade between posts.
- G. The fabric shall be fastened to the end, corner and gateposts with stretcher bars and stretcher bar bands spaced approximately 14.0-inches on line posts and at approximately 18.0-inches on tension wires.
- H. Any galvanized coating damaged during construction of the fencing shall be repaired by application of molten Galvo-Weld, Galvinox or equal.

******END OF SECTION******

SECTION 02830 - MODULAR BLOCK RETAINING WALL SYSTEM

PART 1 -- GENERAL

1.1 SUMMARY

- A. The work under this section of these specifications includes, or is incidental to, the design, furnishing, and constructing a dry cast modular block retaining wall in compliance with Standard Detail 7008J. The work shall include the footings, drainage, the modular block, anchoring devices, railings, specified accessories and related items of construction.
- B. The retaining wall shall be constructed in the location and configuration as shown on the plans; however, the Engineer reserves the right to alter this alignment to improve constructability and/or aesthetics.
- C. Geosynthetic wall reinforcement (if required) shall be designed as part of the modular block retaining wall system and shall be certified by the designer of the retaining wall system that it meets the necessary strength and durability criteria for the application.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Measurement of the Modular Block Retaining Wall shall be by the square feet (SF) of wall installed as measured from the bottom of the block at the footing base to the top of the wall cap for the wall length. Payment at the contract price shall be compensation in full for all costs of furnishing and installing a complete wall system.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated retaining wall items. Such items of work include but are not limited to:
 - 1. Furnishing and installing appropriate sub-drainage, including piping and granular backfill, include in the price bid for retaining wall.
 - 2. Excavation below and behind wall, furnishing and installing granular footing material, drainage aggregate, and granular backfill, include in the price bid for retaining wall.
 - 3. Furnishing and installing a geosynthetic wall reinforcement system or approved other anchoring system, include in the price bid for retaining wall.
 - 4. Disposal of any excess or unsuitable excavated material, include in the price bid for retaining wall.
 - 5. Protecting existing improvements from damage, include in the price bid for retaining wall.
 - 6. Gradation and compaction testing to meet requirements of source and field quality control, include in the price bid for retaining wall.
 - 7. Preparation, furnishing, and applying surface sealer as specified herein, include in the price bid for retaining wall.
 - 8. Providing color samples and furnishing the selected block in any color in the manufacturer's standard color palette, include in the price bid for retaining wall.

1.3 SPECIFICATION REFERENCE

- A. NCMA Design Manual For Segmental Retaining Walls
- B. Unless otherwise noted, the provisions in this Section are in addition to the referenced specifications.
- C. In addition, all work and equipment shall conform to the most current applicable OSHA standards.

1.4 SUBMITTAL

- A. Product Data: Material description and installation instructions for each manufactured product specified.
- B. Shop Drawings: Retaining wall system design, including wall elevation views, geosynthetic reinforcement layout, pertinent details, and drainage provisions. The shop drawings shall be signed by a professional engineer licensed in the state in which the wall will be installed.
- C. Design:
 - 1. The successful bidder shall submit detailed design drawings and computations for the construction of the modular block retaining wall. The drawings and computations shall include, but not be limited to, footing / foundation drawings, wall details, anchoring requirements, compaction requirements, subdrainage details, railing details, re-bar schedules and other drawings and details that are appropriate for the successful completion of the project.
 - 2. Included shall be a typical section detailing excavation limits, geotextile locations, block embedments, leveling pad dimensions, backfill, etc. Include as many sections and other views necessary for the construction and inspection of the wall. The information on embedment, geotextile locations, and geotextile lengths as they relate to wall heights may be shown in tabular form. Also included shall be pertinent information on the individual blocks, the geotextile material and compaction requirements.
 - 3. All drawings submitted by the Contractor shall be certified and signed by a Professional Engineer licensed in the state in which the wall will be installed. Each plan sheet shall clearly identify the name of the responsible engineering firm and the name of the person certifying the plan.
 - 4. Engineering design calculations shall be prepared in accordance with the NCMA Design Manual for Segmental Retaining Walls.
 - 5. Analysis of global stability must be addressed and incorporated into the design for installations involving multiple retaining walls.
- D. Samples
 - 1. Furnish samples showing standard color selections for the block type being supplied.
 - 2. Furnish one unit in the color and face pattern specified, if requested.
 - 3. Furnish 12.0-inch square or larger piece of the geosynthetic reinforcement specified.
- E. Test Reports: Independent laboratory reports stating moisture absorption and compressive strength properties of the concrete retaining wall units meet the Project Specifications when tested in accordance with ASTM C140, Sections 6, 8 and 9.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. CONCRETE RETAINING WALL UNITS:
 - 1. Physical Requirements:
 - (a) The units shall conform to ASTM C1372, except that:
 - (1) The minimum compressive strength requirements shall be 38 Mpa (5500 psi) for any individual unit and 40 Mpa (5800 psi) for the average of 3 units.
 - (2) The freeze/thaw durability of wall units tested in accordance with ASTM C 1262 in a 3 percent saline solution shall be the minimum of the following:
 - 1. The weight loss of each of five test specimens at the conclusion of 90 cycles shall not exceed 1 percent of its initial weight; or

2. The weight loss of 4 out of 5 test specimens at the conclusion of 100 cycles shall not exceed 1.5 percent of its initial weight, with the maximum allowable weight loss for the 5th specimen to not exceed 10 percent.
- (3) The freeze/thaw durability of cap units test tested in accordance with ASTM C 1262 in a 3 percent saline solution shall be the minimum of the following:
 1. The weight loss of each of five test specimens at the conclusion of 40 cycles shall not exceed 1 percent of its initial weight; or
 2. The weight loss of 4 out of 5 test specimens at the conclusion of 50 cycles shall not exceed 1.5 percent of its initial weight, with the maximum allowable weight loss for the 5th specimen not to exceed 10 percent.
- (4) Cap units must meet the requirements of (a) and (c) and have a top surface sloped at minimum of 1 mm fall per 10 mm run (1.0-inch fall per 10.0-inches run) front to back or be crowned at the center.
- (5) ASTM C 1262 test results shall be recorded and reported in 10 cycle intervals
- (6) It is the intention of this testing that 100 percent of the wall units and cap units meet the weight loss requirements for (b1) and (c1) respectively, or that a minimum of 80 percent of the wall units and cap units tested meet the weight loss requirements for (b2) and (c2) respectively. If a manufacturer chooses to increase the sample size tested beyond the 5 units required for each block type, these percentages will still apply to the sample size chosen (i.e. if a sample size of 7 blocks is tested a minimum of 6 must meet the weight loss requirement of (b2) or (c2), if a sample size of 10 blocks is tested a minimum of 8 must meet the weight loss requirement).
- (7) The minimum required sampling rate for laboratory testing is one sample set per 10,000 units or fraction thereof, with a minimum of one sample per product type per contract. Sample size = 5 whole units per block type. Wall units and cap units are considered separate block types.
- (8) Sampling and testing shall conform to ASTM C 140, except that: Section 6.2.4 shall be deleted and replaced with:

“The specimens shall be coupons cut from a finished side or back shell of each unit and sawn to remove any face shell projections. The coupon size shall have a height to thickness ratio of 2 to 1 before capping and a length to thickness ratio of 4 to 1. The coupon shall be cut from the unit such that the coupon height dimension is in the same direction as the unit height dimension. Compressive testing of full size units will not be permitted. The compressive strength of the coupon shall be assumed to represent the net area compressive strength of the whole unit.”
- (9) Cap units and wall units shall be sampled and tested as separate block types.
2. Unit Face Area: 1.0-square feet.
3. Color: Selected by the Owner from manufacturer's full range of standard colors.
4. Face Pattern Geometry: Beveled.
5. Texture: Split Rock Face.
6. Batter: 1V:8H
7. Acceptable Products:
 - (a) Diamond Pro as manufactured by Anchor Block Company.
 - (b) Classic 8 as manufactured by Rockwood Retaining Walls.

(c) Square Foot as manufactured by Versa-Lock Retaining Walls.

(d) Standard Unit as manufactured by Keystone Retaining Walls

B. SURFACE SEALER

1. Surface sealers shall be a type listed on the MnDOT Approved/Qualified Products list for segmental masonry wall sealants. The list is available on the MnDOT website at:
<http://www.dot.state.mn.us/products/index.html>.

C. GEOSYNTHETIC WALL REINFORCEMENT

1. Polyester fiber geogrid or geotextile, or polypropylene woven geotextile, as shown on the plan or as recommended by the retaining wall block manufacturer.

D. SUB-SURFACE DRAINS

1. Perforated PVC drain pipe, SDR35 (ASTM D3034)

E. GRANULAR MATERIALS

1. The drainage aggregate shall conform to the requirements of MnDOT 3149 for coarse filter aggregate.
2. The granular backfill shall be select granular borrow conforming to MnDOT Spec 3149 modified as follows:
 - (a) Pit-run or crusher-run material that is graded from coarse to fine such that 100 percent of the material must pass the 2.0-inch sieve and that the ratio of the proportion passing the #200 sieve divided by the portion passing the 1.0-inch sieve (#200/1.0-inch ratio) may not exceed 10 percent by mass.

F. CONSTRUCTION ADHESIVE

1. Exterior grade adhesive as recommended by the retaining wall unit manufacturer or where shown on the plans.

2.2 SOURCE QUALITY CONTROL

- A. Sampling and testing shall be performed by the modular block supplier in accordance with ASTM C1372

PART 3 -- EXECUTION

3.1 RETAINING WALL ERECTION

- A. General: Erect units in accordance with manufacturer's instructions and recommendations, and as specified herein.
- B. Place first course of concrete wall units on the prepared base material. Check units for level and alignment. Maintain the same elevation at the top of each unit within each section of the base course.
- C. Ensure that foundation units are in full contact with natural or compacted soil base.
- D. Place concrete wall units side-by-side for full length of wall alignment. Alignment may be done by using a string line measured from the back of the block. Gaps are not allowed between the foundation concrete wall units.
- E. Place drainage aggregate (12.0-inches, minimum unless otherwise shown on the drawings) between, and directly behind the concrete wall units. Fill voids in retaining wall units with drainage aggregate. Provide a drainage zone behind the wall units to within 9.0-inches of the final grade. Cap the backfill and drainage aggregate zone with 9.0-inches of impervious material.
- F. Install drainage pipe at the lowest elevation possible, to maintain gravity flow of water to outside of the reinforced zone. Slope the main collection drainage pipe, located just behind the concrete retaining wall units, 2 percent (minimum) to provide gravity flow to the daylighted areas. Daylight the main collection drainage pipe through the face of the wall, and/or to an appropriate location away from the wall system at

each low point or at 50.0-foot (maximum) intervals along the wall. Alternately, the drainage pipe can be connected to a storm sewer system at 50.0-foot (maximum) intervals.

- G. Remove excess fill from top of units and install next course. Ensure drainage aggregate and backfill are compacted before installation of next course.
- H. Check each course for level and alignment. Adjust units as necessary to maintain level and alignment prior to proceeding with each additional course.
- I. Install each succeeding course. Backfill as each course is completed. Pull the units forward until the locating surface of the unit contacts the locating surface of the units in the preceding course. Interlock wall segments that meet at corners by overlapping successive courses. Attach concrete retaining wall units at exterior corners with adhesive specified.
- J. Install geosynthetic reinforcement in accordance with geosynthetic manufacturer's recommendations and the shop drawings.
 - 1. Orient geosynthetic reinforcement with the highest strength axis perpendicular to the wall face.
 - 2. Prior to geosynthetic reinforcement placement, place the backfill and compact to the elevation of the top of the wall units at the elevation of the geosynthetic reinforcement.
 - 3. Place geosynthetic reinforcement at the elevations and to the lengths shown on the drawings.
 - 4. Lay geosynthetic reinforcement horizontally on top of the concrete retaining wall units and the compacted backfill soils. Place the geosynthetic reinforcement within 1.0-inch of the face of the concrete retaining wall units. Place the next course of concrete retaining wall units on top of the geosynthetic reinforcement.
 - 5. The geosynthetic reinforcement shall be in tension and free from wrinkles prior to placement of the backfill soils. Pull geosynthetic reinforcement hand-taut and secure in place with staples, stakes, or by hand-tensioning until the geosynthetic reinforcement is covered by 6-inches of loose fill.
 - 6. The geosynthetic reinforcements shall be continuous throughout their embedment lengths. Splices in the geosynthetic reinforcement strength direction are not allowed.
 - 7. Do not operate tracked construction equipment directly on the geosynthetic reinforcement.
 - 8. At least 6.0-inches of compacted backfill soil is required prior to operation of tracked vehicles over the geosynthetic reinforcement. Keep turning of tracked construction equipment to a minimum.
 - 9. Rubber-tired equipment may pass over the geosynthetic reinforcement at speeds of less than 5 miles per hour. Turning of rubber-tired equipment is not allowed on the geosynthetic reinforcement.

3.2 BACKFILL PLACEMENT

- A. Unless otherwise shown on the plans, backfill beyond the drainage aggregate within reinforcement zone shall be granular backfill as specified herein.
- B. Place reinforced backfill, spread and compact in a manner that will minimize slack in the reinforcement.
- C. Place fill within the reinforced zone and compact in lifts not exceeding 6.0 to 8.0-inches (loose thickness) where hand-operated compaction equipment is used, and not exceeding 12.0-inches (loose thickness) where heavy, self-propelled compaction equipment is used.
- D. Only lightweight hand-operated compaction equipment is allowed within 4.0-feet of the back of the retaining wall units. If the specified compaction cannot be achieved within 4.0-feet of the back of the retaining wall units, replace the reinforced soil in this zone with drainage aggregate material.
- E. Compaction testing shall be done in accordance with ASTM D1556 or ASTM D2922.
- F. Minimum Compaction Requirements for Fill Placed in the Reinforced Zone

1. The minimum compaction requirement shall be determined by the project geotechnical engineer testing the compaction. At no time shall the soil compaction requirements be less than 95 percent of the soil's standard Proctor maximum dry density (ASTM D698) [modified Proctor maximum dry density (ASTM D1557)] for the entire wall height
 2. Moisture Content: Within 2 percentage points of the optimum moisture content for all wall heights.
 3. These specifications may be changed based on recommendations by the Project geotechnical engineer.
- G. At the end of each day's operation, slope the last level of compacted backfill away from the interior (concealed) face of the wall to direct surface water runoff away from the wall face.
- H. The Contractor is responsible for ensuring that the finished site drainage is directed away from the retaining wall system.
- I. In addition, the Contractor is responsible for ensuring that surface water runoff from adjacent construction areas is not allowed to enter the retaining wall area of the construction site.

3.3 CAP UNIT INSTALLATION

- A. Apply adhesive to the top surface of the unit below and place the cap unit into desired position.
- B. Cut cap units as necessary to obtain the proper fit.
- C. Backfill and compact to top of cap unit.

3.4 SITE CONSTRUCTION TOLERANCES

- A. Vertical Alignment: Plus or minus 1.0-inch over any 10.0-foot distance, with a maximum differential of 2.0-inches over the length of the wall.
- B. Horizontal Location Control From Plan
 1. Straight Lines: Plus or minus 1.0-inch over any 10.0-foot distance.
 2. Corner and Radius Locations: Plus or minus 12.0-inches from theoretical location shown on plan.
 3. Curves and Serpentine Radii: Plus or minus 12.0-inches from theoretical location shown on plan.
- C. Immediate Post Construction Wall Batter: Within 2 degrees of the design batter, negative batter unacceptable.
- D. Bulging: Plus or minus 1¼-inches over any 10.0-foot distance.
- E. Maximum horizontal gap between erected blocks: ½-inch

3.5 ADJUSTING AND CLEANING

- A. Replace damaged units with new units as the work progresses.
- B. Remove debris caused by wall construction and leave adjacent paved areas broom clean.
- C. All work shall be done in accordance with the approved drawings.

3.6 SEALER

- A. Segmental masonry retaining wall surface sealing shall consist of preparation, furnishing and applying the surface sealer to the top, exposed front face, and backside of the upper three courses of all walls.
- B. Due to the potentially hazardous ingredients contained in sealer formulations extreme care must be exercised in their handling and use, and the manufacturer's recommendations shall be closely followed.
- C. The Contractor shall comply with the manufacturer's written instructions for preparing, handling and applying the surface sealer.
- D. The surface to be treated shall receive a light water-blast to the extent that the surface is clean and free of oils.

- E. Before the surface sealer is applied the surface to be sealed shall be dry and free of all dust, debris, and frost.
- F. Surface sealers shall be applied at the heaviest application rate specified by the manufacturer.

******END OF SECTION******

SECTION 02890 - TRAFFIC SIGNS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools equipment and performances of all work and services necessary or incidental to project signing as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Modify Post shall be paid at the unit price bid for related items and includes the cost of modifying each post as required by the contract.
 - 2. Traffic Signs shall be paid at the unit price bid for related items and includes the cost of providing and installing the sign, sign posts, stringers, brackets, attachment angles or strap mounting hardware, and all other materials and labor required for sign installation per the plan details.
- B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated project signing item. Such items of work include but are not limited to:
 - 1. No exception to the referenced specification is made.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2564 - Traffic Signs and Devices.
- B. MnDOT 3401 -Flanged Channel Sign Posts.
- C. Current "Minnesota Manual for Uniform Traffic Control Devices" - <http://www.dot.state.mn.us/trafficeng/publ/mutcd/index.html>
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 NOT USED

PART 3 -- EXECUTION

3.1 NOT USED

****END OF SECTION****

SECTION 02920 - TURF RESTORATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to turf restoration as indicated on the drawings or as specified herein.
- B. A variety of different seeding mixtures may be utilized on this project. The Contractor shall refer to the plan for the locations of the different turf establishment areas.
- C. Temporary seeding may be necessary during construction in erosion sensitive areas. The Contractor shall do temporary seeding work as specified herein or as directed by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. All measurements for payments for turf establishment items shall be based on the Unit Price bid per item.
- B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated seeding and sodding items. Such items of work include but are not limited to:
 - 1. Application of starter fertilizer on all areas to be sodded shall be included in the price bid for sodding.
 - 2. Subgrade preparation and topsoil placement as required on all areas shown on the plans.
 - 3. Maintenance of newly sodded and seeded areas, as specified, include in the unit price for the associated items.
 - 4. Stapling of sod on sloped areas, include in the unit price bid for sodding.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 2574 – Soil Preparation
- B. MnDOT 2575 - Establishing Turf and Controlling Erosion
- C. MnDOT 3876 – Seed
- D. MnDOT 3877 - Topsoil
- E. MnDOT 3878 - Sod
- F. MnDOT 3881 - Fertilizer
- G. MnDOT 3882 - Mulch Material
- H. MnDOT 3884 - Hydraulic Erosion Control Products
- I. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Seeding
 - 1. The seed mixtures to be used must be shown on the plans.

2. Seed mixtures selected shall be consistent with the intended uses of the MnDOT specifications and seeding manual, subject to approval of the Engineer.
 3. Unless otherwise specified on the plans, all application rates for MnDOT mixes, except temporary seed, are 150 percent the specified rate.
 4. Type 1 mulch shall consist of clean straw with no pasture hay.
 5. All seed shall be supplied as pure-live seed (PLS).
 6. All seed and seed mixes shall conform to State seed requirements for noxious weed content.
 7. All seed and seed mixes shall conform to State labeling requirements. For all species in the mix, the label and or invoice shall include the county of origin, and if from Canada, the province.
- B. Sodding Items
1. Unless otherwise indicated on the plans, sod shall be Lawn Sod as defined in the referenced specification except when located within MnDOT right-of-way where Salt Tolerant Sod shall be utilized.
- C. Imported Topsoil
1. Unless otherwise indicated on the plans, imported topsoil borrow for general use as a turf growing medium shall comply with MnDOT 3877.2.A.
 2. Unless otherwise indicated on the plans, imported topsoil borrow for use as a plant growing medium in designated areas such as landscape beds shall meet the requirements of MnDOT 3877.2.B.
- D. Fertilizer
1. Fertilizer shall be (insert fertilizer type here).
 2. Fertilizer shall be applied at a rate of (insert fertilizer application rate here).
- E. Hydraulic Matrix
1. Hydraulic Matrix shall be MnDOT Type Bonded Fiber Matrix
 2. Hydraulic Matrix shall be applied at a rate of 3500 lbs/acre (dry weight)

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. GENERAL

1. The subgrade shall be shaped to the approximate contour of the finished surface. All construction debris shall be removed from the area prior to the placement of the topsoil. The subgrade shall be loosened with a disc or harrow to a depth of 6.0-inches prior to application of the topsoil.
2. The topsoil shall be shaped to the approximate contour of the finished surface, with a minimum depth of 6.0-inches, unless otherwise shown on the plan. All construction debris, rocks and trash shall be removed from the area prior to seeding or sodding. The topsoil shall be loosened with a disc or harrow to its full depth prior to seeding or sodding.
3. The Contractor shall be responsible for providing water and maintenance for a period of until final acceptance by the Owner, to firmly establish the seed or sod. The term maintenance shall include mowing, weed control and watering, as necessary. Failure to perform this work within 24-hours of notification of non-compliance may result in the Owner or Engineer arranging for completion of the work by others. A contract deduction shall be made equal to the total of all costs to perform such work so arranged, including but not limited to, labor, materials, equipment and administrative costs.
4. Where extended maintenance in areas seeded with Native or Wetland Seed Mixes is included in the project, such maintenance shall include at a minimum:

- (a) Mow 2 to 3 times (30 days apart) during 1st year with the mower deck about 6.0 to 8.0-inches off the ground.
- (b) Mow one time during the 2nd year before weeds set their seeds.
- (c) Mow once every 3 to 5-years following the initial 2-years of maintenance to remove dead plant material and stimulate new seed.

B. SEEDING REQUIREMENTS

- 1. Turf establishment by seeding shall be done utilizing the various combinations of seed mixtures (including aquatic plants), fertilizing and mulching at disturbed areas as shown on the plans.
- 2. Areas prepared for seeding shall be free of rocks, debris and clumps of soil. The areas shall be graded uniformly and vegetated areas shall be raked free of chunks exceeding ½-inch diameter.
- 3. Seed shall be applied with a drill seeder, unless otherwise approved by the Owner.
- 4. The Contractor shall furnish weight tickets documenting pounds of hydraulic soil stabilizer placed, pounds of fertilizer placed and pounds of seed placed. The seed tickets shall show individual plant species along with the percent purity and percent germination. The fertilizer tickets shall show mix proportions. The Contractor shall also furnish its QA/QC data to the Engineer.
- 5. Dormant seeding and snow seeding may be utilized in accordance with the referenced specification and technical memorandum, provided the final acceptance standards are met.
- 6. Final acceptance of seeding shall be based on an established growth of 6.0-inches with a uniform density to cover 70 percent of the designated area, free of weeds and bare spots. Any re-seeding necessary shall be performed at the Contractor's expense.

C. SODDING REQUIREMENTS

- 1. Sod shall be placed by the Contractor in the locations shown on the plans as directed by the Engineer.
- 2. When placing sod in irregularly shaped locations, the Contractor shall produce sharp, straight joints between sod rolls.
- 3. Sod shall be placed to create a firm, smooth, uniform surface without ruts, knobs or wrinkles.
- 4. Sod placed on slopes greater than 1:4 (v:h), in ditch bottoms, and around storm sewer inlets or outlets shall be anchored with staples. Staples shall be U shaped 3 mm (0.12-inch) diameter or heavier steel wire having a span width of 25 mm (1.0-inch) and a length of 200 mm (8.0-inches) from top to bottom, after bending.
- 5. All re-work necessary to repair imperfections in sod placement shall be made at the Contractor's expense.

******END OF SECTION******

SECTION 02975 - BITUMINOUS SURFACE CRACK AND JOINT REPAIR

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the repairing of the existing bituminous surface improvements; including routing, cleaning and sealing the existing surface.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
 - 1. Payment shall be at the unit price bid per linear foot of cracks which were identified by the Engineer, and properly routed, cleaned and sealed by the Contractor.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated geotextile fabric - trench construction items. Such items of work include but are not limited to:
 - 1. Surface preparation including sweeping, brushing, etc., include in the unit price bid for crack sealing.
 - 2. Protecting castings and valve boxes from sealant material, include in the unit price bid for crack sealing.

1.3 SPECIFICATION REFERENCES

- A. MnDOT 3723 shall apply to the sealing of all cracks, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Crack Sealant
 - 1. The crack sealant compound shall be packaged in sealed containers. Each container shall be clearly marked with the name of the manufacturer, the trade name of the sealant, the manufacturer's batch and lot number, the pouring temperature, and the safe heating temperature.
 - 2. Mixing of different manufacturer's brands or different types of sealant shall be prohibited

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. A copy of the manufacturer's recommendations pertaining to the heating and application of the joint sealant material shall be submitted to the Engineer prior to the commencement of work. These recommendations shall be adhered to and followed by the contractor. The temperature of the sealer in the field application equipment shall never exceed the safe heating temperature recommended by the manufacturer. Any given quantity of material shall not be heated at the pouring temperature for more than six hours and shall never be reheated. Sealing shall not proceed if the temperature of the material has not reached or has fallen below the manufacturer's recommended minimum application temperature.
- B. Sealant materials may be placed during a period of rising temperature after the air temperature in the shade and away from artificial heat has reached 40 degrees Fahrenheit and indications are for a continued rise in temperature. During a period of falling temperature, the placement of sealant material shall be suspended when the air temperature, in the shade and away from artificial heat, reaches

40 degrees Fahrenheit. Sealant shall not be placed when in the opinion of the Engineer; the weather or roadbed conditions are unfavorable.

- C. Routing and sealing will be permitted only during daylight hours between May 1 and October 15.
- D. The City shall determine the actual areas that will be repaired by marking the existing cracks to be routed, cleaned and sealed. The routing, cleaning and sealing shall extend the full width of the surface on transverse cracks.
- E. The Contractor shall conduct the bituminous crack sealing operations so that routing, cleaning and sealing is a continuous operation. Traffic shall not be allowed to kneed together or damage the reservoir once it has been created. Routed cracks not sealed before traffic is allowed on the surface shall be re-routed at no additional cost to the Owner.
 - 1. ROUTING. The routing equipment shall be mechanical and power driven and shall be capable of following the existing cracks. All cracks shall be routed 1.0-inch wide x 1.0-inch deep. The cracks shall be routed with sharp router blades to the specified dimensions without deviation from the existing crack or creating excessive spalling. Equipment designed to "plow" the cracks to dimension will not be permitted. Wet sawing will not be allowed.
 - 2. CLEANING. Immediately prior to cleaning and sealing the cracks, the entire bituminous surface shall be cleaned to remove all loosened bituminous particles and foreign material and the cracks shall be blown clean with oil-free compressed air. Compressed air shall be 100 psi and 75 cfm minimum at the nozzle. The crack and surface area 6.0-inches on both sides will then be cleaned and dried with a hot compressed air heat lance. The heat lance shall meet the following requirements: temperature of heated air at exit or orifice minimum of 2,800 degrees Fahrenheit. Velocity of exiting heated air minimum of 2,800 fps. The application time and final results of the cleaning are subject to the Engineers approval.
 - 3. SEALING. After the cracks have been properly cleaned, the Contractor shall install a foam backer rod in those cracks wider than ¼-inch that extends below the bottom to the routed joint. The backer rod shall be compressed to fill the entire width of the crack and shall not protrude up above the bottom of the routed reservoir. The Contractor shall install a bond breaker tape at the bottom of the routed reservoir for those cracks less than ¼-inch in width which extended below the bottom of the routed joint.
- F. The sealant shall be placed evenly in two separate applications. The first application shall fill the reservoir to approximately three-fourths the depth of the routed joint. After the first application has sufficiently cooled, the second application shall be placed to provide an "over bond" seal with the bituminous pavement. The over band shall be of the width and thickness to assure a tight seal with the pavement surface. The sealant shall be pressure applied with a wand type applicator; pour pots or similar devices shall not be used to apply the crack sealant. The applicator wand shall be returned to the machine and the crack sealant materials reticulated immediately upon completion of each crack.

******END OF SECTION******

APPENDIX



COMPLETION OF THIS FORM IS THE CONTRACTOR'S RESPONSIBILITY ON A WEEKLY BASIS. FAILURE TO SUBMIT RENDERS SERVICES SUBJECT TO NON-ACCEPTANCE.

[illegible]



STRUCTURE FIELD ELEVATION REPORT FOR _____

COMPLETION OF THIS FORM IS THE CONTRACTOR'S RESPONSIBILITY ON A WEEKLY BASIS. FAILURE TO SUBMIT RENDERS STRUCTURES SUBJECT TO NON-ACCEPTANCE.

STRUCTURE LOCATION				STRUCTURE TYPE (CIRCLE ONE)	DESIGN INVERT (FROM PLAN)	AS-CONSTRUCTED INVERT ELEVATION *	DIFFERENCE (+ / -)	COMMENTS / QUALITY ASSURANCE
STRUCTURE NO.	STRUCTURE STATION	DIRECTION OF INVERT/FLOW	STREET NAME OR EASEMENT LOCATION					
				MH CB Apron				
				MH CB Apron				
				MH CB Apron				
				MH CB Apron				
				MH CB Apron				
				MH CB Apron				
				MH CB Apron				
				MH CB Apron				

* From measurements taken in the field to nearest 0.01 feet



STANDARD DETAIL PLATES

PLATE NUMBER	DESCRIPTION
SANITARY	
5001J	SANITARY SEWER MANHOLE
5003J	SANITARY SEWER DROP MANHOLE
5004J	SANITARY SEWER SERVICE CLEANOUT
5005J	NON-RIGID SANITARY SEWER TRENCH
5006J	INSULATION FOR NON-RIGID SANITARY SEWER
5016J	ROCK EXCAVATION FOR SANITARY SEWER
5017J	SANITARY SEWER SERVICE
5019J	STRUCTURE MARKER SIGNS
WATER	
6001J	HYDRANT INSTALLATION
6004J	WATERMAIN OFFSET
6005J	WATER VALVE MANHOLE
6007J	DUCTILE IRON WATERMAIN TRENCH
6008J	HYDRANT LOCATION
6009J	WATER SERVICE INSTALLATION
6010J	GATE VALVE AND BOX INSTALLATION
6011J	WATERMAIN INSULATION
6012J	GATE VALVE ADAPTOR
6020J	CONCRETE THRUST BLOCKS
6023J	WATERMAIN WET TAP
6024J	IRRIGATION SYSTEM TAP, METER AND BACKFLOW PREVENTOR ASSEMBLY
6025J	ADJUSTABLE VALVE EXTENSION STEM
STREETS	
7001J	B618 CONCRETE CURB & GUTTER
7002J	B618 CURB & GUTTER (GUTTER OUT)
7003J	MOUNTABLE CONCRETE CURB & GUTTER
7004J	CONCRETE VALLEY GUTTER
7008J	DRY CAST MODULAR BLOCK RETAINING WALL
70010J	TRANSITION TO B618 CURB AT CATCH BASIN
7011J	CONTRACTION JOINT
7014J	TYPICAL BARRICADE
7015J	DEPRESSED CURB WITH DRIVEWAY APRON
7017J	CONCRETE DRAINAGE PAN
8003J	WETLAND BUFFER SIGN
MISC.	
9009J	TREE PRESERVATION FENCE
9012J	MAILBOX INSTALLATION
9014J	TYPICAL LOCATION OF PUBLIC UTILITIES
9015J	FUTURE THROUGHT STREET SIGN

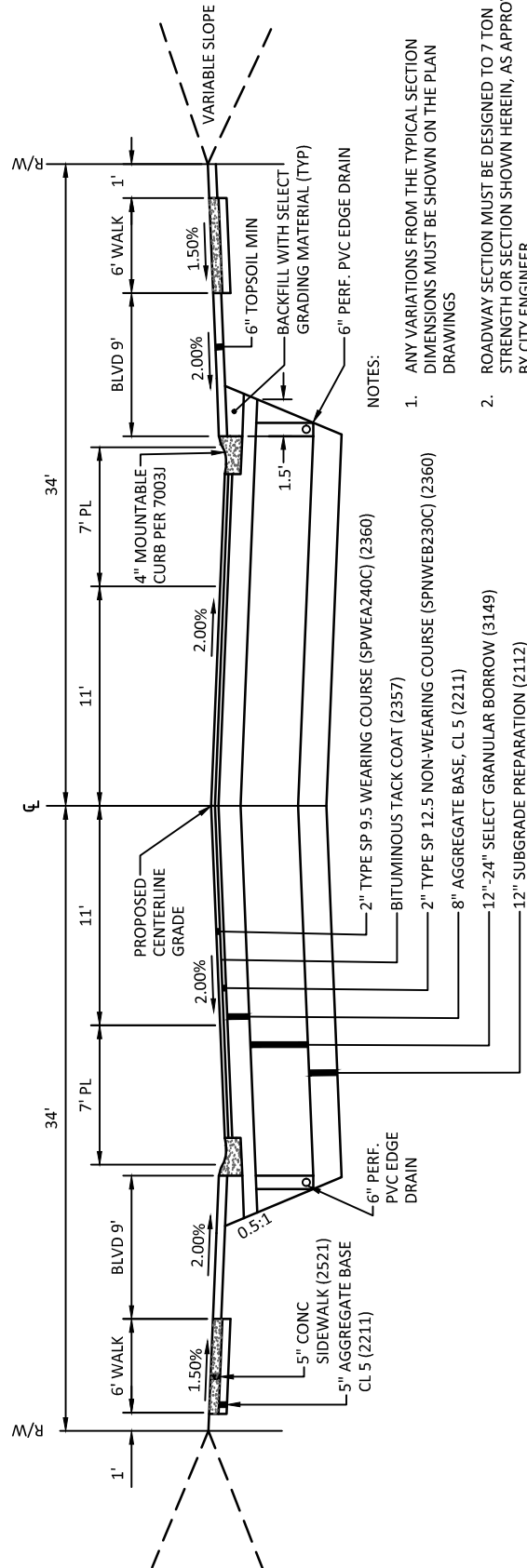
PLATE NUMBER	DESCRIPTION
STREETS	
1000J	TYPICAL SECTION - LOCAL STREET
1001J	TYPICAL SECTION - MINOR COLLECTOR
1002J	TYPICAL SECTION - MAJOR COLLECTOR
1003J	BITUMINOUS TRAIL
1004J	BITUMINOUS STREET PATCH
1005J	CONCRETE DRIVEWAY PAVEMENT
LIGHTING	
2003J	DECORATIVE STREET LIGHT - ACORN
2004J	DECORATIVE STREET LIGHT - TRADITIONAL
2005J	DECORATIVE STREET LIGHT - SHOEBOX
EROSION	
3001J	VELOCITY CHECK - HD SILT FENCE
3002J	SILT FENCE - MACHINE SLICED
3003J	SILT FENCE - HAVY DUTY
3004J	SILT FENCE - PREASSEMBLED
3005J	ROCK CONSTRUCTION ENTRANCE
3008J	EROSION CONTROL BLANKET INSTALLATION
3009J	TYPICAL SEDIMENT BASIN CROSS SECTION
3010J	RIPRAP DITCH CHECK
3011J	INLET PROTECTION PERFORATED WALL
3013J	BIOROLL DITCH CHECK
3014J	INLET PROTECTION - GEOTEXTILE BAG
3015J	INLET PROTECTION - ROCK BAG
3016J	RISER STANDPIPE
3017J	FLOTATION SILT CURTAIN
3018J	ALTERNATE CULVERT STANDPIPE
3019J	RIPRAP AT RIVER OUTFALL
3020J	RCP END RIPRAP DETAIL
3031J	ARTICULATED BLOCK AT FLARED END
3032J	TYPICAL BENCH DETAIL
STORM	
4001J	RC STORM SEWER CLASS C BEDDING
4002J	RC STORM SEWER CLASS B BEDDING
4006J	STORM SEWER STRUCTURE DES F, TYPE A CONE
4007J	DRAINAGE STRUCTURE DESIGN J
4010J	ROADWAY EDGE DRAIN
4014J	POND SKIMMER STRUCTURE WITH RATE CONTROL BAFFLE
4015J	POND SKIMMER STRUCTURE
4018J	SUBSURFACE DRAIN CLEANOUT
4020J	DRAINAGE STRUCTURE DESIGN 4020
4022J	DRAINAGE STRUCTURE DESIGN 4022
4029J	DRAINAGE STRUCTURE DESIGN R-1 (2'X3)
4030J	RC APRON TRASH GUARD
4031J	CONCRETE CURB & GUTTER TRANSITION & CATCH BASIN LOCATION
#####	#####



STANDARD DETAIL
TYPICAL SECTION - LOCAL STREET
CITY OF JORDAN

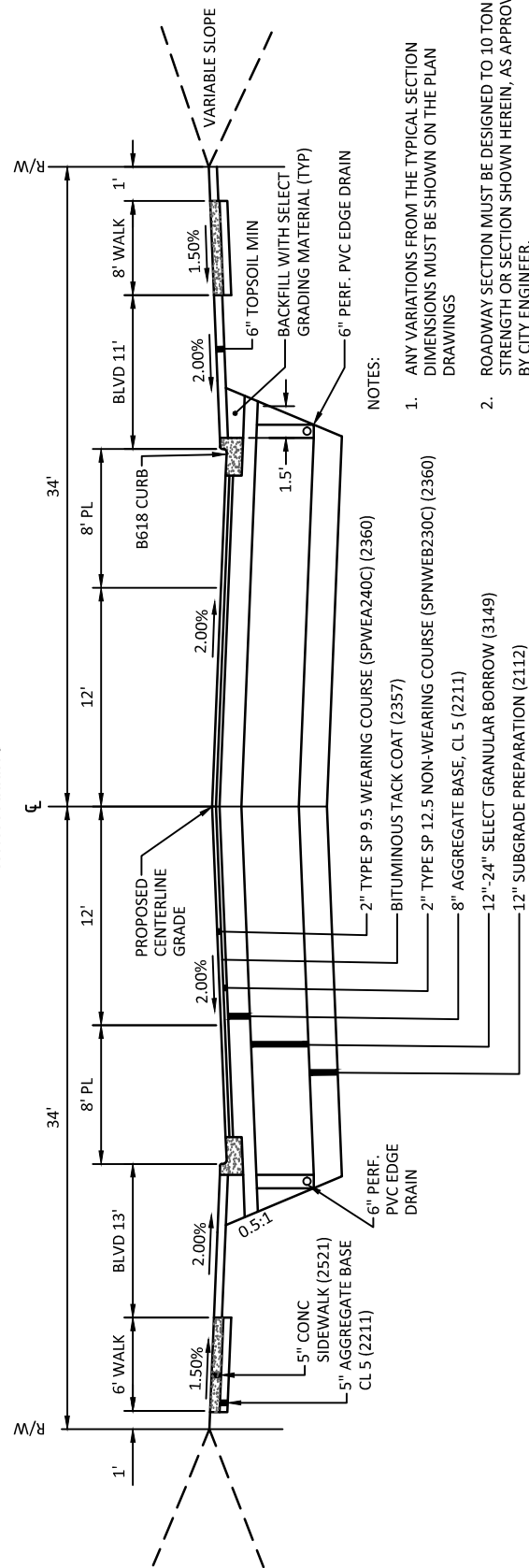
STANDARD DETAIL
NO. 1000J
DATE APRIL 2019

TYPICAL SECTION
LOCAL STREET



NOTES:

1. ANY VARIATIONS FROM THE TYPICAL SECTION DIMENSIONS MUST BE SHOWN ON THE PLAN DRAWINGS
2. ROADWAY SECTION MUST BE DESIGNED TO 7 TON STRENGTH OR SECTION SHOWN HEREIN, AS APPROVED BY CITY ENGINEER.
3. SEE CITY CODE, 153.11 FOR ADDITIONAL DESIGN STANDARDS.

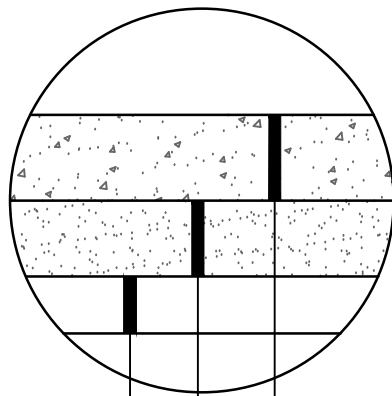


- NOTES:
1. ANY VARIATIONS FROM THE TYPICAL SECTION DIMENSIONS MUST BE SHOWN ON THE PLAN DRAWINGS
 2. ROADWAY SECTION MUST BE DESIGNED TO 10% STRENGTH OR SECTION SHOWN HEREIN, AS APPROVED BY CITY ENGINEER.
 3. SEE CITY CODE, 153.11 FOR ADDITIONAL DESIGN STANDARDS.



STANDARD DETAIL
TYPICAL SECTION - MINOR COLLECTOR
CITY OF JORDAN

STANDARD DETAIL
NO. 1001J
DATE APRIL 2019



6" CONCRETE DRIVEWAY PAVEMENT (2531)

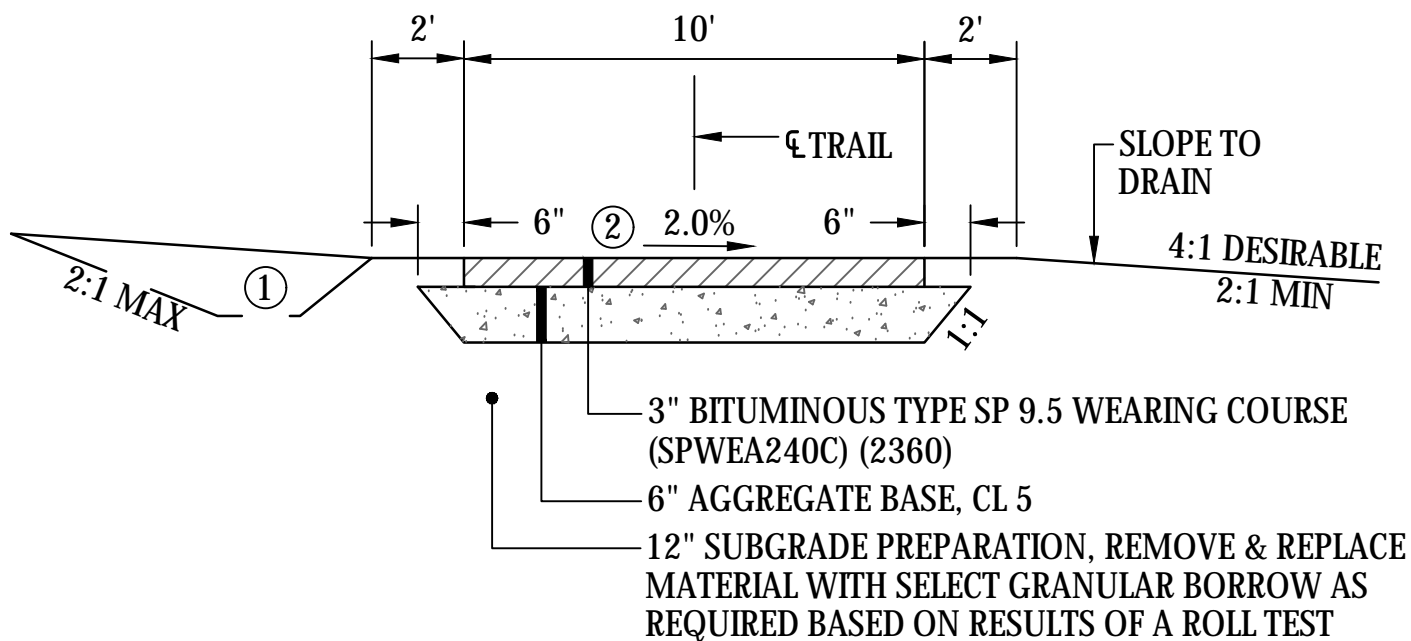
6" AGGREGATE BASE, CL 5 (2211) (INCIDENTAL)

SUBGRADE PREPARATION (2112) (INCIDENTAL)



STANDARD DETAIL
CONCRETE DRIVEWAY PAVEMENT
CITY OF JORDAN

STANDARD DETAIL
 NO. 1005J
 DATE APRIL 2019

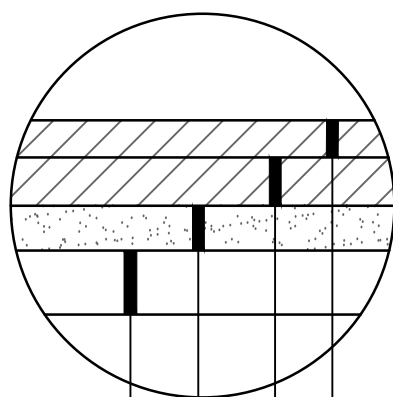


- ① DITCH IF REQUIRED FOR DRAINAGE
 ② SLOPE TOWARDS INSIDE OF CURVE



STANDARD DETAIL
BITUMINOUS TRAIL
CITY OF JORDAN

STANDARD DETAIL
 NO. 1003J
 DATE APRIL 2019



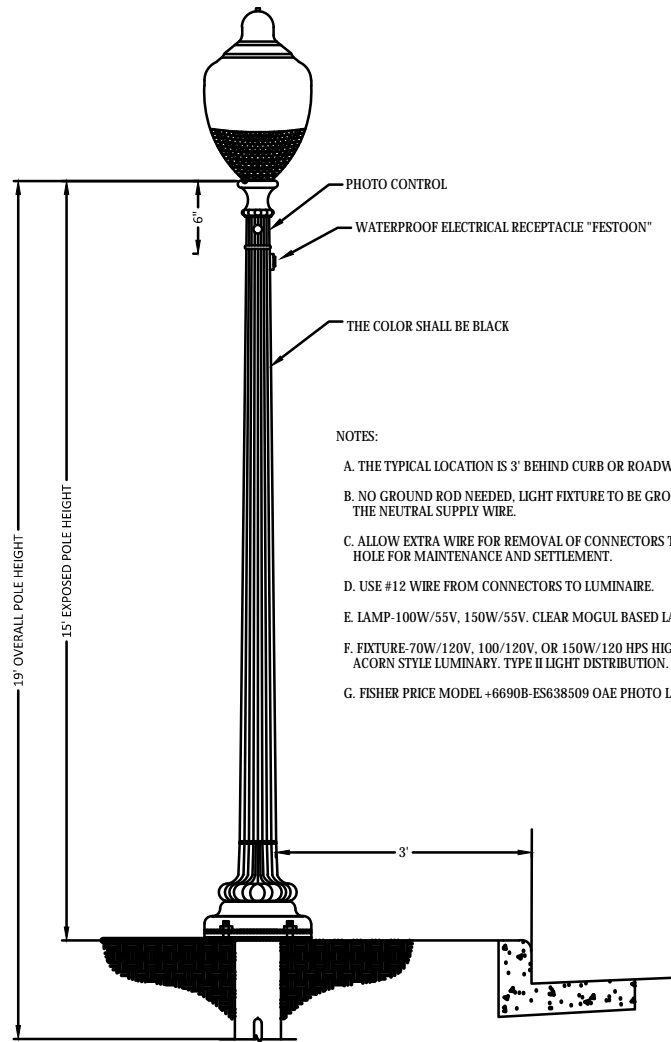
2" TYPE SP 12.5 WEARING COURSE (SPWEB240C) (2360)
 2" TYPE SP 12.5 WEARING COURSE (SPNWEB240C) (2360)
 12" AGGREGATE BASE, CL 5 (2211)
 SUBGRADE PREPARATION (2112)

NOTE:
 SAW CUT ALL ADJACENT PAVEMENT EDGES AND APPLY TACK MATERIAL TO ALL EDGES. DEPTHS SHOWN ARE MINIMUM. MATCH EXISTING PAVEMENT AND AGGREGATE BASE DEPTHS. PREPARE SUBGRADE TO APPROVAL OF THE CITY.



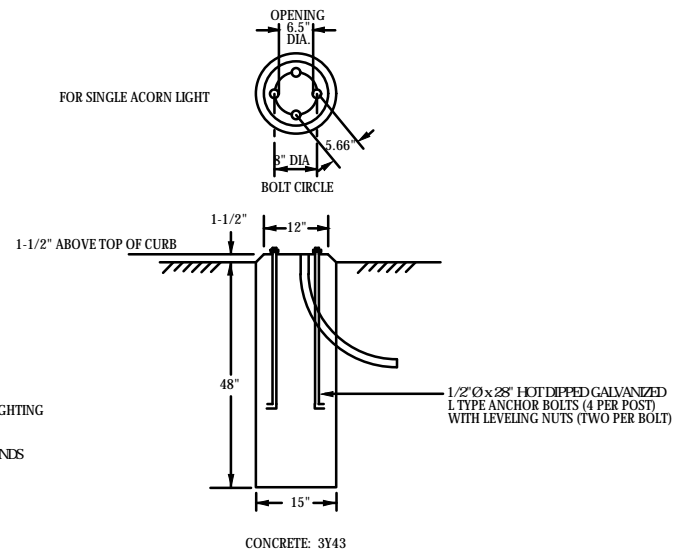
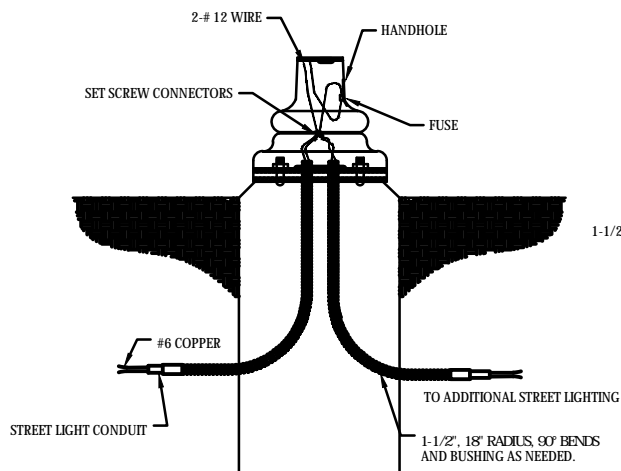
STANDARD DETAIL
BITUMINOUS STREET PATCH
CITY OF JORDAN

STANDARD DETAIL
 NO. 1004J
 DATE APRIL 2019



NOTES:

- A. THE TYPICAL LOCATION IS 3' BEHIND CURB OR ROADWAY.
- B. NO GROUND ROD NEEDED, LIGHT FIXTURE TO BE GROUNDED TO THE NEUTRAL SUPPLY WIRE.
- C. ALLOW EXTRA WIRE FOR REMOVAL OF CONNECTORS THROUGH HAND HOLE FOR MAINTENANCE AND SETTLEMENT.
- D. USE #12 WIRE FROM CONNECTORS TO LUMINAIRE.
- E. LAMP-100W/55V, 150W/55V. CLEAR MOGUL BASED LAMPS.
- F. FIXTURE-70W/120V, 100/120V, OR 150W/120 HPS HIGH PERFORMANCE ACORN STYLE LUMINAIRE. TYPE II LIGHT DISTRIBUTION.
- G. FISHER PRICE MODEL -6690B-ES638509 OAE PHOTO LAMP.



STANDARD DETAIL

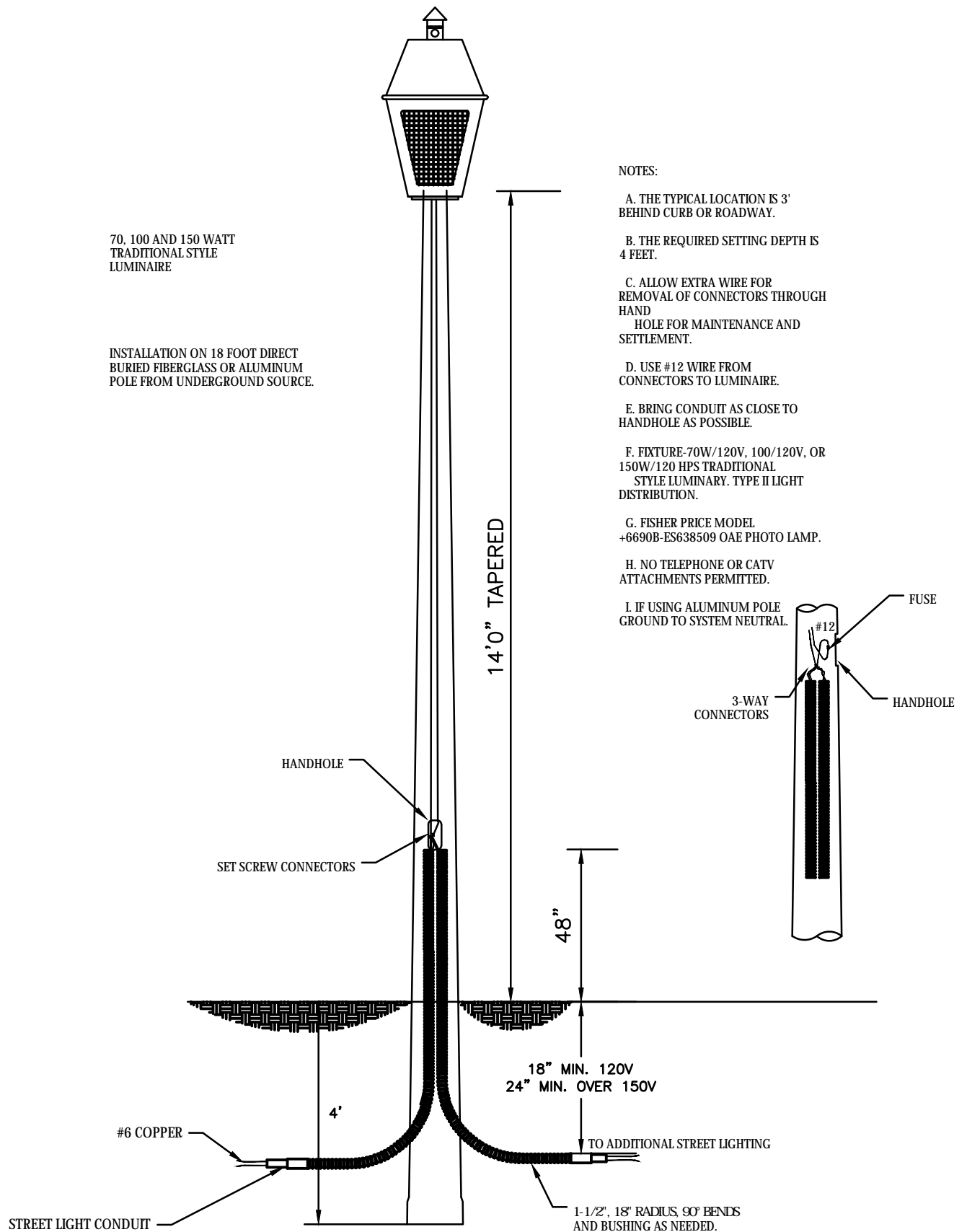
DECORATIVE STREET LIGHT - ACORN

CITY OF JORDAN

STANDARD DETAIL

NO. 2003J

DATE APRIL 2019

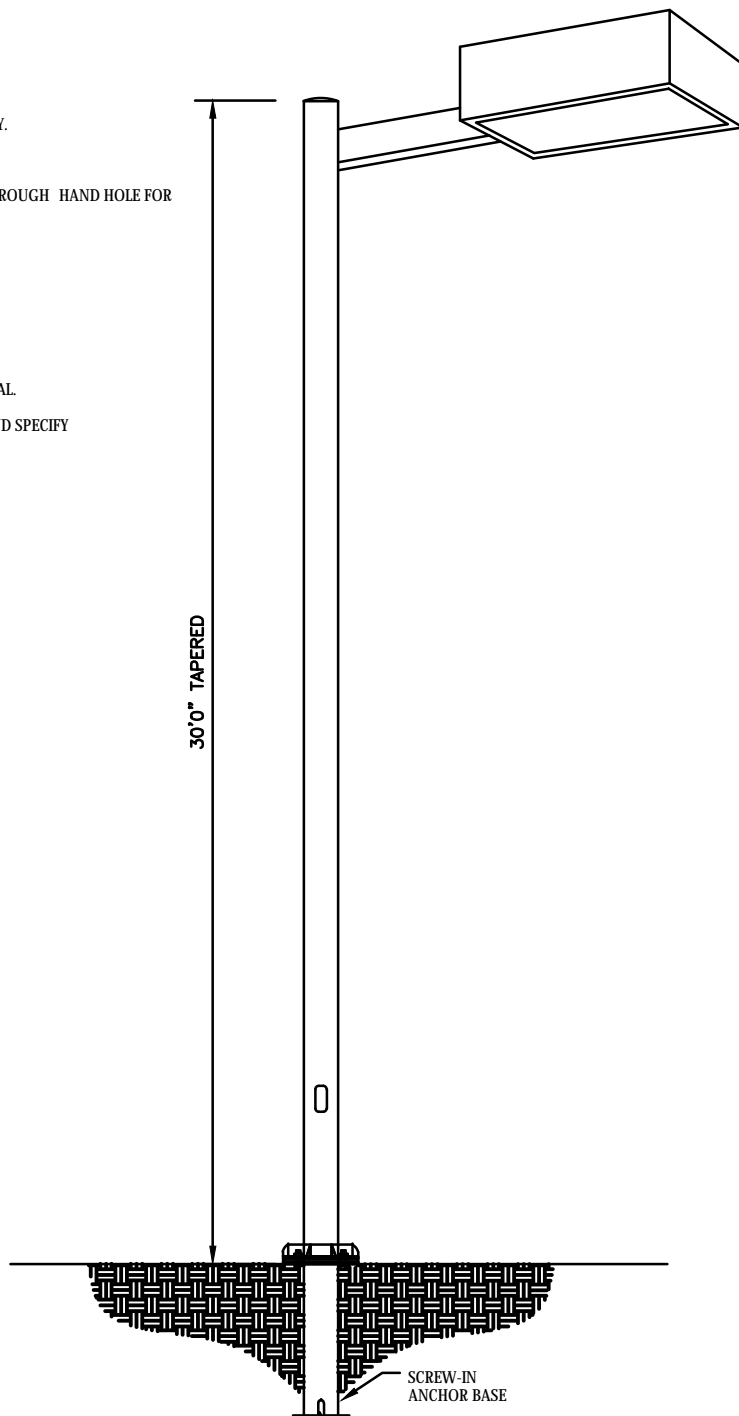
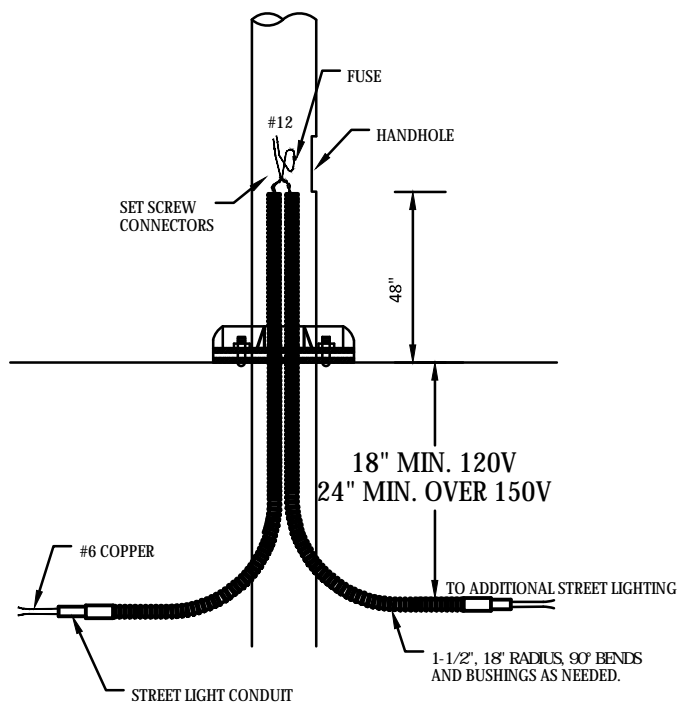


STANDARD DETAIL
DECORATIVE STREET LIGHT - TRADITIONAL
CITY OF JORDAN

STANDARD DETAIL
 NO. 2004J
 DATE APRIL 2019

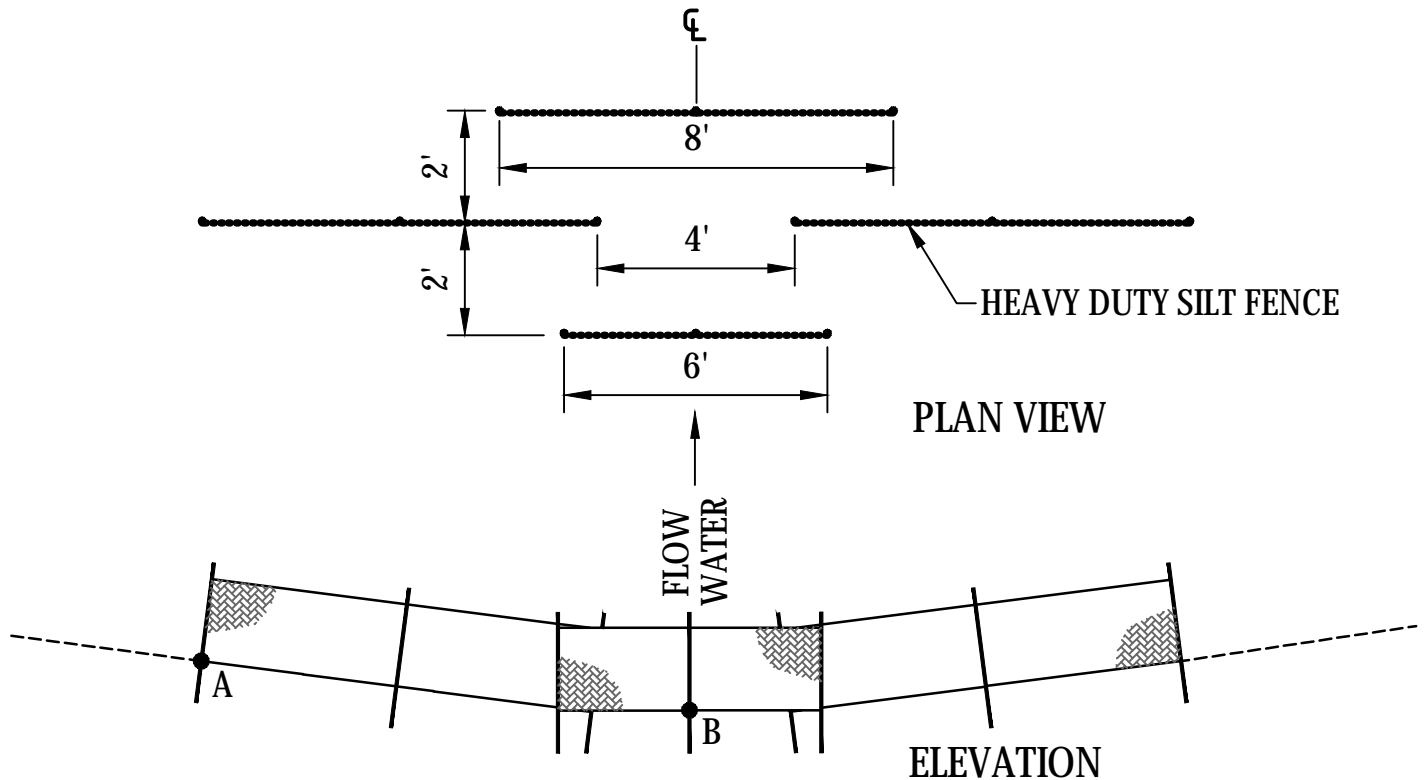
NOTES:

- A. THE TYPICAL LOCATION IS 3' BEHIND CURB OR ROADWAY.
- B. THE REQUIRED SETTING DEPTH IS 4 FEET.
- C. ALLOW EXTRA WIRE FOR REMOVAL OF CONNECTORS THROUGH HAND HOLE FOR MAINTENANCE AND SETTLEMENT.
- D. USE #12 WIRE FROM CONNECTORS TO LUMINAIRE.
- E. BRING CONDUIT AS CLOSE TO HANDHOLD AS POSSIBLE.
- F. FIXTURE-100W, 150W OR 250W HPS TRADITIONAL.
- G. NO TELEPHONE OR CATV ATTACHMENTS PERMITTED.
- H. IF USING ALUMINUM POLE GROUND TO SYSTEM NEUTRAL.
- I. IF MOUNTING TWO FIXTURES, MOUNT BACK TO BACK AND SPECIFY SPECIAL LONGER FULLY THREADED MOUNTING RODS.



STANDARD DETAIL
DECORATIVE STREET LIGHT - SHOEBOX
CITY OF JORDAN

STANDARD DETAIL
 NO. 2005J
 DATE APRIL 2019



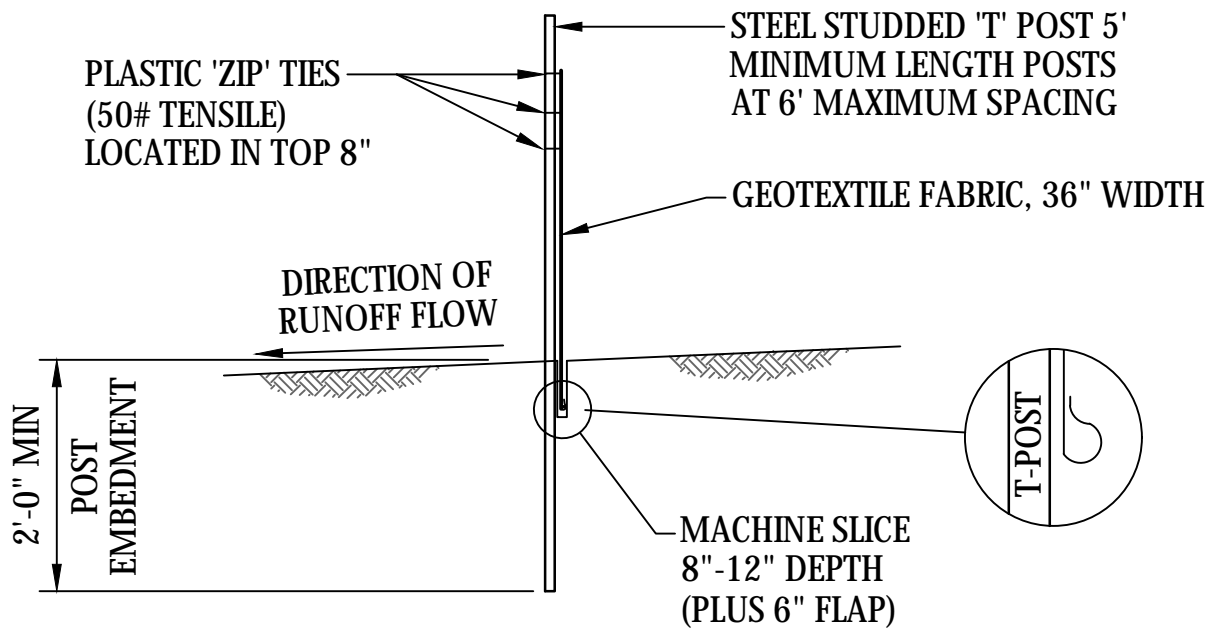
NOTES:

1. POINT A MUST BE A MIN OF 12 INCHES HIGHER THAN POINT B
2. HEAVY DUTY SILT FENCE SHALL CONFORM TO THE REQUIREMENTS OF MnDOT SPECIFICATION 3886
3. DIMENSIONS SHOWN ARE FOR TYPICAL 8' DITCH BOTTOM, MODIFICATIONS MAY BE NECESSARY FOR VARYING SLOPES AND DITCH WIDTHS
4. REFER TO PLAN OR MnDOT EROSION CONTROL MANUAL FOR SPACING INTERVALS OF CHECKS



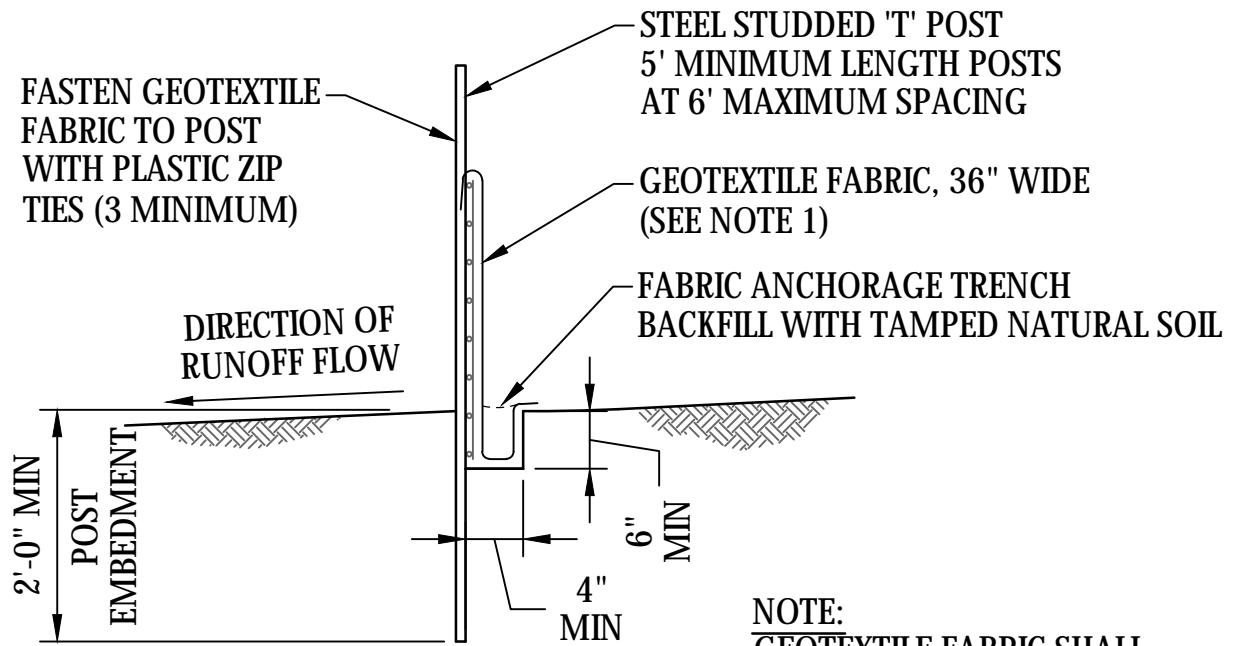
STANDARD DETAIL
VELOCITY CHECK - HD SILT FENCE
CITY OF JORDAN

STANDARD DETAIL
 NO. 3001J
 DATE APRIL 2019



STANDARD DETAIL
SILT FENCE - MACHINE SLICED
CITY OF JORDAN

STANDARD DETAIL
NO. 3002J
DATE APRIL 2019

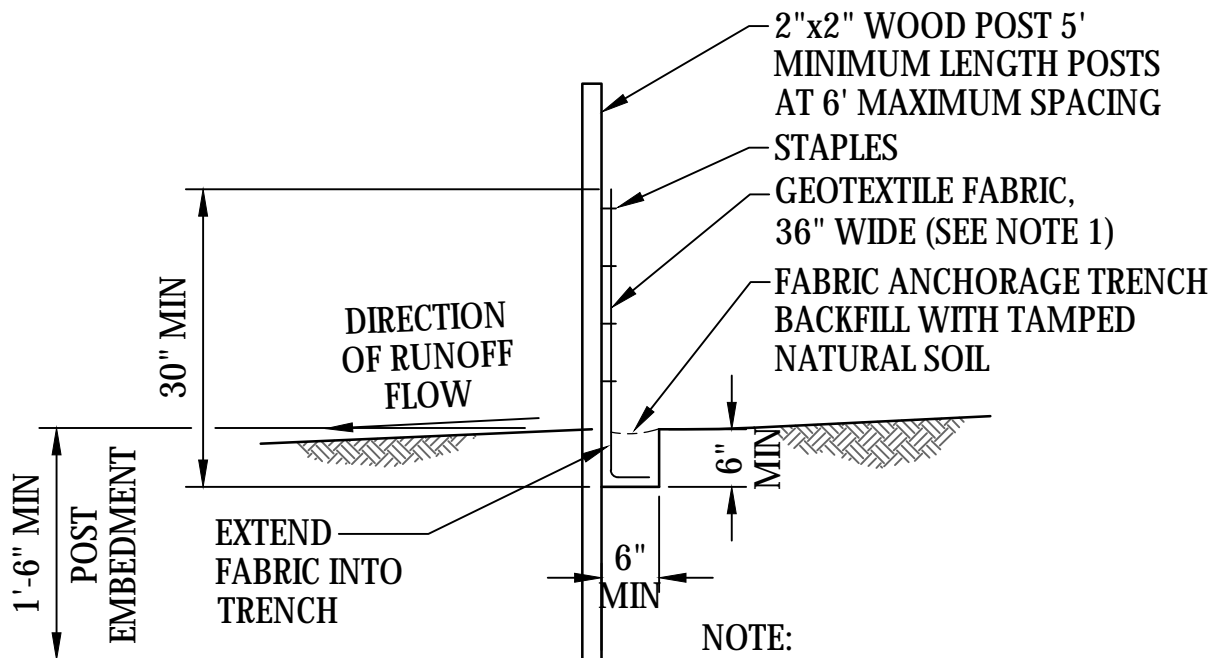


NOTE:
GEOTEXTILE FABRIC SHALL
BE PER MnDOT SPEC 3886



STANDARD DETAIL
SILT FENCE - HAVY DUTY
CITY OF JORDAN

STANDARD DETAIL
NO. 3003J
DATE APRIL 2019



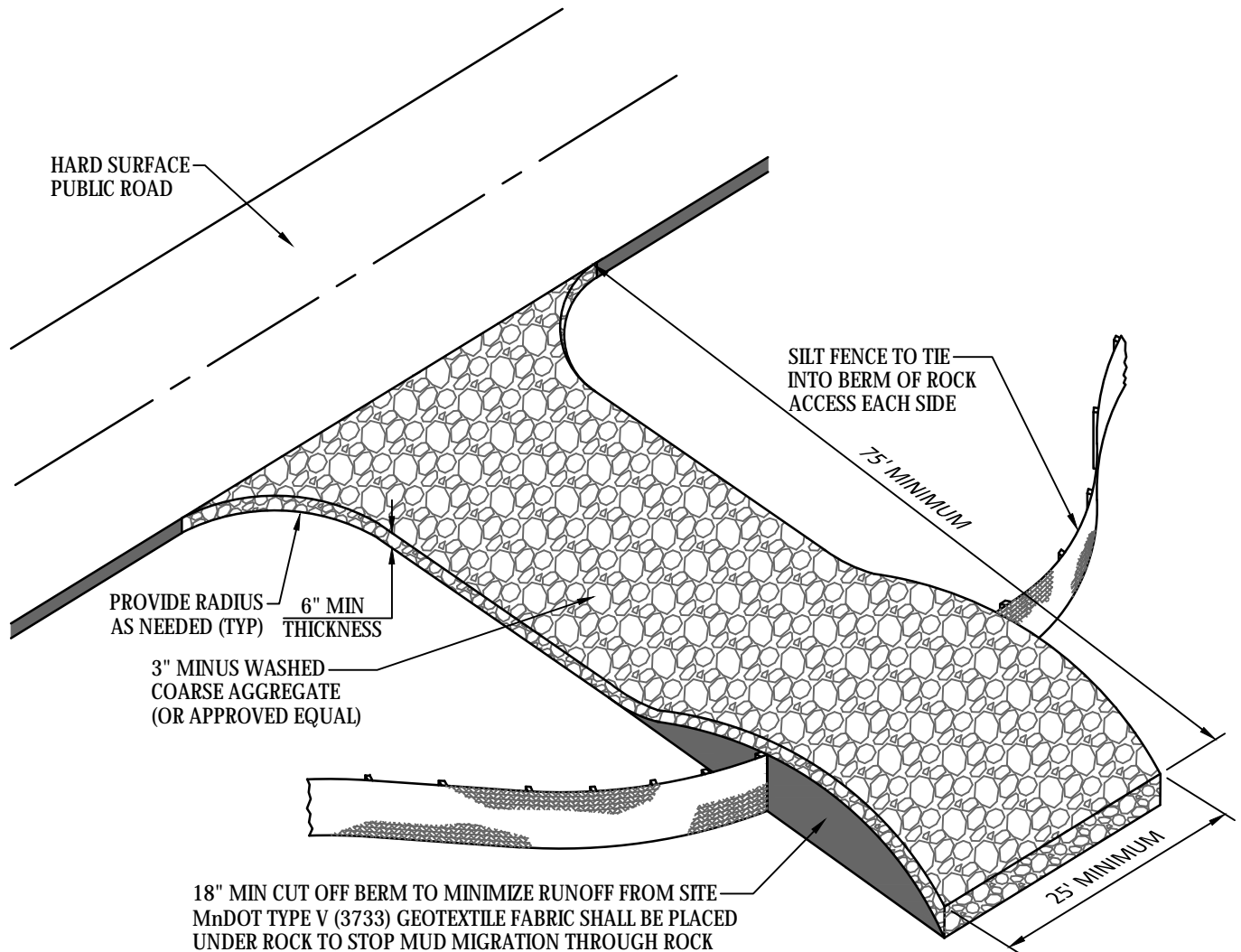
NOTE:

1. GEOTEXTILE FABRIC SHALL BE
PER MnDOT SPEC 3886



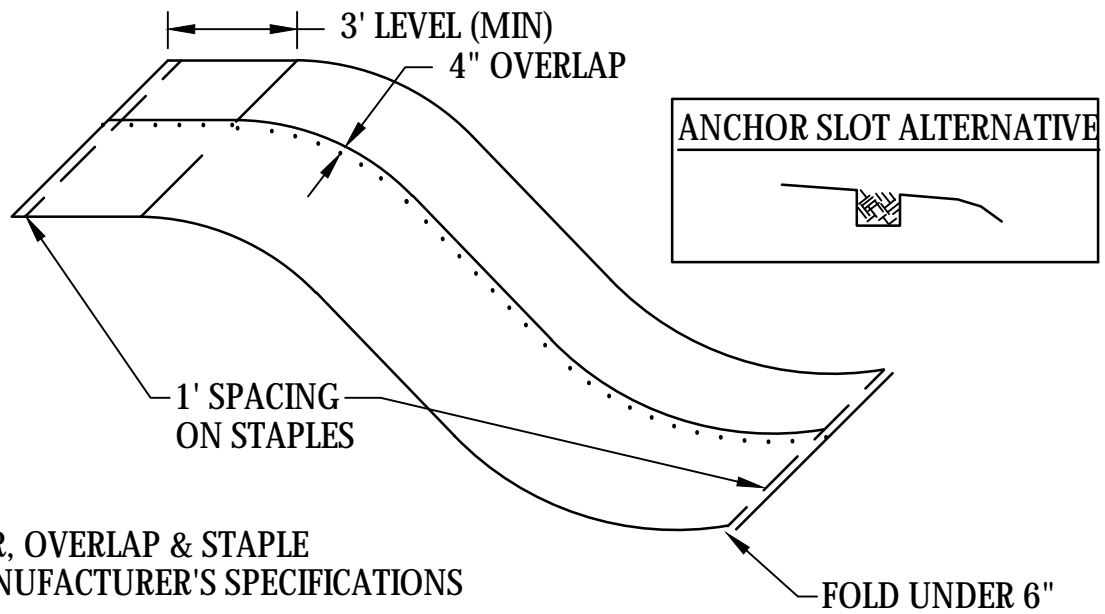
STANDARD DETAIL
SILT FENCE - PREASSEMBLED
CITY OF JORDAN

STANDARD DETAIL
NO. 3004J
DATE APRIL 2019



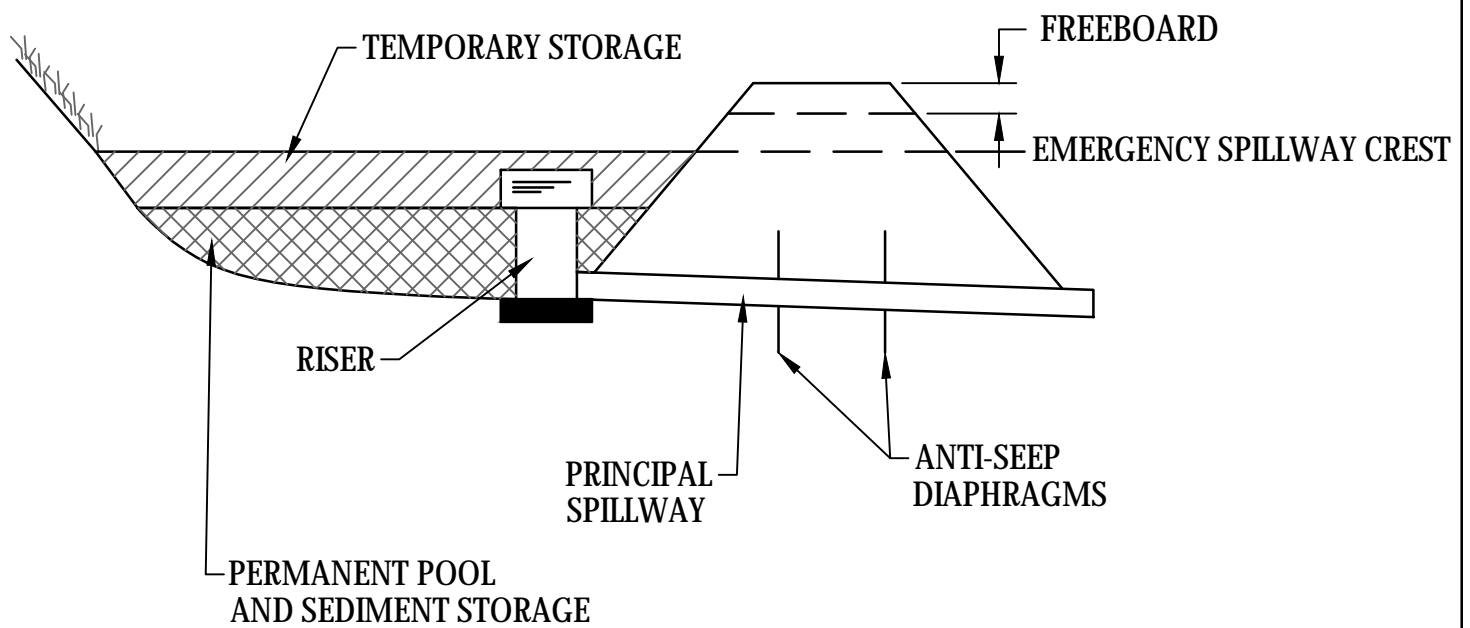
STANDARD DETAIL
ROCK CONSTRUCTION ENTRANCE
CITY OF JORDAN

STANDARD DETAIL
 NO. 3005J
 DATE APRIL 2019



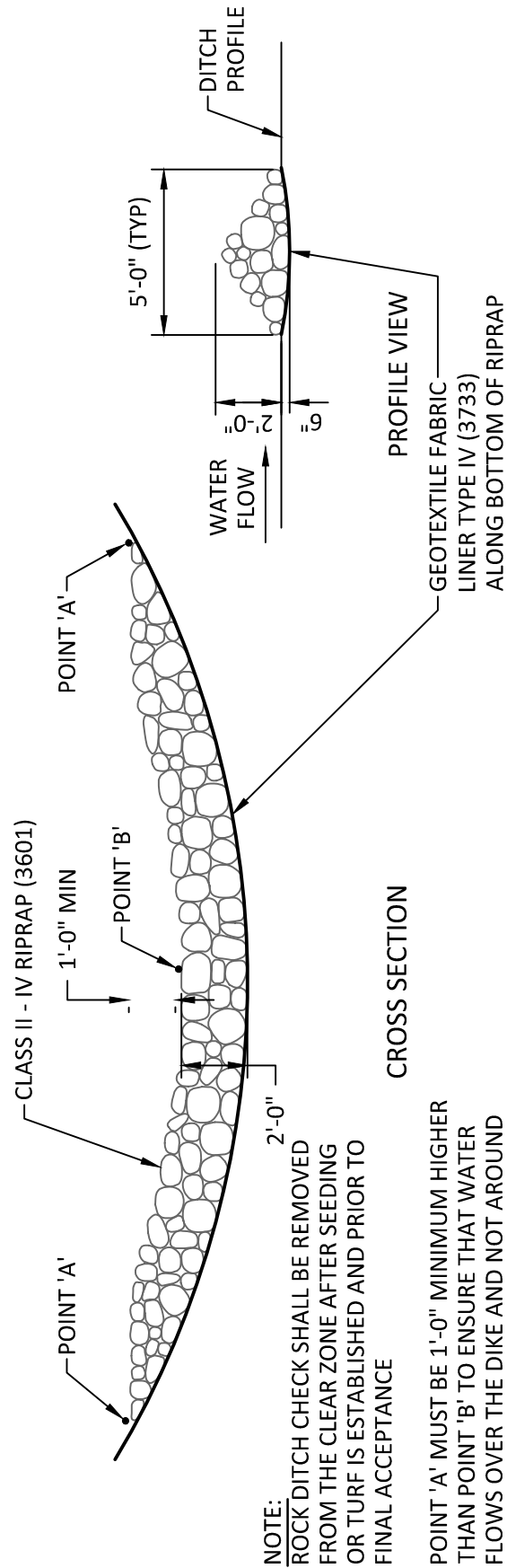
STANDARD DETAIL	
EROSION CONTROL BLANKET INSTALLATION	
CITY OF JORDAN	

STANDARD DETAIL	
NO.	3008J
DATE	APRIL 2019



STANDARD DETAIL
TYPICAL SEDIMENT BASIN CROSS SECTION
CITY OF JORDAN

STANDARD DETAIL
 NO. 3009J
 DATE APRIL 2019

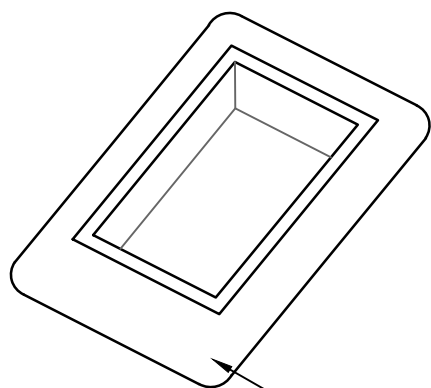


DITCH CHECK - RIPRAP
NOT TO SCALE

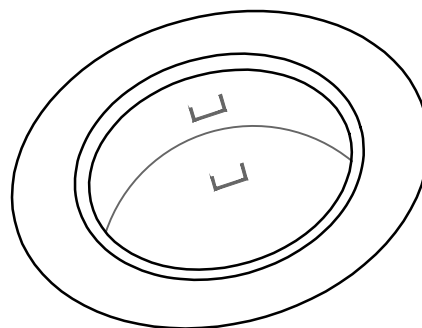


STANDARD DETAIL
RIPRAP DITCH CHECK
CITY OF JORDAN

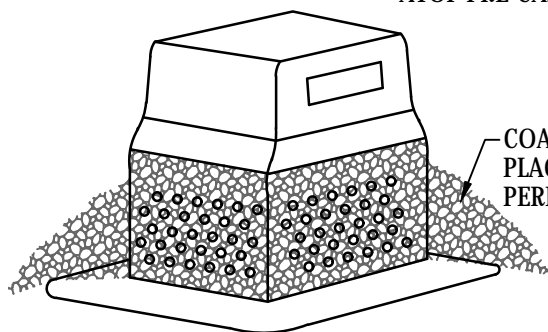
STANDARD DETAIL
NO. 3010J
DATE APRIL 2019



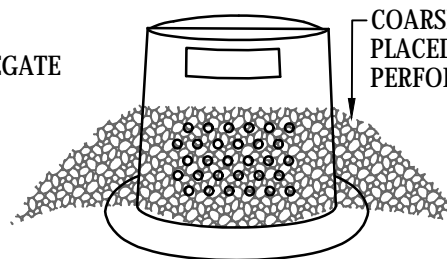
PLACE BARRIER FRAME
ATOP PRE-CAST TOP SLAB



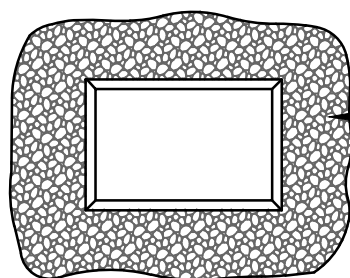
PLACE BARRIER FRAME
ATOP PRE-CAST TOP SLAB



COARSE FILTER AGGREGATE
PLACED TO COVER
PERFORATIONS

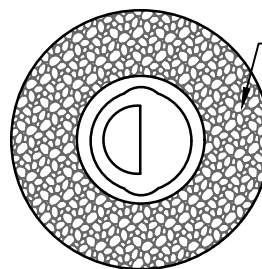


COARSE FILTER AGGREGATE
PLACED TO COVER
PERFORATIONS



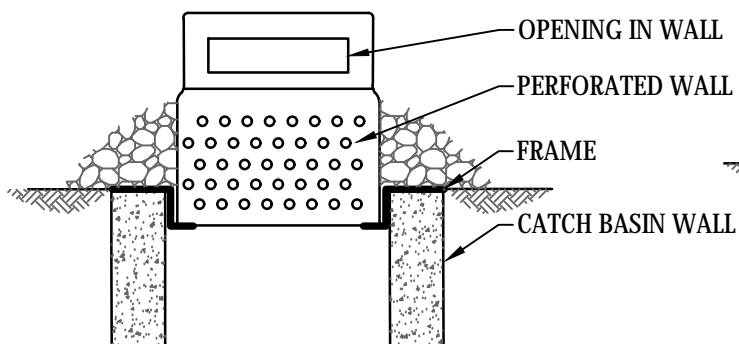
COARSE FILTER AGGREGATE
PLACED TO COVER
PERFORATIONS

TOP VIEW

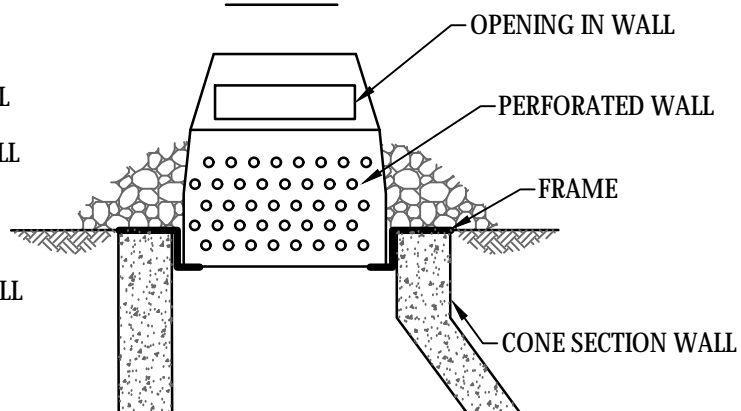


COARSE FILTER AGGREGATE
PLACED TO COVER
PERFORATIONS

TOP VIEW



OPENING IN WALL
PERFORATED WALL
FRAME
CATCH BASIN WALL



OPENING IN WALL

PERFORATED WALL

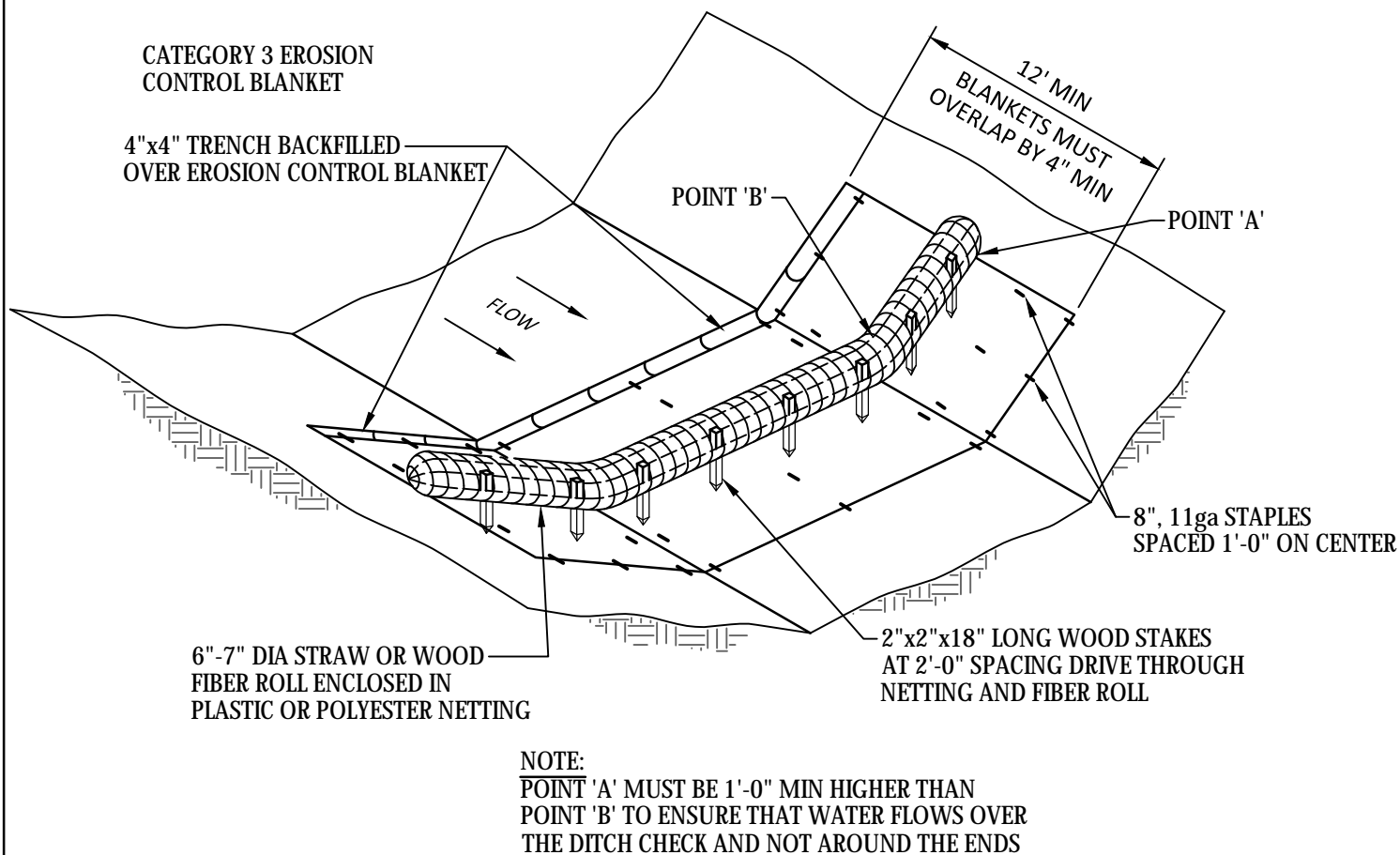
FRAME

CONE SECTION WALL



STANDARD DETAIL
INLET PROTECTION PERFORATED WALL
CITY OF JORDAN

STANDARD DETAIL
NO. 3011J
DATE APRIL 2019



STANDARD DETAIL
BIOROLL DITCH CHECK
CITY OF JORDAN

STANDARD DETAIL
 NO. 3013J
 DATE APRIL 2019

1 INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER. MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE DEPARTMENTS EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL IN THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

2 FINISHED SIZE, INCLUDING POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

INSTALLATION NOTES:

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

INLET SPECIFICATIONS AS PER THE PLAN DIMENSION LENGTH AND WIDTH TO MATCH

1

2

GEOTEXTILE FABRIC, TYPE WOVEN MONOFILAMENT CONFORMING TO SPEC. 3886, TABLE 3886-1 MACHINE SLICE

FRONT, BACK AND BOTTOM TO BE MADE FROM SINGLE PIECE OF FABRIC

4"x6" OVAL HOLE SHALL BE HEAT CUT INTO ALL FOUR SIDE PANELS

8"

4"

12"

6"

FLAP POCKET

2

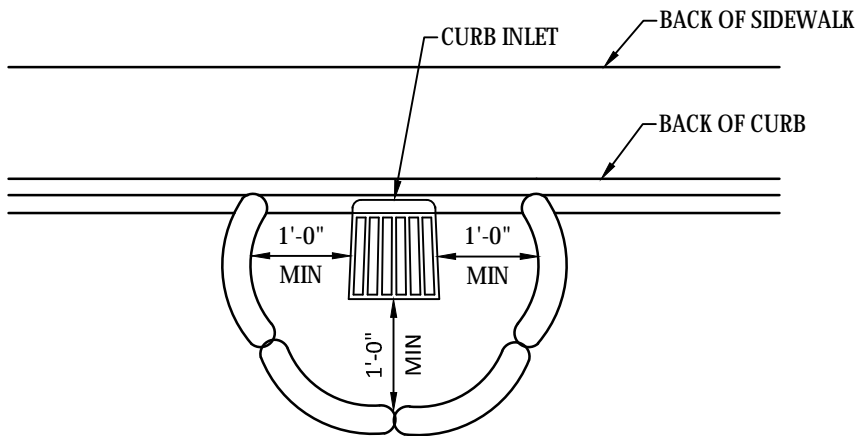
USE REBAR OR STEEL ROD FOR REMOVAL OR FOR INLETS WITH CAST CURB BOX USE WOOD 2x4, EXTEND 10" BEYOND GRATE WIDTH ON BOTH SIDES, LENGTH VARIES, SECURE TO GRATE WITH WIRE OR PLASTIC TIES

MINIMUM DOUBLE STITCHED SEAMS ALL AROUND SIDE PIECES AND ON FLAP POCKETS



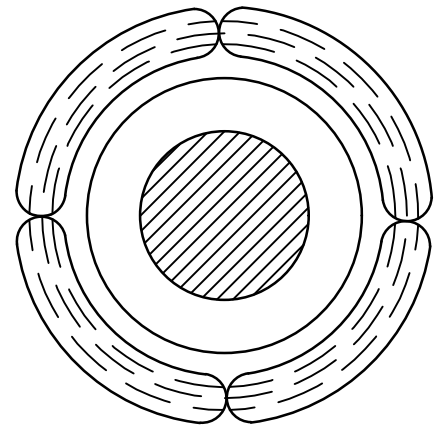
STANDARD DETAIL
INLET PROTECTION - GEOTEXTILE BAG
CITY OF JORDAN

STANDARD DETAIL
NO. 3014J
DATE APRIL 2019



NOTE:
THIS INLET PROTECTION IS USED DURING
ROUGH GRADING ONLY, USE BEFORE ROAD
IS OPEN TO TRAFFIC OR IS PAVED

PAYMENT SHALL INCLUDE ALL MATERIALS,
FILLING OF LOG, PLACEMENT,
MAINTENANCE & REMOVAL;
80% OF BID PRICE SHALL BE PAID UPON
PROPER PLACEMENT WITH THE FINAL 20%
PAID UPON REMOVAL

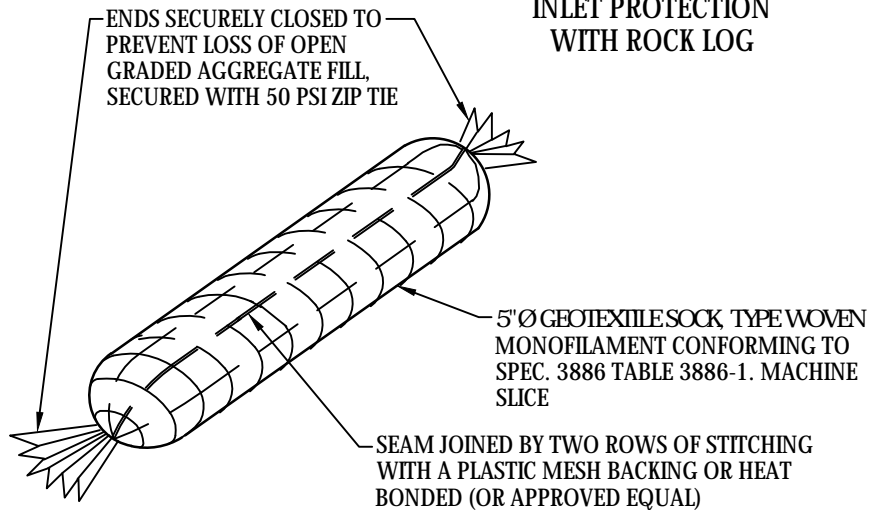


FILL ROCK LOG WITH 45 LBS. OF OPEN
GRADED AGGREGATE CONSISTING OF
SOUND, DURABLE PARTICLES OF CRUSHED
QUARRY ROCK OR GRAVEL CONFORMING
TO THE FOLLOWING GRADATION.

GRADATION	
SIEVE SIZE	PERCENT PASSING
1 1/2"	100
1"	95-100
3/4"	65-95
3/8"	30-65
NO 4	10-35
NO 10	3-20
NO 40	0-8
NO 200	0-3

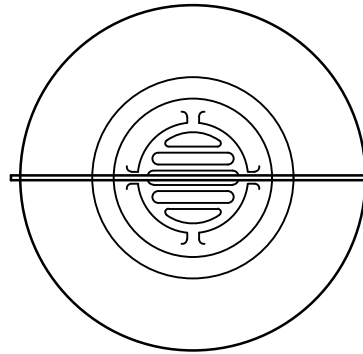
NOTE:
CRUSHED CONCRETE OR BITUMINOUS
SHALL NOT BE USED FOR OPEN
GRADED AGGREGATE.

INLET PROTECTION
WITH ROCK LOG



STANDARD DETAIL
INLET PROTECTION - ROCK BAG
CITY OF JORDAN

STANDARD DETAIL
NO. 3015J
DATE APRIL 2019



ANTIVORTEX ROD, 5/8" Ø MINIMUM,
TACK WELD TO STANDPIPE AND
SET PARALLEL TO FLOW

PLAN VIEW

1" HOLES SPACED
8"-10" ON CENTER

1'-0" UNLESS ADJUSTMENT IS
REQUIRED BECAUSE OF
POTENTIAL FOR FLOODING

GEOTEXTILE
(SEE NOTE)

PERFORATED METAL
STANDPIPE WRAPPED
GEOTEXTILE (SEE NOTE)

1'-0"

ELEVATION

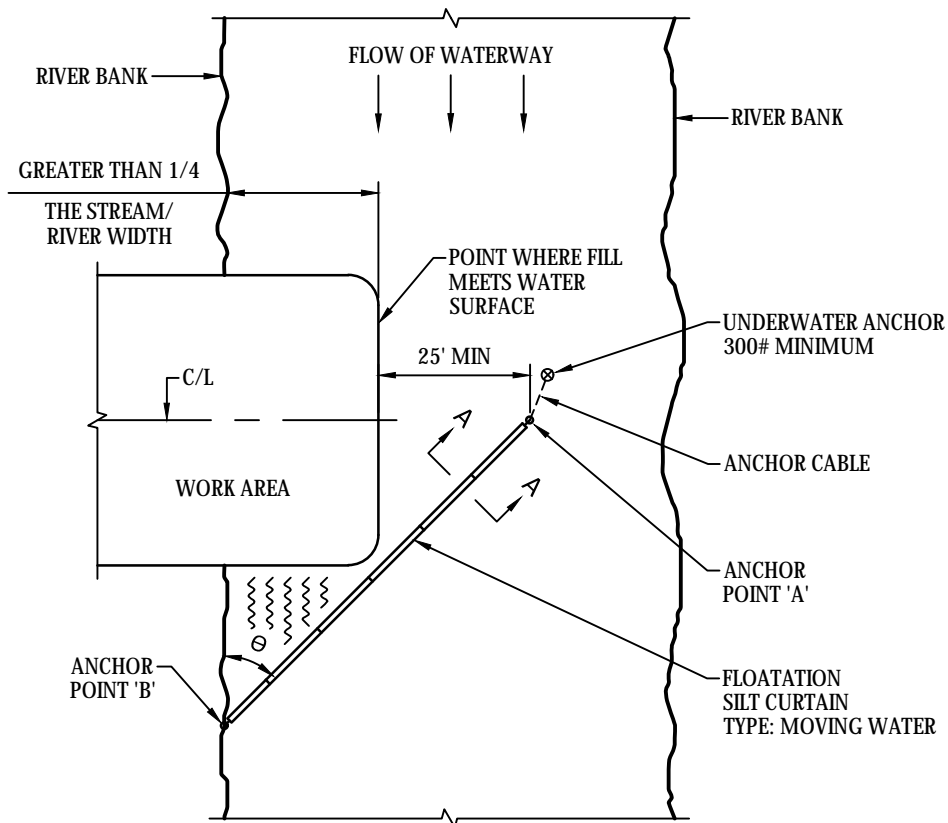
NOTE:

ALL GEOTEXTILE USED FOR INLET
PROTECTION SHALL BE MONOFILAMENT
IN BOTH DIRECTIONS



STANDARD DETAIL
RISER STANDPIPE
CITY OF JORDAN

STANDARD DETAIL
NO. 3016J
DATE APRIL 2019

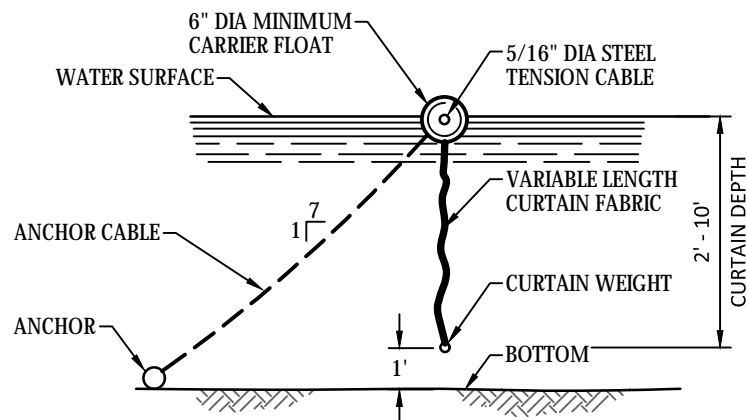


$\angle \theta$	RIVER VELOCITY
45°	SLOW, LESS THAN 3 FT/SEC
35°	MODERATE, 3 - 5 FT/SEC

PLAN VIEW

DESIGN GUIDELINES:
WHEN TEMPORARY FILL ENCROACHES MORE THAN
1/4 BUT LESS THAN 1/3 THE WIDTH OF THE STREAM

MAXIMUM WATER DEPTH: 11 FT
MINIMUM WATER DEPTH: 3 FT
MAXIMUM WATER VELOCITY: 5 FT/SEC

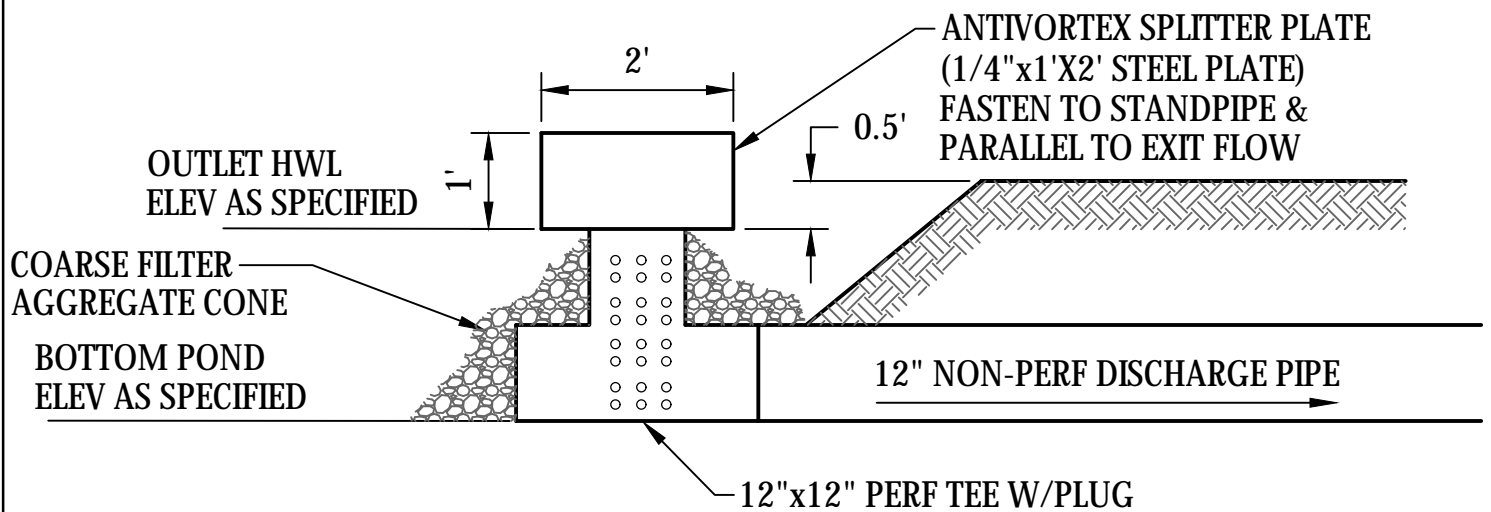


SECTION A-A



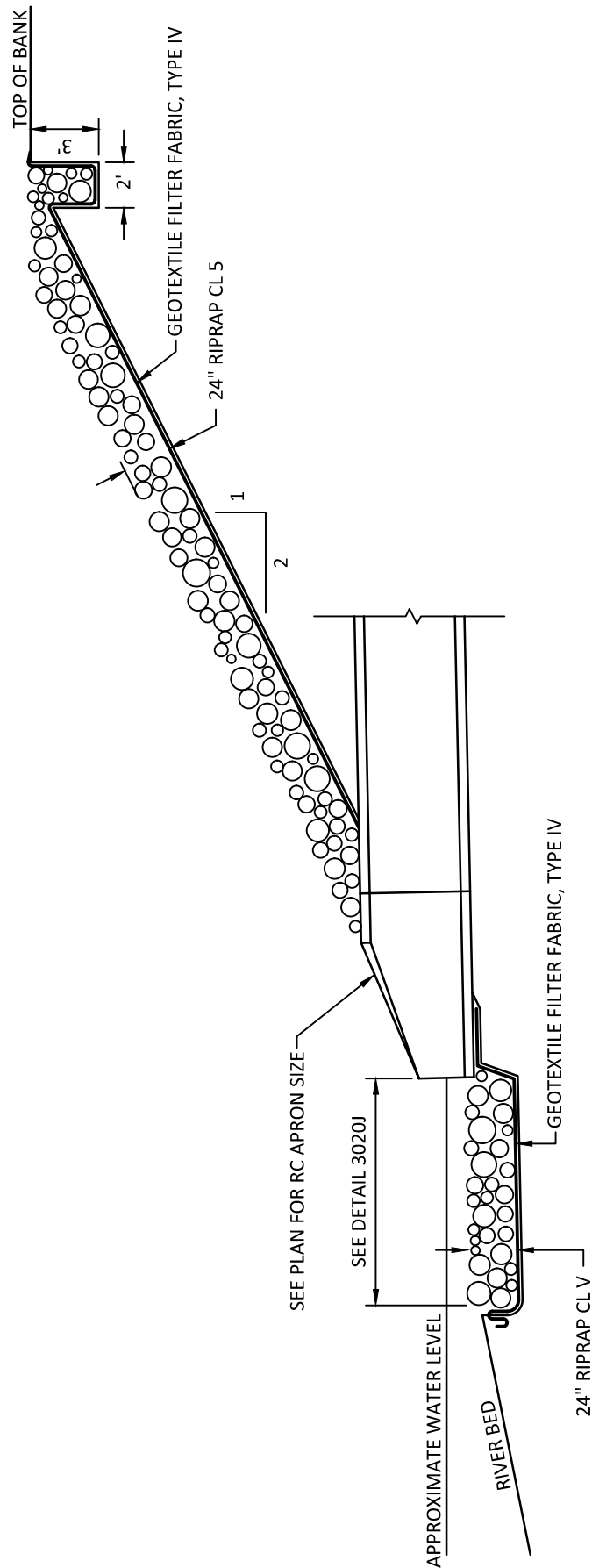
STANDARD DETAIL FLOTATION SILT CURTAIN CITY OF JORDAN

STANDARD DETAIL
NO. 3017J
DATE APRIL 2019



STANDARD DETAIL
ALTERNATE CULVERT STANDPIPE
CITY OF JORDAN

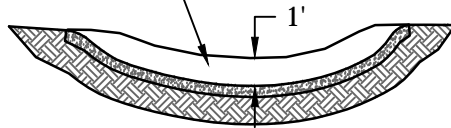
STANDARD DETAIL
 NO. 3018J
 DATE APRIL 2019



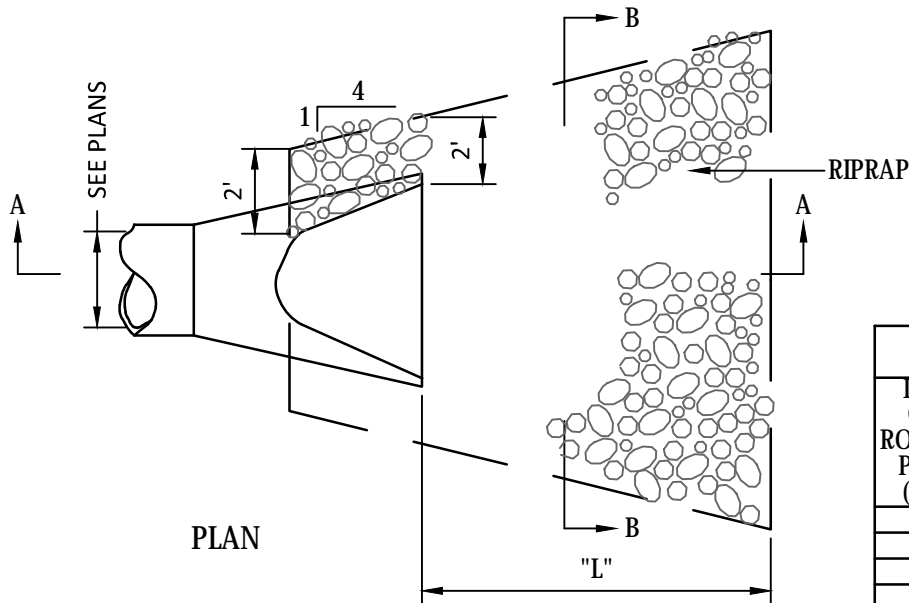
STANDARD DETAIL
RIPRAP AT RIVER OUTFALL
CITY OF JORDAN

STANDARD DETAIL
 NO. 3019J
 DATE APRIL 2019

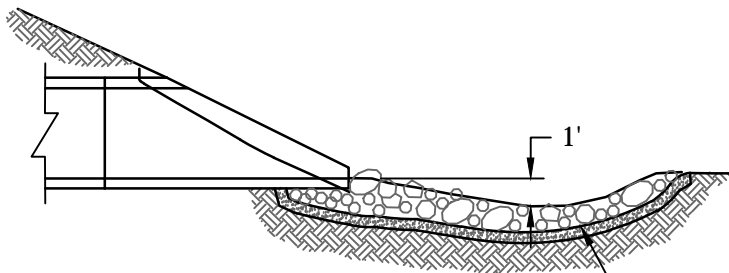
SEE TABLE FOR
MINIMUM DEPTH



SECTION B-B



PLAN



SECTION A-A

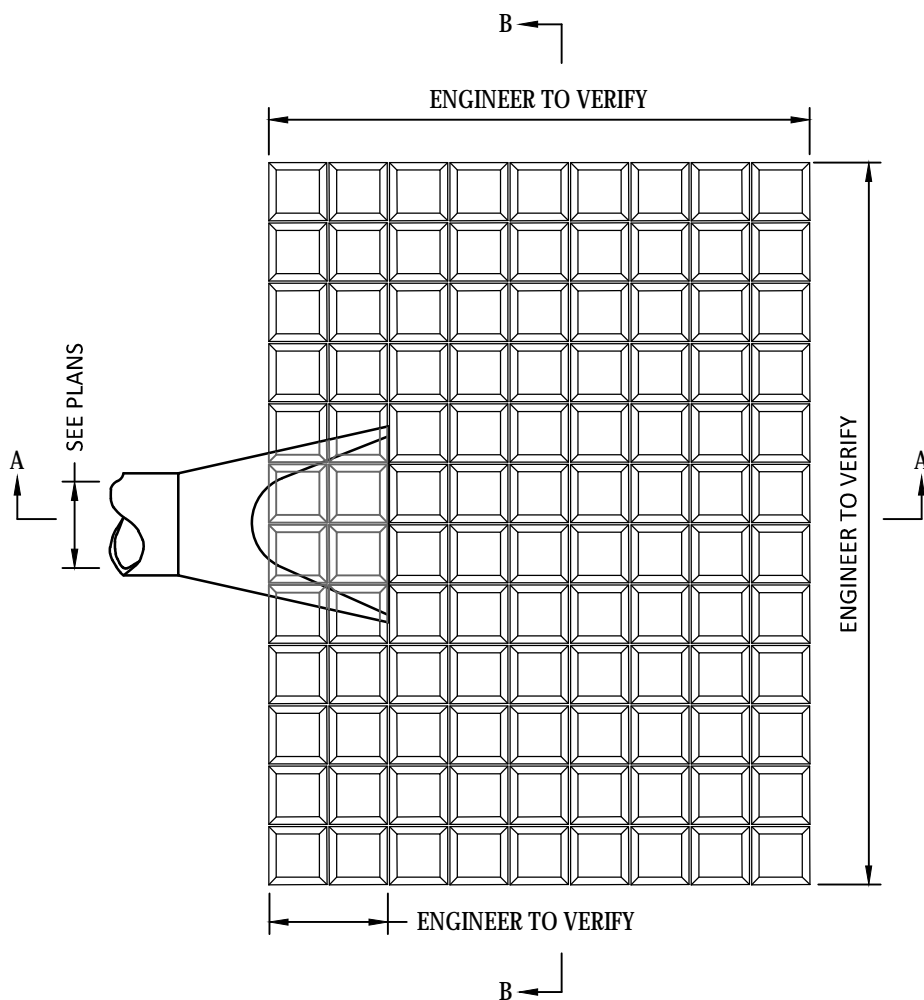
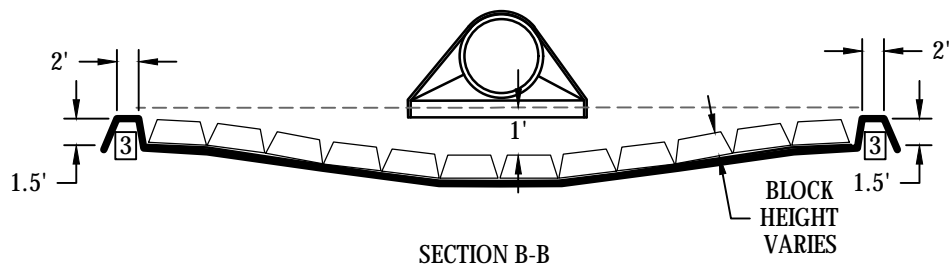
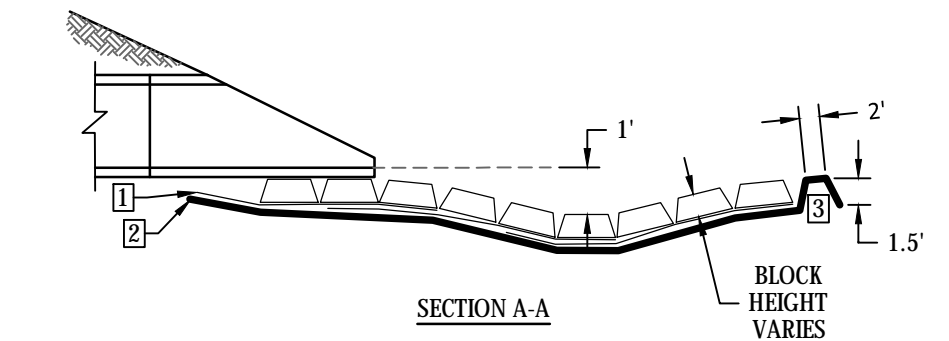
GEOTEXTILE FABRIC, PER SPEC 3733;
THE FABRIC SHOULD COVER THE AREA
OF THE RIPRAP AND EXTEND UNDER
THE CULVERT APRON THREE FEET

		CLASS II d50=6"	CLASS III d50=9"	CLASS IV d50=12"
DIA OF ROUND PIPE (IN)	L (FT)	12" DEPTH RIPRAP (CU YD)	18" DEPTH RIPRAP (CU YD)	24" DEPTH RIPRAP (CU YD)
12	8	5	8	10
15	8	5	8	10
18	10	6	10	15
21	10	8	15	15
24	12	10	15	20
27	12	10	15	20
30	14	15	20	25
36	16	18	25	30
42	18	20	30	40
48	20	20	40	50



STANDARD DETAIL
RCP END RIPRAP DETAIL
CITY OF JORDAN

STANDARD DETAIL
NO. 3020J
DATE APRIL 2019



1 ARTICULATED BLOCK TO BE PLACED FROM DOWN STREAM END GOING UPSTREAM. FABRIC INSTALLED TO BE PULLED TAUT TOWARDS THE UPSTREAM END PRIOR TO PLACEMENT OF NEXT BLOCK SECTION.

2 GEOTEXTILE FILTER, TYPE IV (MNDOT 2511 / 3733 INCIDENTAL) SHALL COVER THE AREA OF THE ARTICULATED BLOCK AND EXTEND UNDER THE CULVERT APRON THREE FEET.

3 THE LAST 3.5' OF GEOTEXTILE FILTER ON THE DOWN STREAM END IS TO BE DUG INTO THE EXISTING GROUND.

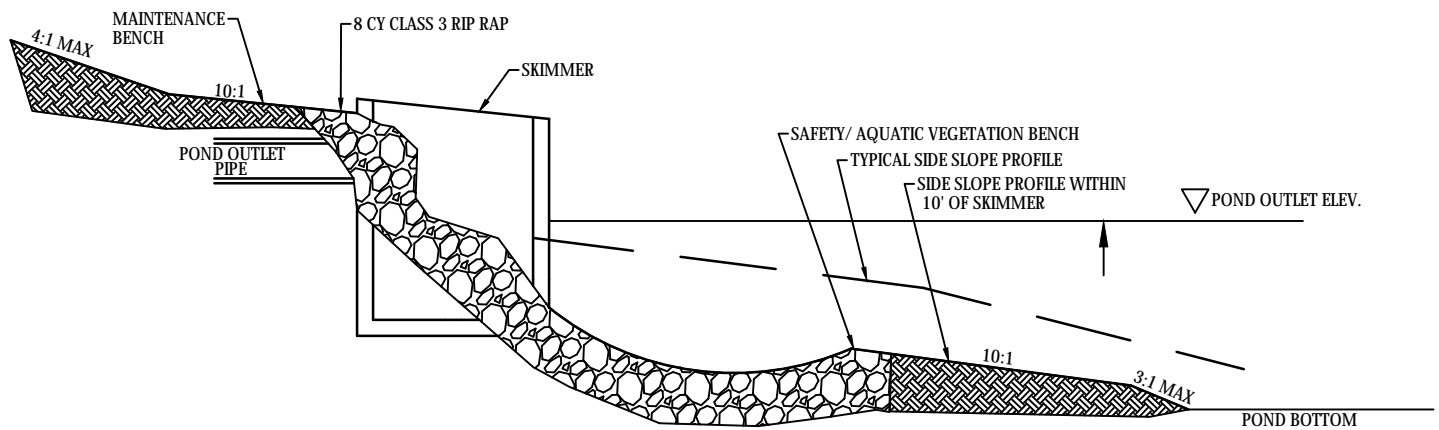
CONSTRUCTION NOTE:

- TOP SOIL TO BE PLACED LEVEL WITH TOP OF BLOCK AND SEEDED WITH MNDOT SEED MIX NO. 250GR TOPSOIL SHALL BE PLACED IN MANNER TO MINIMIZE ANY SETTLEMENT OF BLOCKS OR SOIL
- BLOCKS TO BE INSTALLED ACCORDING TO MANUFACTURERS RECOMMENDATIONS

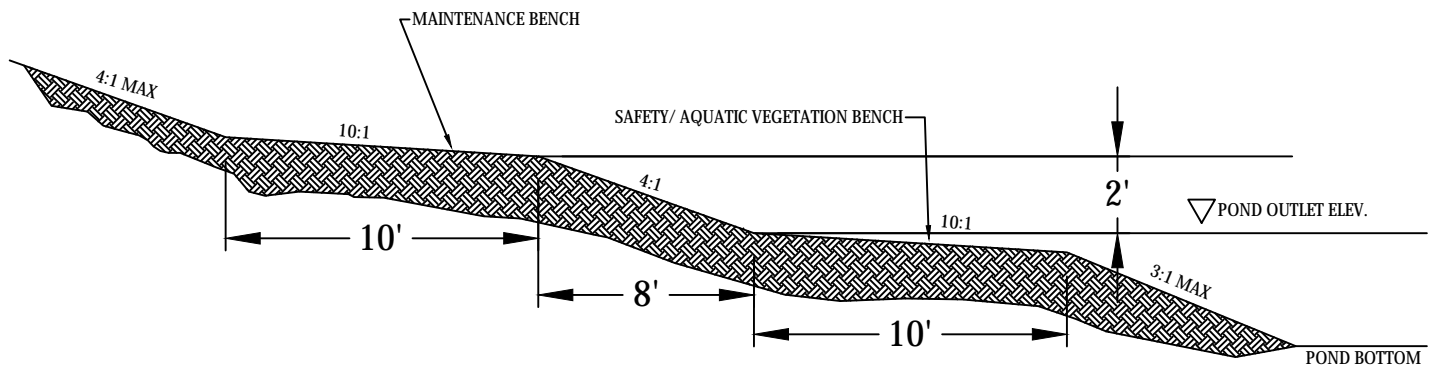


STANDARD DETAIL
ARTICULATED BLOCK AT FLARED END
CITY OF JORDAN

STANDARD DETAIL
 NO. 3031J
 DATE APRIL 2019



TYPICAL BENCH DETAIL WITHIN 10' OF SKIMMER OUTLET

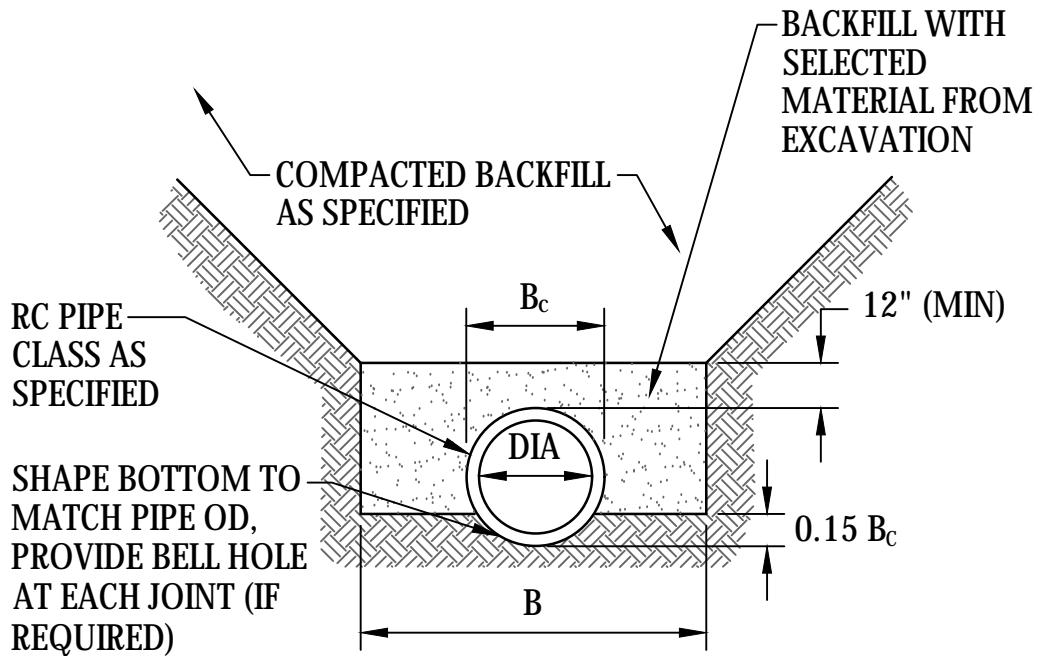


TYPICAL BENCH DETAIL



STANDARD DETAIL
TYPICAL BENCH DETAIL
CITY OF JORDAN

STANDARD DETAIL
NO. 3032J
DATE APRIL 2019

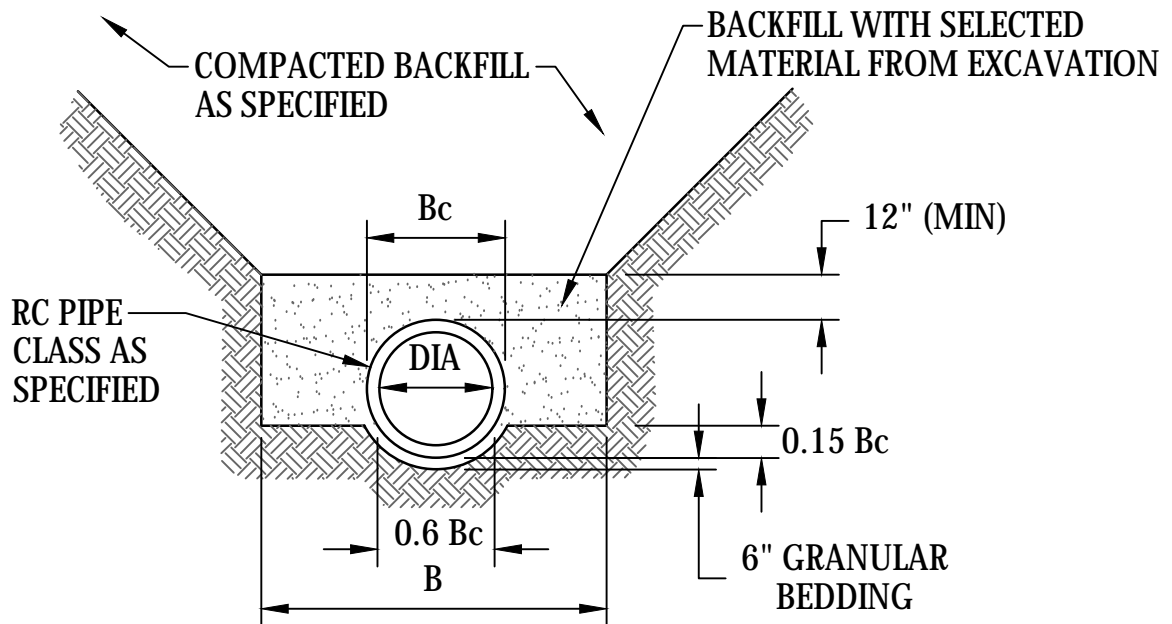


PIPE DIA	B
36" OR LESS	$B_c + 24"$
42" TO 54"	$1.5 \times B_c$
60" OR OVER	$B_c + 36"$



STANDARD DETAIL
RC STORM SEWER CLASS C BEDDING
CITY OF JORDAN

STANDARD DETAIL
 NO. 4001J
 DATE APRIL 2019

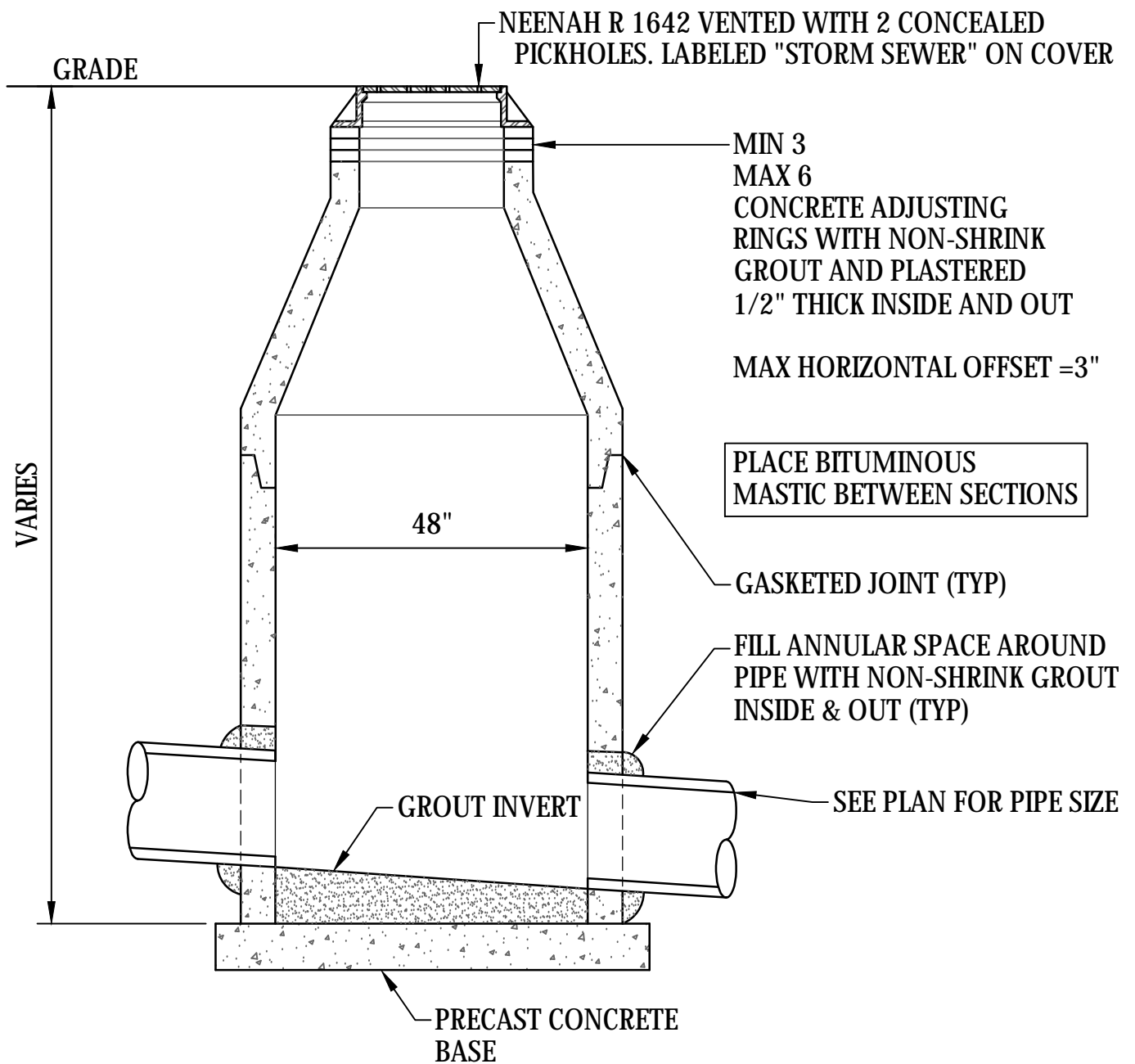


PIPE DIA	B
36" OR LESS	$B + 24" C$
42" TO 54"	$1.5 \times B_c$
60" OR OVER	$B + 36" C$



STANDARD DETAIL
RC STORM SEWER CLASS B BEDDING
CITY OF JORDAN

STANDARD DETAIL
 NO. 4002J
 DATE APRIL 2019



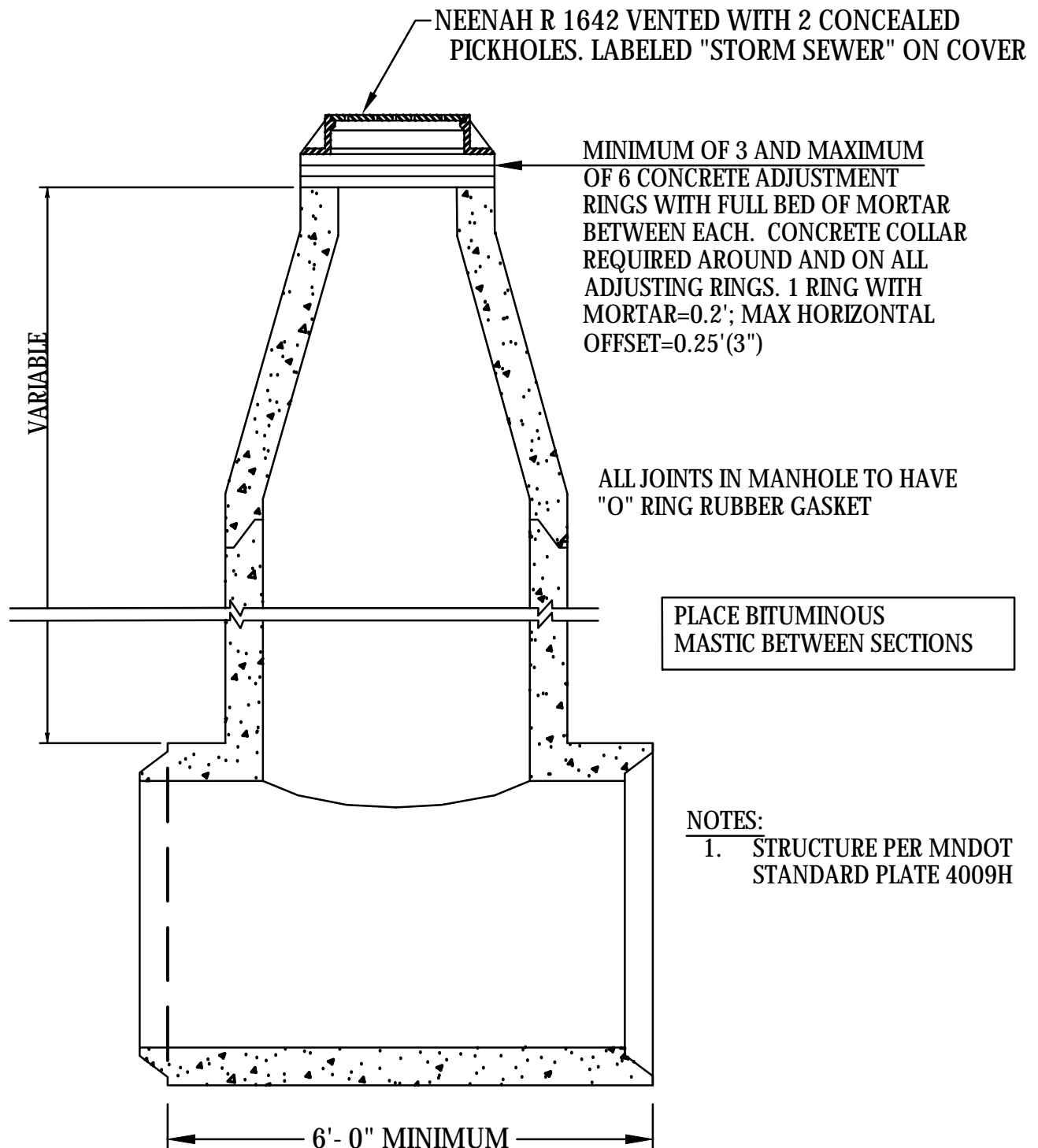
NOTE:

1. STRUCTURE PER MNDOT 4020 STANDARD PLATE, EXCEPT CONE.



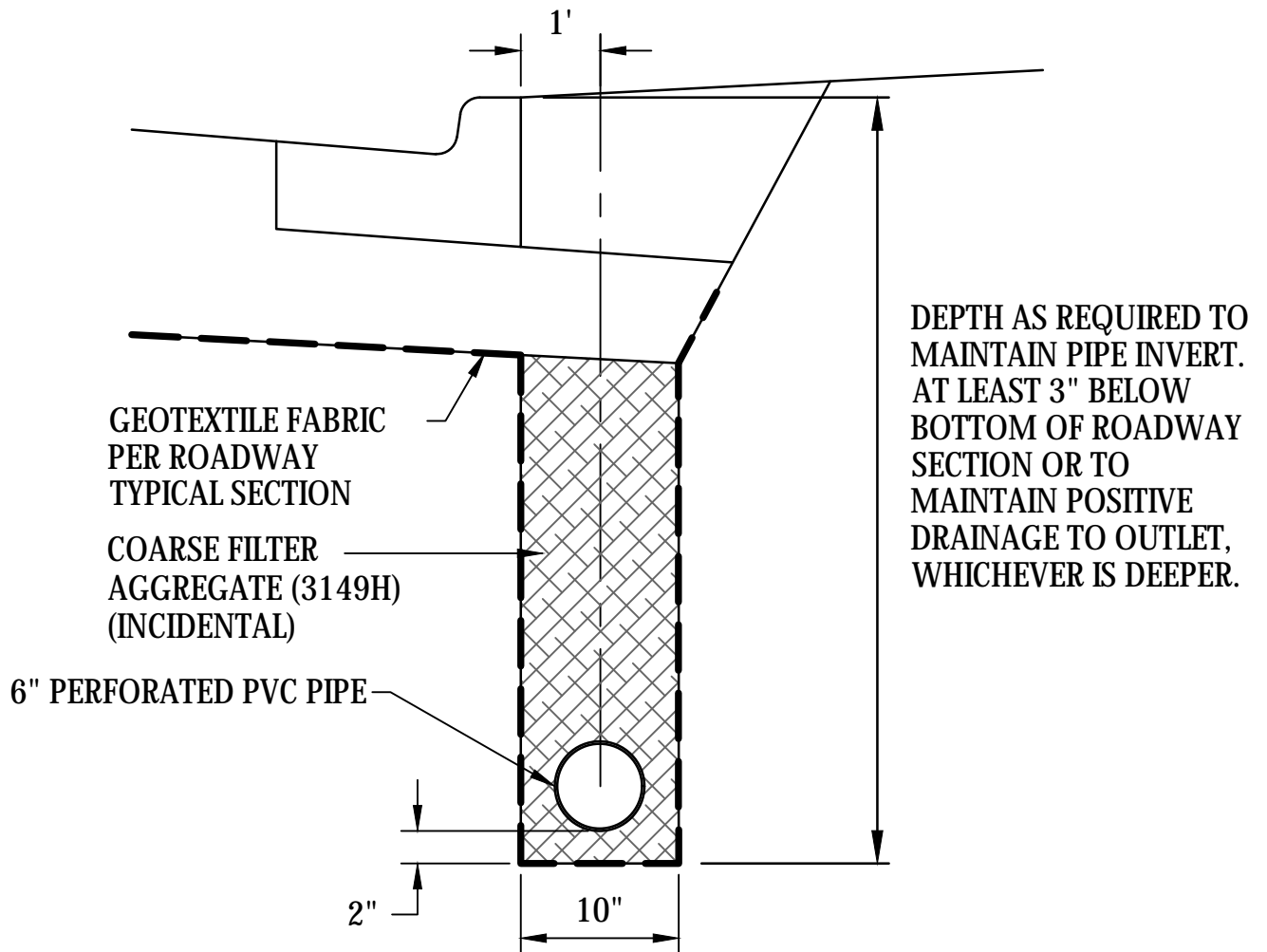
STANDARD DETAIL
STORM SEWER STRUCTURE DES F, TYPE A CONE
CITY OF JORDAN

STANDARD DETAIL
 NO. 4006J
 DATE APRIL 2019



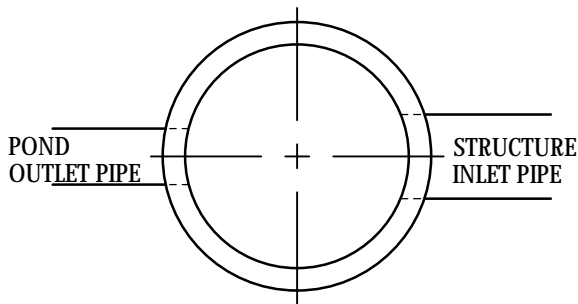
STANDARD DETAIL
DRAINAGE STRUCTURE DESIGN J
CITY OF JORDAN

STANDARD DETAIL
 NO. 4007J
 DATE APRIL 2019



STANDARD DETAIL
ROADWAY EDGE DRAIN
CITY OF JORDAN

STANDARD DETAIL
NO. 4010J
DATE APRIL 2019

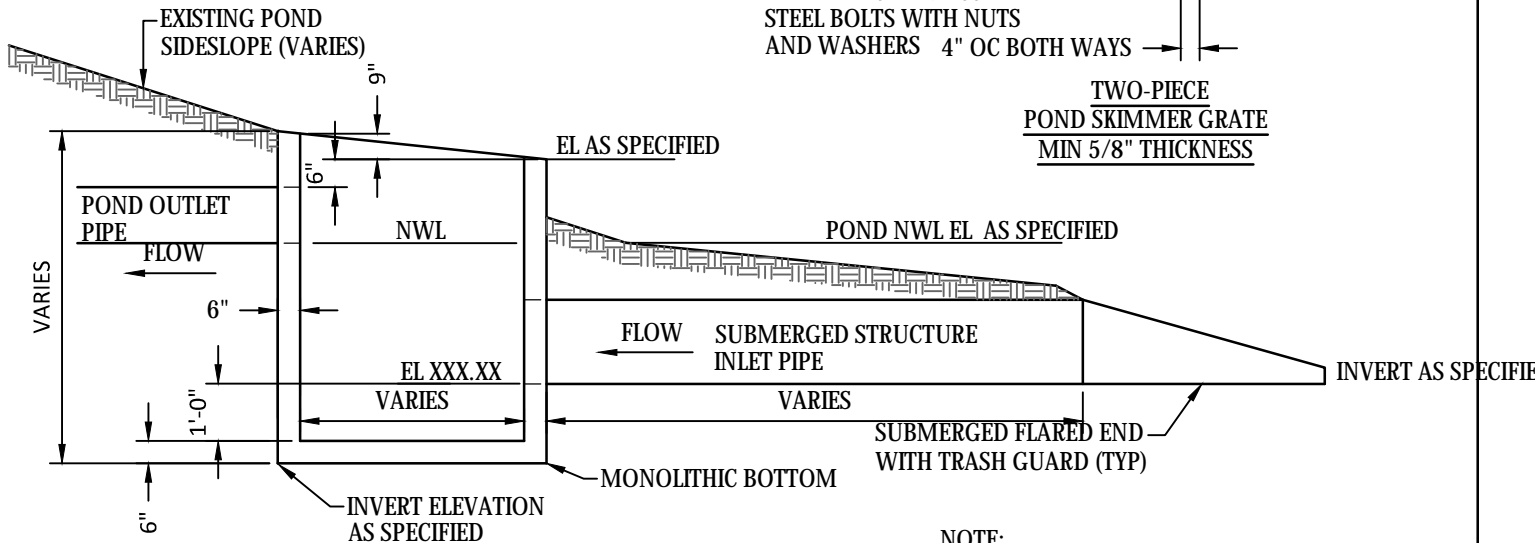


- GRATE NOTES:
1. GRATE TO BE MADE IN TWO (2) PIECES
 2. ALL METAL SHALL BE HOT-DIPPED GALVANIZED

HINGE ASSEMBLY
MINIMUM OF 2
HINGES REQUIRED

(4) 1/2" DIA-13 UNC
HEX HEAD STAINLESS
STEEL BOLTS WITH NUTS
AND WASHERS 4" OC BOTH WAYS

TWO-PIECE
POND SKIMMER GRATE
MIN 5/8" THICKNESS



SECTION VIEW

NOTE:
1. ALL PIPE JOINTS SHALL BE TIED.



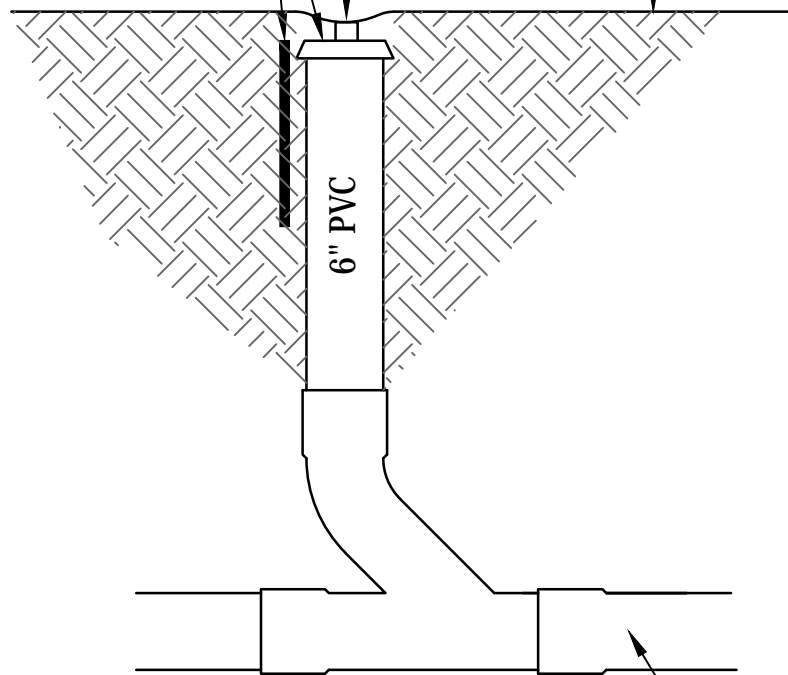
STANDARD DETAIL
POND SKIMMER STRUCTURE
CITY OF JORDAN

STANDARD DETAIL
NO. 4015J
DATE APRIL 2019

THREADED METAL CAP OR 18"
STEEL PIN FOR LOCATING

THREADED CAP

GRADE



6" PVC PERFORATED
DRAIN PIPE AS SPECIFIED

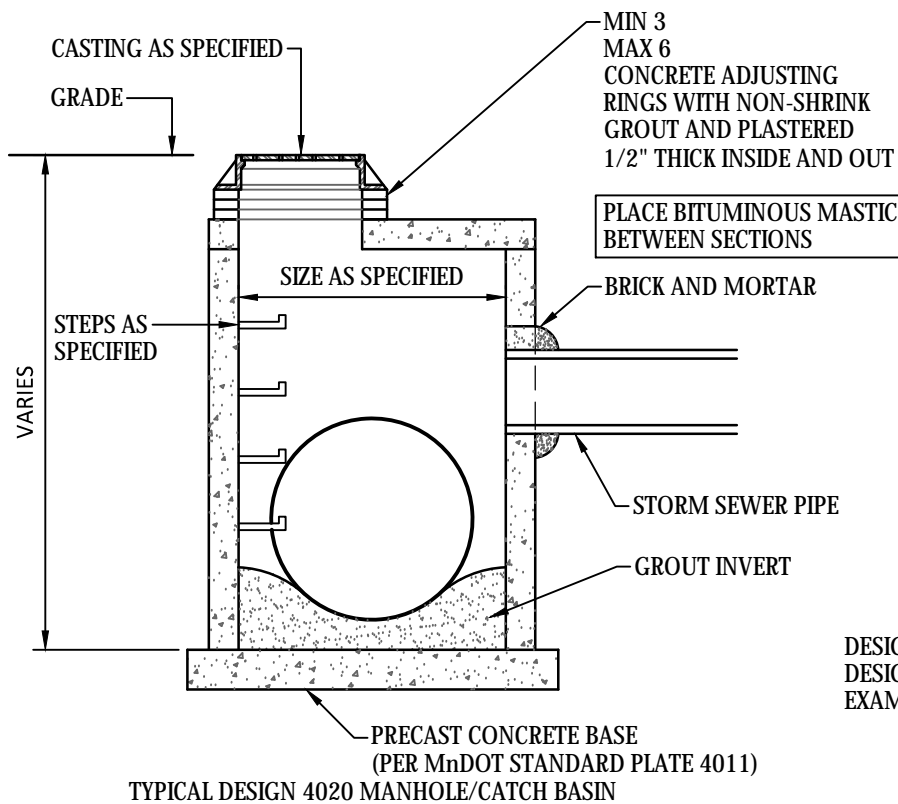
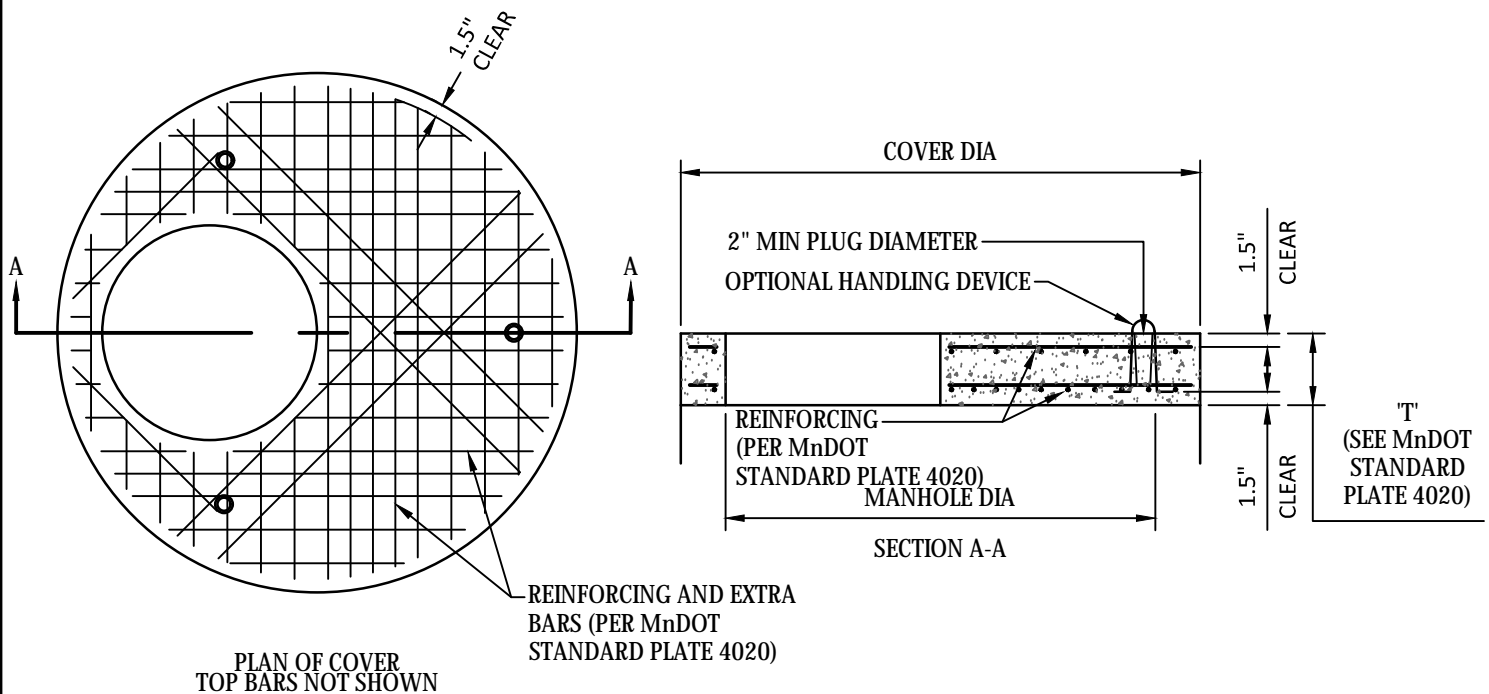
NOTE:

1. LOCATION OF CLEANOUT TO BE IDENTIFIED BY STAMP IN CONCRETE CURB.



STANDARD DETAIL
SUBSURFACE DRAIN CLEANOUT
CITY OF JORDAN

STANDARD DETAIL
NO. 4018J
DATE APRIL 2019



NOTES:

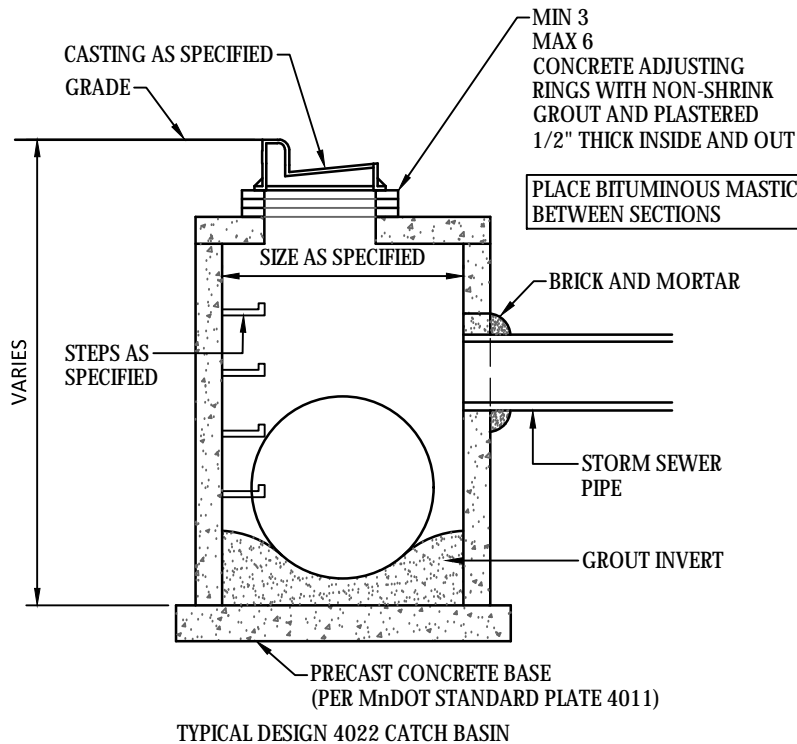
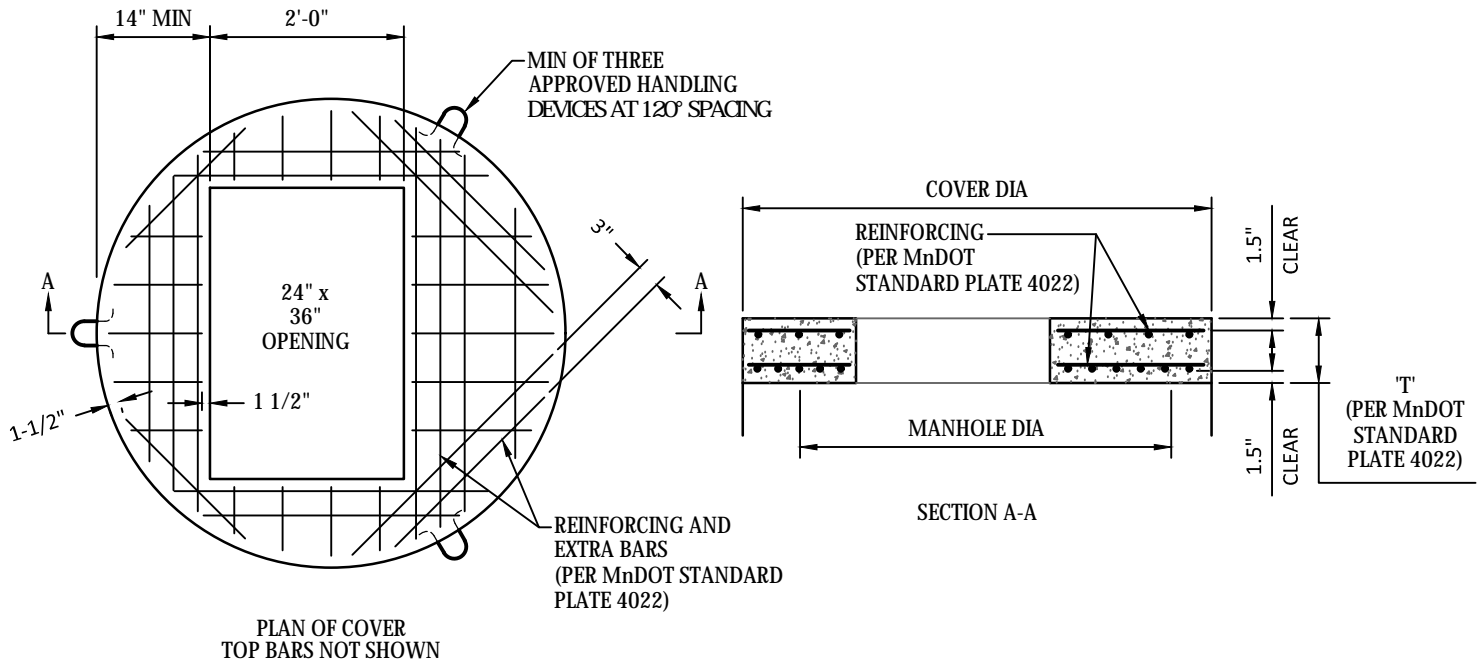
1. AASHTO HS 25 LOADING MAX FILL HEIGHT 15'
2. THE "STORM SEWER" SHALL BE PERMANENTLY MARKED ON THE TOP COVER
3. EQUIVALENT STEEL AREAS IN WIRE MESH MAY BE USED
4. REINFORCEMENT PER SPEC 3301, GRADE 60 A SINGLE HOOP OF 8ga STEEL WIRE
5. STRUCTURE DESIGN PER MNDOT PLATE 4020.

DESIGNATION:
DESIGN DIAMETER - STANDARD PLATE #
EXAMPLE: DESIGN 48-4020



STANDARD DETAIL DRAINAGE STRUCTURE DESIGN 4020 CITY OF JORDAN

STANDARD DETAIL
NO. 4020J
DATE APRIL 2019



NOTES:

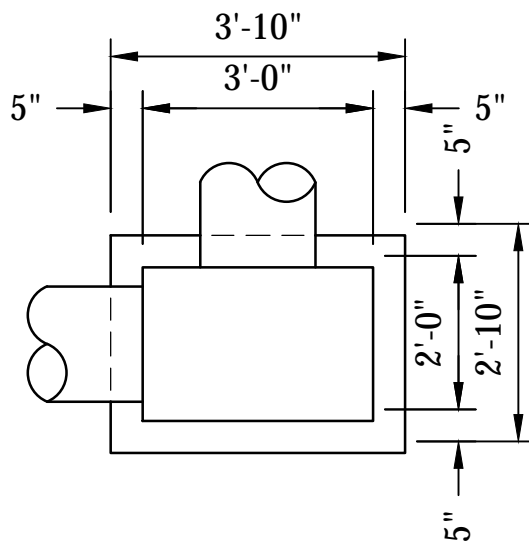
1. AASHTO HS 25 LOADING MAX FILL HEIGHT 15'
2. THE "STORM SEWER" SHALL BE PERMANENTLY MARKED ON THE TOP COVER
3. EQUIVALENT STEEL AREAS IN WIRE MESH MAY BE USED
4. REINFORCEMENT PER SPEC 3301, GRADE 60 A SINGLE HOOP OF 8ga STEEL WIRE
5. STRUCTURE DESIGN PER MNDOT 4022

DESIGNATION:
DESIGN DIAMETER - STANDARD PLATE #
EXAMPLE = DESIGN 48-4022

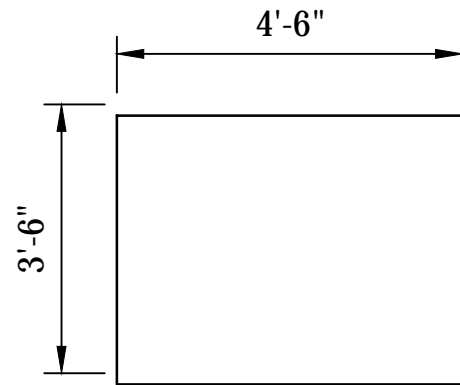


STANDARD DETAIL DRAINAGE STRUCTURE DESIGN 4022 CITY OF JORDAN

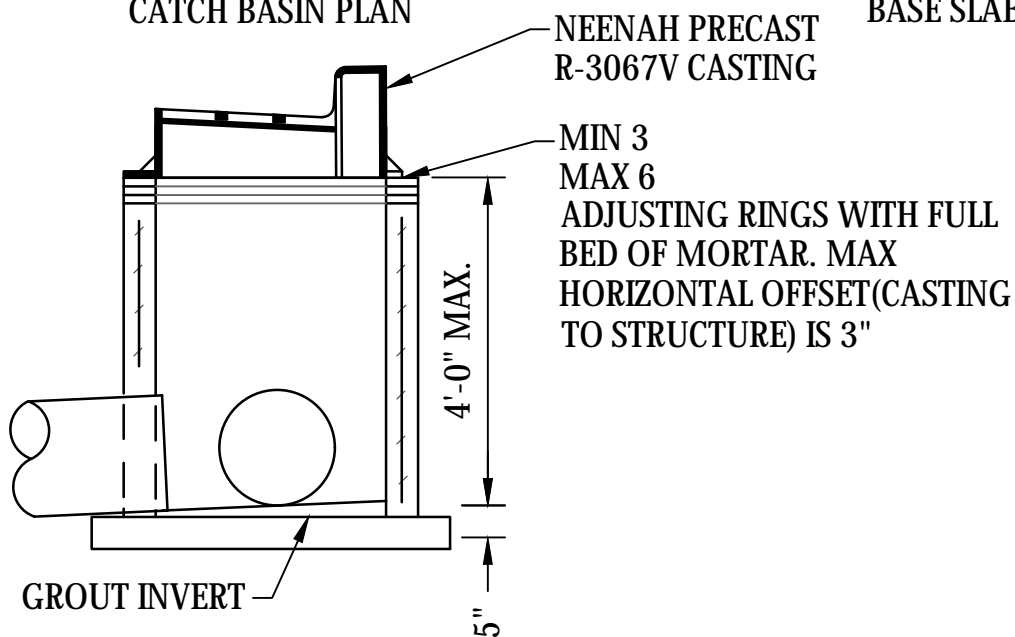
STANDARD DETAIL
NO. 4022J
DATE APRIL 2019



CATCH BASIN PLAN



BASE SLAB PLAN



SECTION

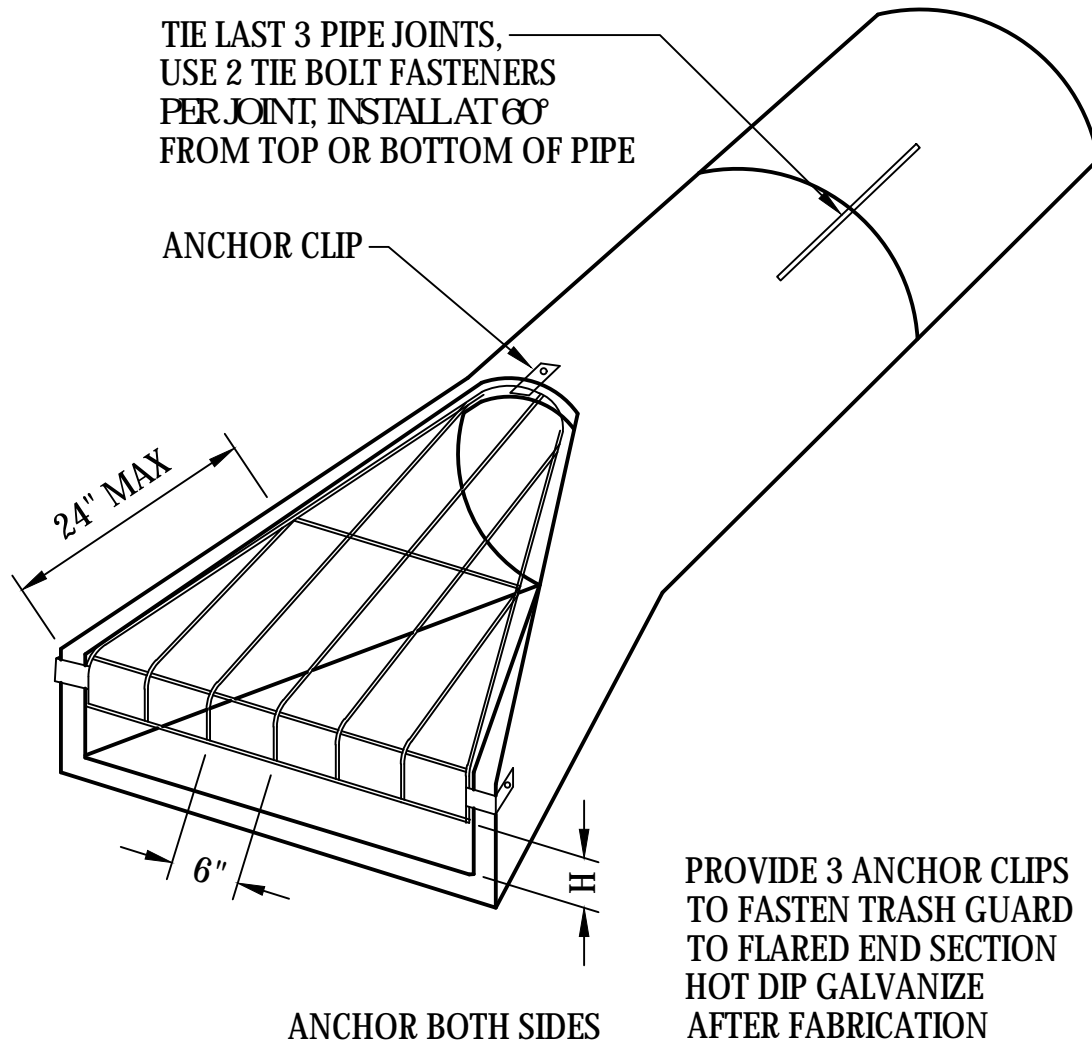
NOTES:

1. PRECAST INVERTS WILL NOT BE ALLOWED.
2. PIPE CUT-OUTS PER PLANS.
3. ALTERNATE CAST-IN-PLACE BASE CAN BE USED
4. MIN REINFORCING SHALL BE WIRE FABRIC HAVING AN AREA OF NOT LESS THAN 0.12 SQ IN PER FOOT IN BOTH DIRECTIONS
5. DOGHOUSES SHALL BE GROUTED ON BOTH THE INSIDE AND OUTSIDE.



STANDARD DETAIL
DRAINAGE STRUCTURE DESIGN R-1 (2'X3)
CITY OF JORDAN

STANDARD DETAIL
 NO. 4029J
 DATE APRIL 2019

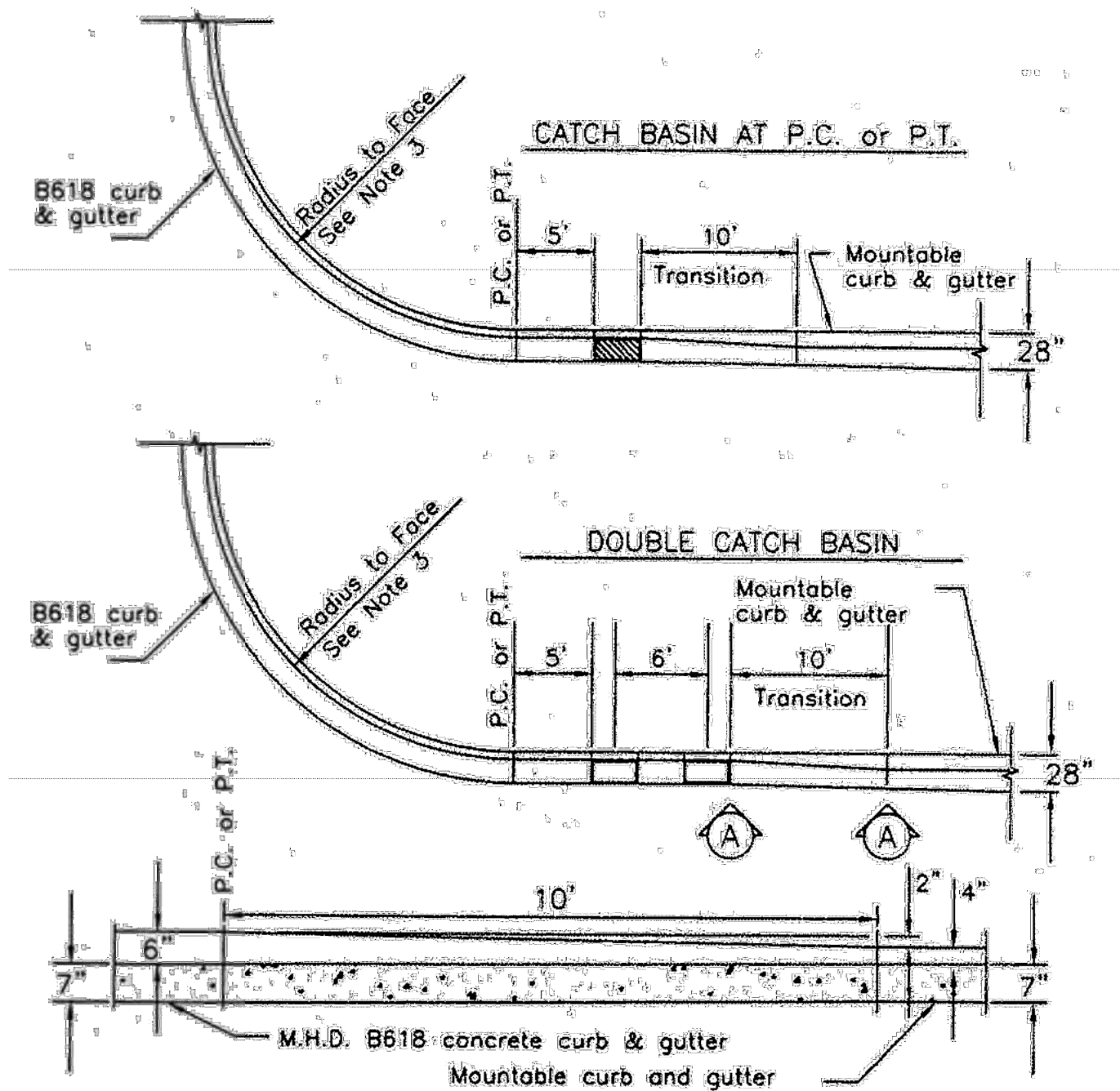


TRASH GUARD SIZES			
PIPE SIZE	BARs	"H"	BOLTS
12"-18"	3/4"Ø	4"	5/8"
21"-42"	1"Ø	6"	3/4"
42"-72"	1 1/4"Ø	12"	1"



STANDARD DETAIL
RC APRON TRASH GUARD
CITY OF JORDAN

STANDARD DETAIL
 NO. 4030J
 DATE APRIL 2019



NOTE:

1. All radii are measured to face of curb.
2. No catch basins will be constructed in the intersection radii.
3. 30' radii will be required at intersections of all collector to residential streets.
20' radii will be required at intersections of all residential to residential streets.



STANDARD DETAIL

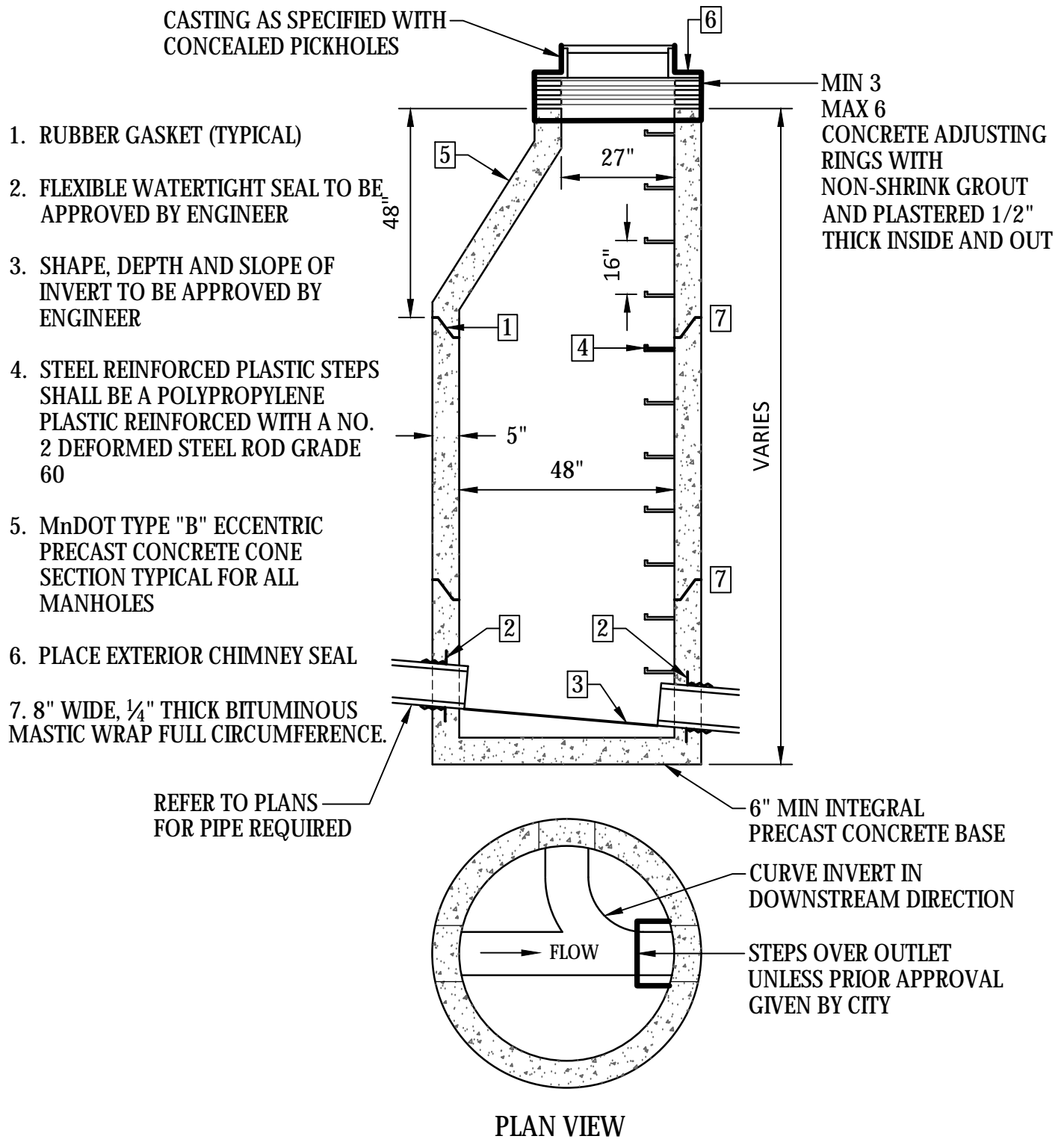
CONCRETE CURB & GUTTER TRANSITION & CATCH BASIN LOCATION

CITY OF JORDAN

STANDARD DETAIL

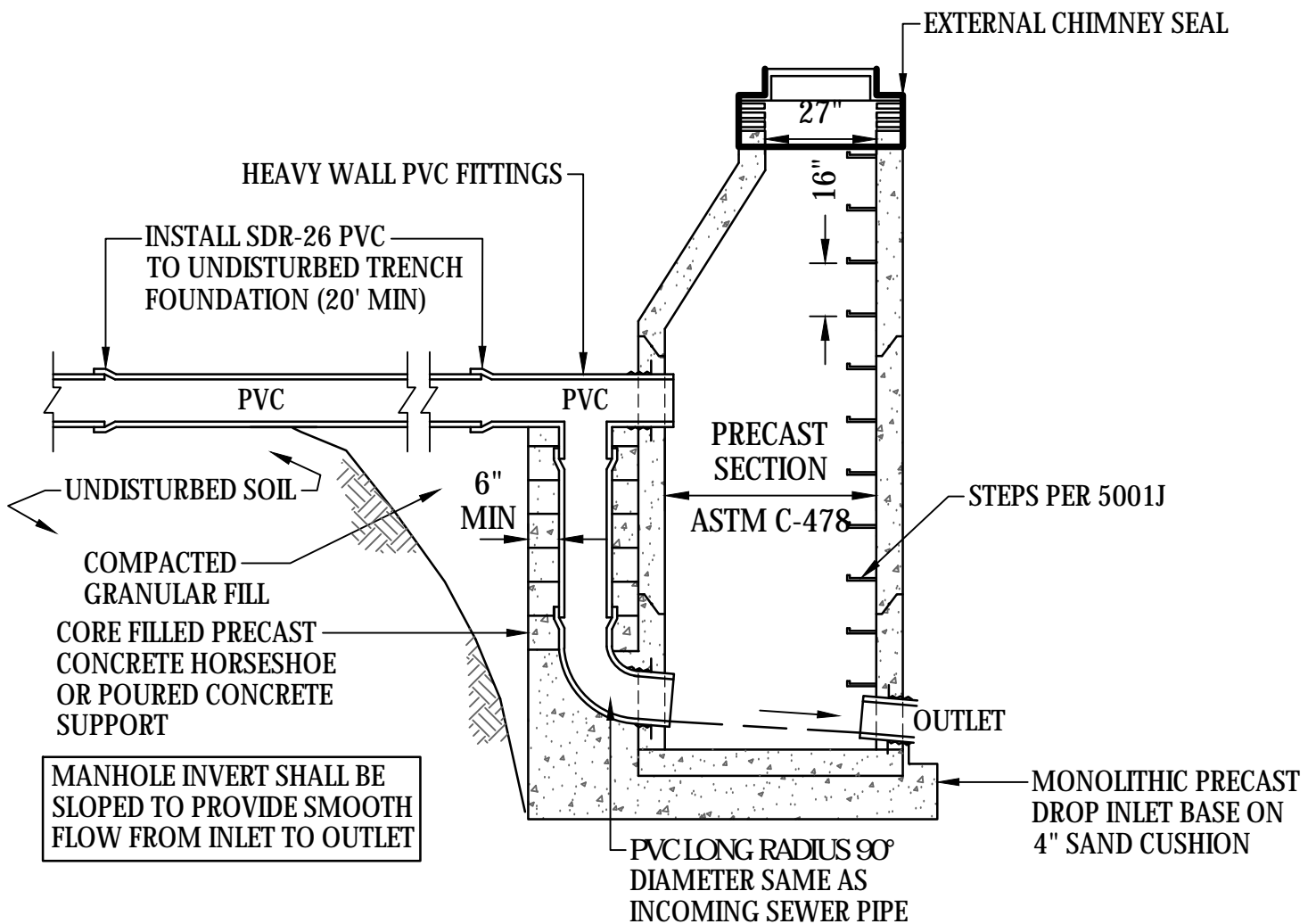
NO. 4031J

DATE APRIL 2019



STANDARD DETAIL
SANITARY SEWER MANHOLE
CITY OF JORDAN

STANDARD DETAIL
 NO. 5001J
 DATE APRIL 2019



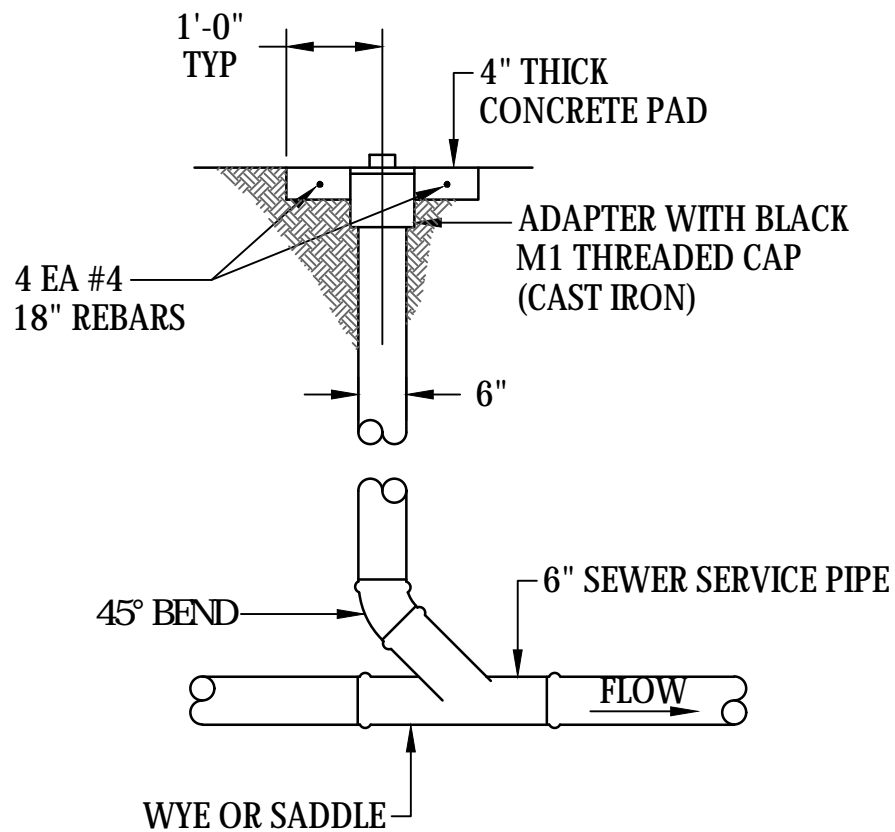
NOTE:

1. REQUIREMENTS OF THIS DETAIL ARE IN ADDITION TO THOSE OF 5001J.



STANDARD DETAIL
SANITARY SEWER DROP MANHOLE
CITY OF JORDAN

STANDARD DETAIL
 NO. 5003J
 DATE APRIL 2019



STANDARD DETAIL

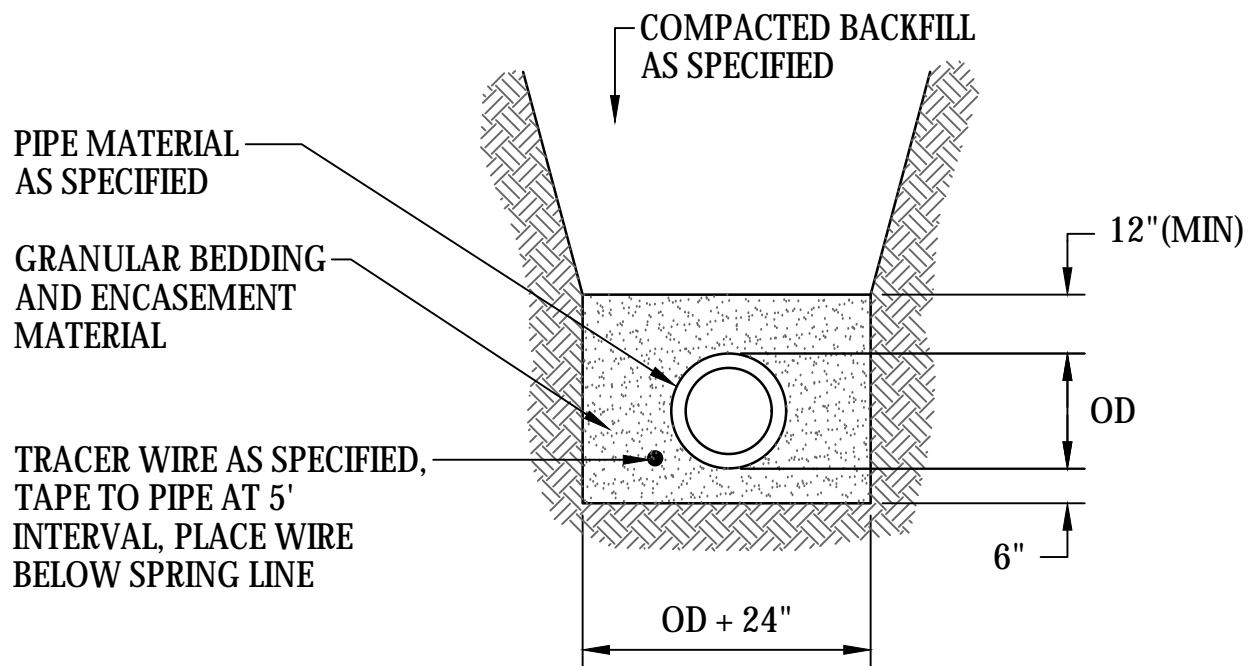
SANITARY SEWER SERVICE CLEANOUT

CITY OF JORDAN

STANDARD DETAIL

NO. 5004J

DATE APRIL 2019

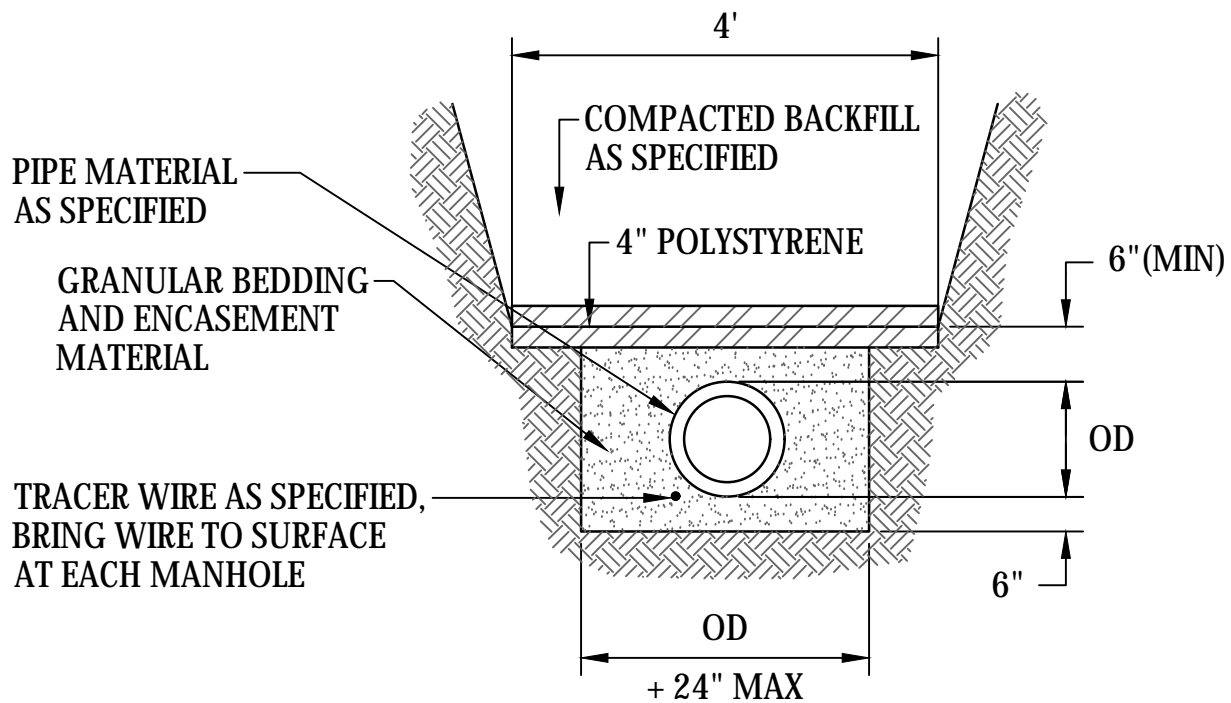


STANDARD DETAIL

NON-RIGID SANITARY SEWER TRENCH

CITY OF JORDAN

STANDARD DETAIL
NO. 5005J
DATE APRIL 2019



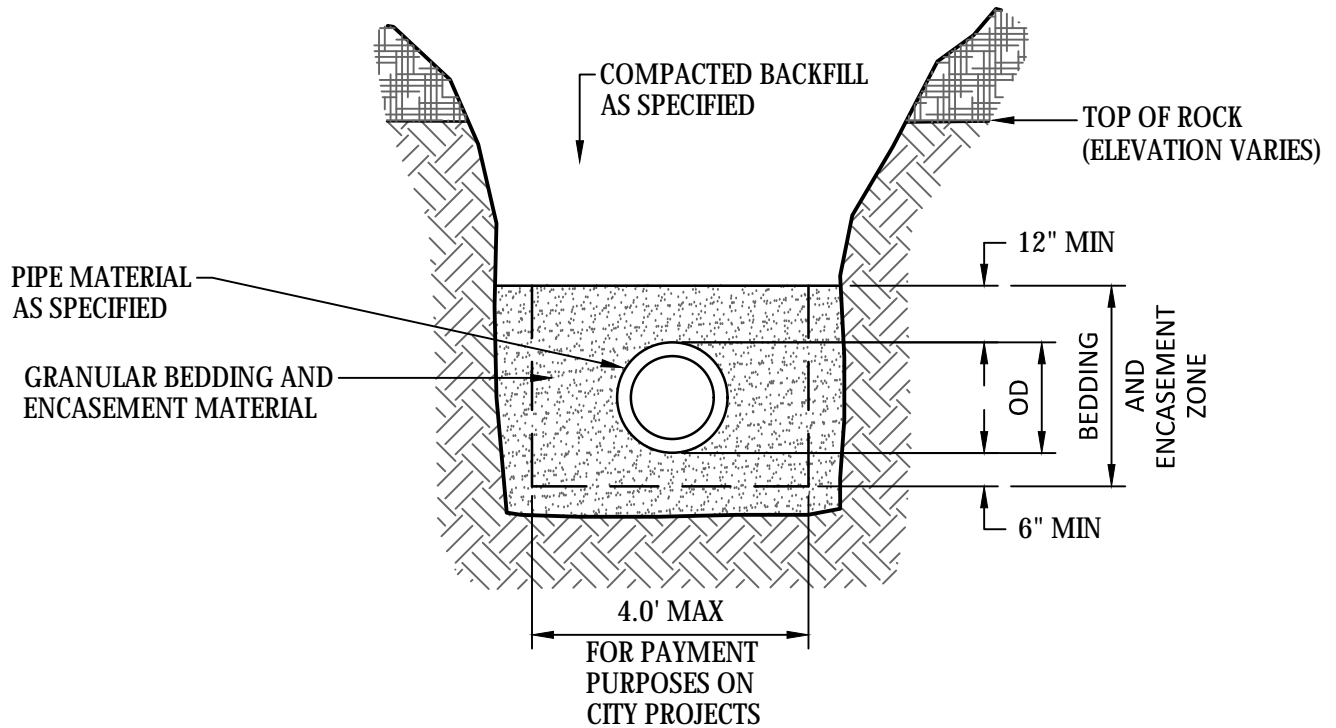
NOTE:

1. INSULATION REQUIRED WHERE SANITARY SEWER INVERT DEPTH IS LESS THAN 7'.



STANDARD DETAIL
INSULATION FOR NON-RIGID SANITARY SEWER
CITY OF JORDAN

STANDARD DETAIL
 NO. 5006J
 DATE APRIL 2019



STANDARD DETAIL

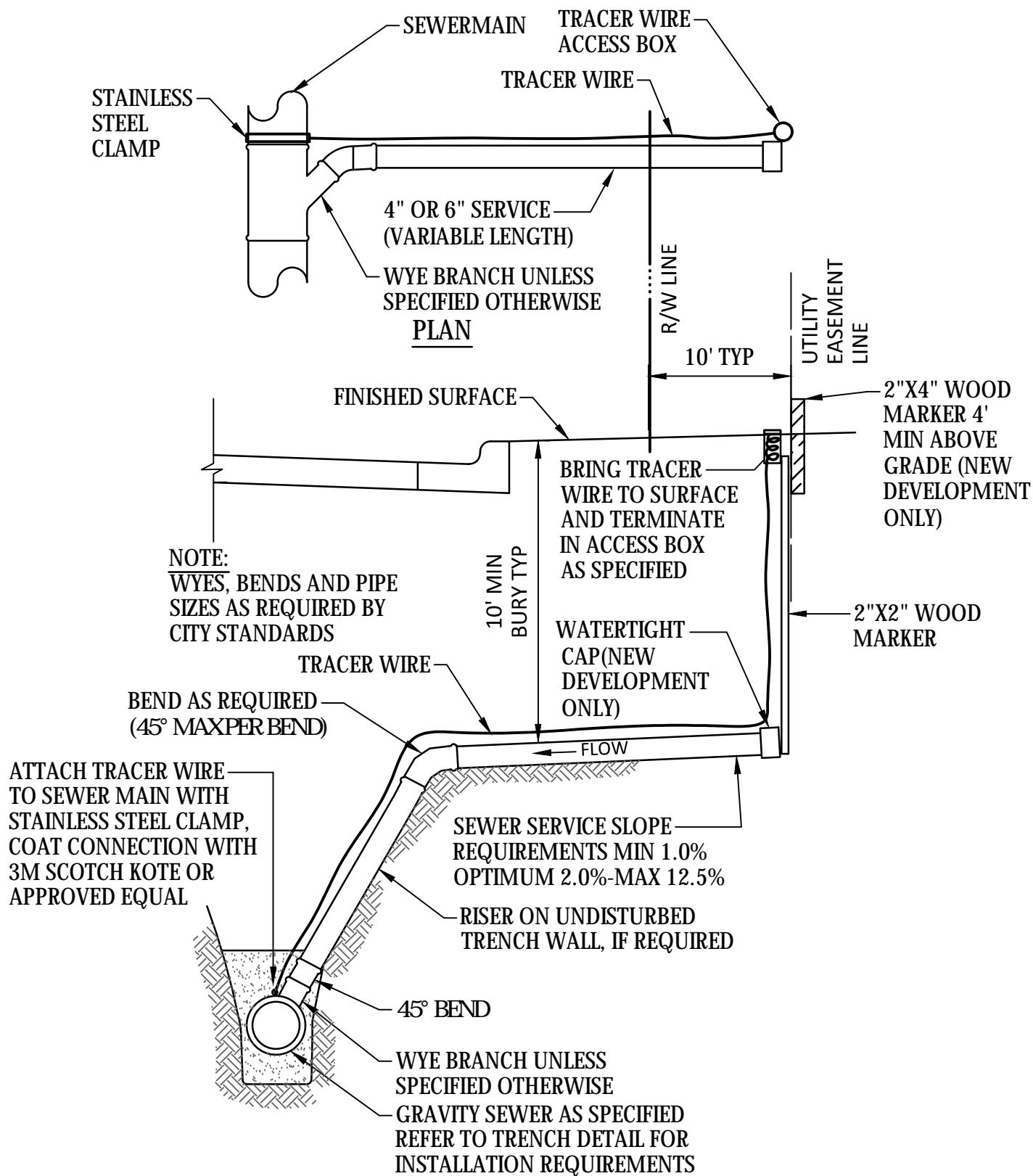
ROCK EXCAVATION FOR SANITARY SEWER

CITY OF JORDAN

STANDARD DETAIL

NO. 5016J

DATE APRIL 2019



PROFILE

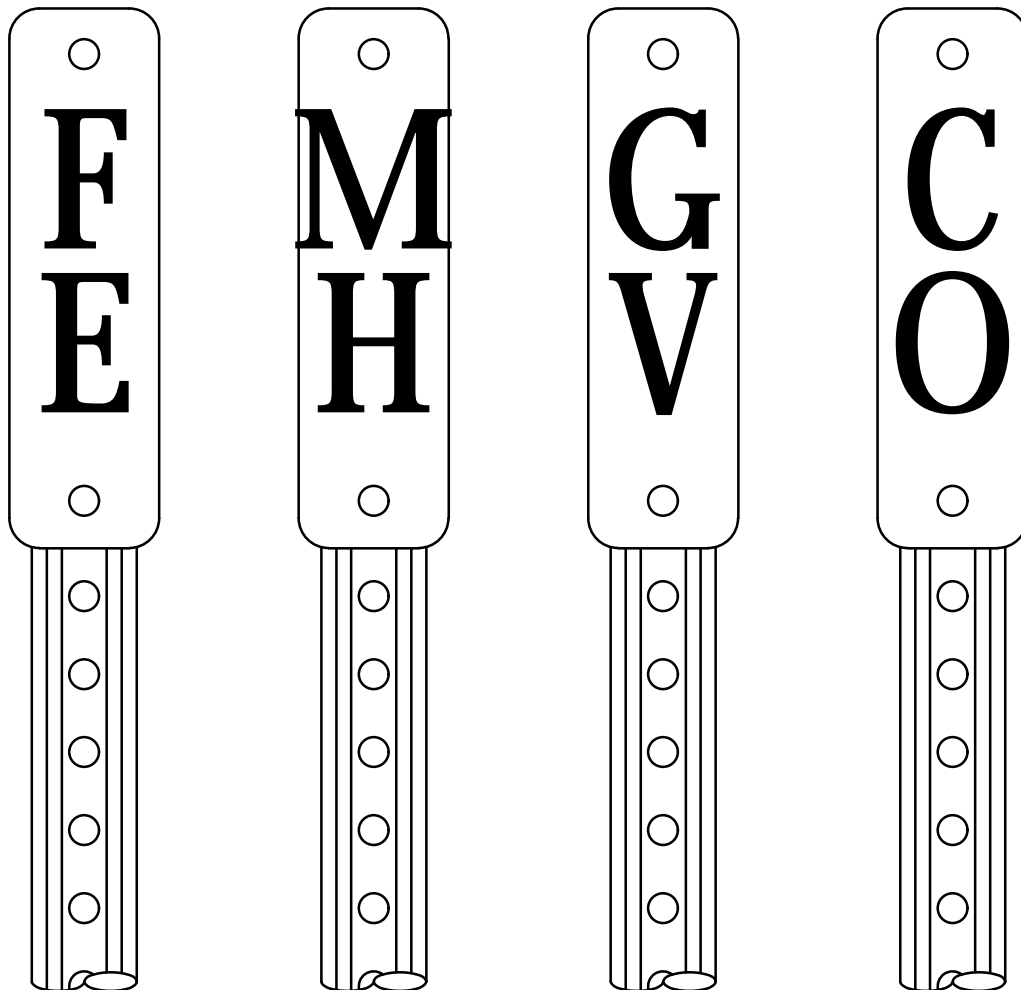


STANDARD DETAIL

SANITARY SEWER SERVICE

CITY OF JORDAN

STANDARD DETAIL
NO. 5017J
DATE APRIL 2019



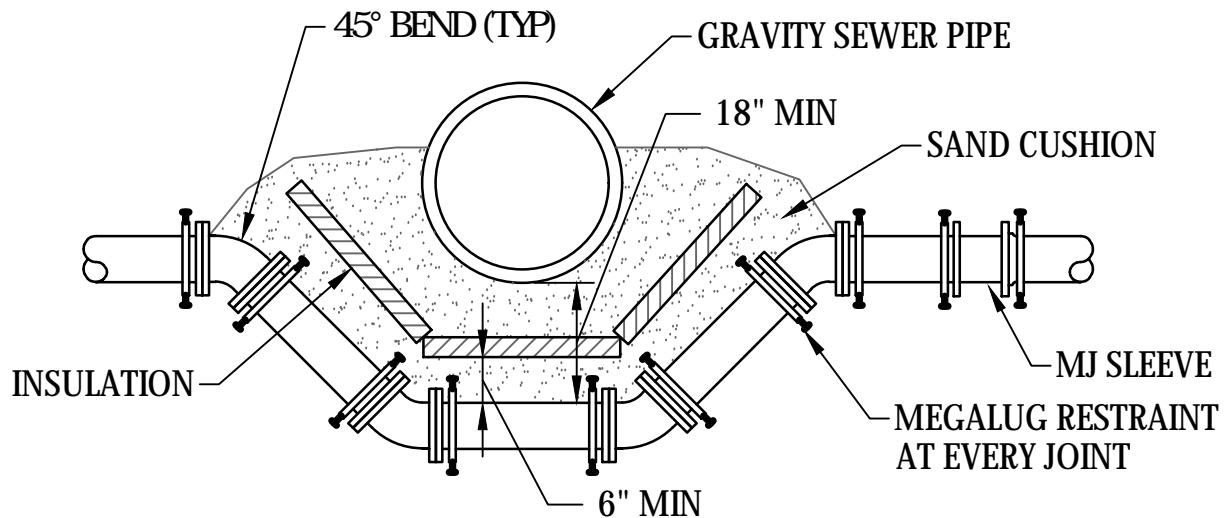
NOTES:

1. 0.063" THICK ALUMINUM SIGN. BLACK LETTERS ON WHITE HIGH INTENSITY REFLECTORIZED BACKGROUND.
2. U-CHANNEL POST, MINIMUM 3 LB/FT 6'-6" LONG, PAINTED GREEN.
3. PLACED AT ALL STRUCTURES IN GREEN SPACES, UNLESS OTHERWISE DIRECTED BY CITY.



**STANDARD DETAIL
STRUCTURE MARKER SIGNS
CITY OF JORDAN**

STANDARD DETAIL
NO. 5019J
DATE APRIL 2019



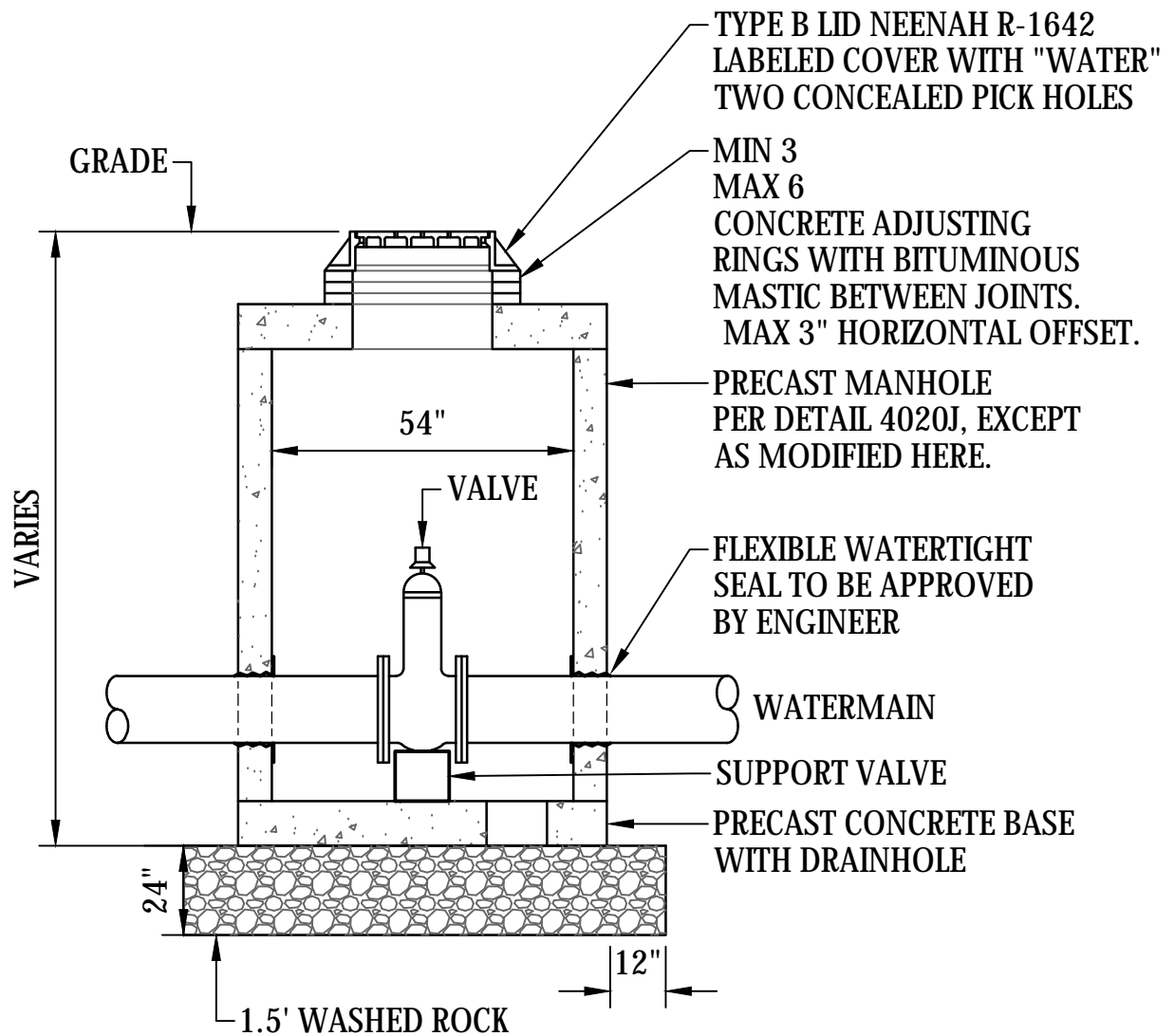
NOTES:

1. PROVIDE MEGALUG RESTRAINT AT JOINT ON BENDS AND AS SHOWN THIS DETAIL
2. COAT ALL ANCHORAGE AS PER SPECS
3. PROVIDE SAND CUSHION BETWEEN TOP OF WATERMAIN AND BOTTOM OF SEWER PIPE, MIN DIMENSIONS AS SHOWN THIS DETAIL (INCIDENTAL)
4. INSULATION TO BE 2" THICK POLYSTYRENE
5. VERTICAL BENDS WILL NOT BE PERMITTED UNLESS PRIOR APPROVED BY THE CITY ENGINEER.



**STANDARD DETAIL
WATERMAIN OFFSET
CITY OF JORDAN**

STANDARD DETAIL
NO. 6004J
DATE APRIL 2019



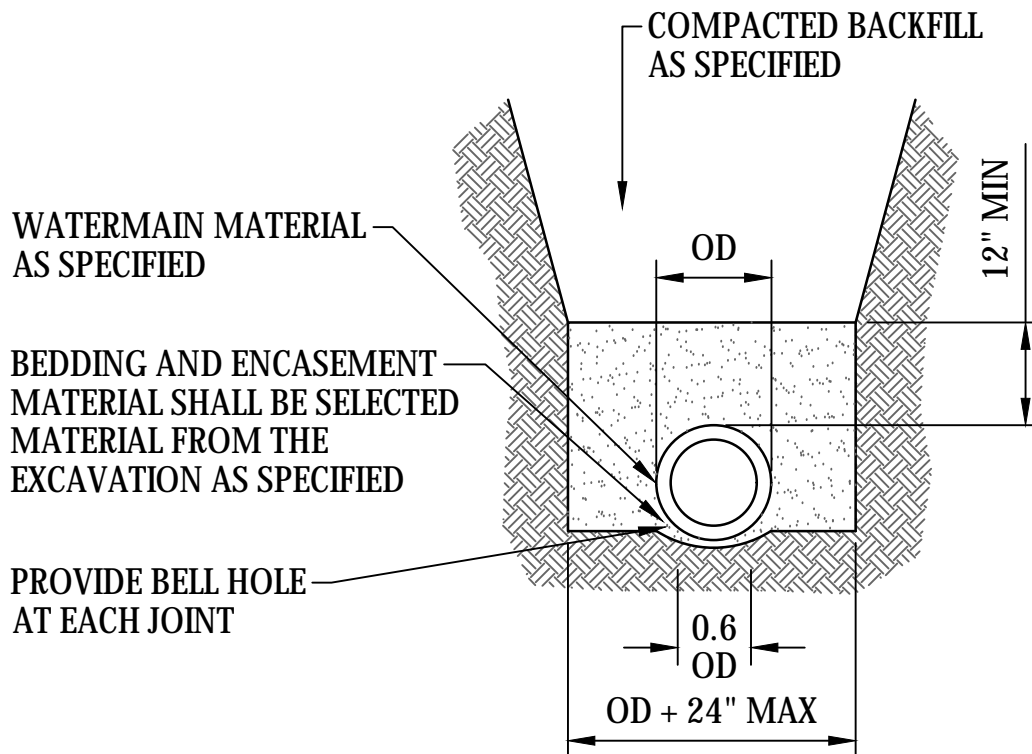
NOTE:

1. WATER VALVE MANHOLES TO BE REQUIRED AT ALL PRV LOCATIONS.
2. SUBMIT MANHOLE AND PRV DESIGN TO CITY ENGINEER FOR REVIEW AND APPROVAL.



STANDARD DETAIL
WATER VALVE MANHOLE
CITY OF JORDAN

STANDARD DETAIL
NO. 6005J
DATE APRIL 2019

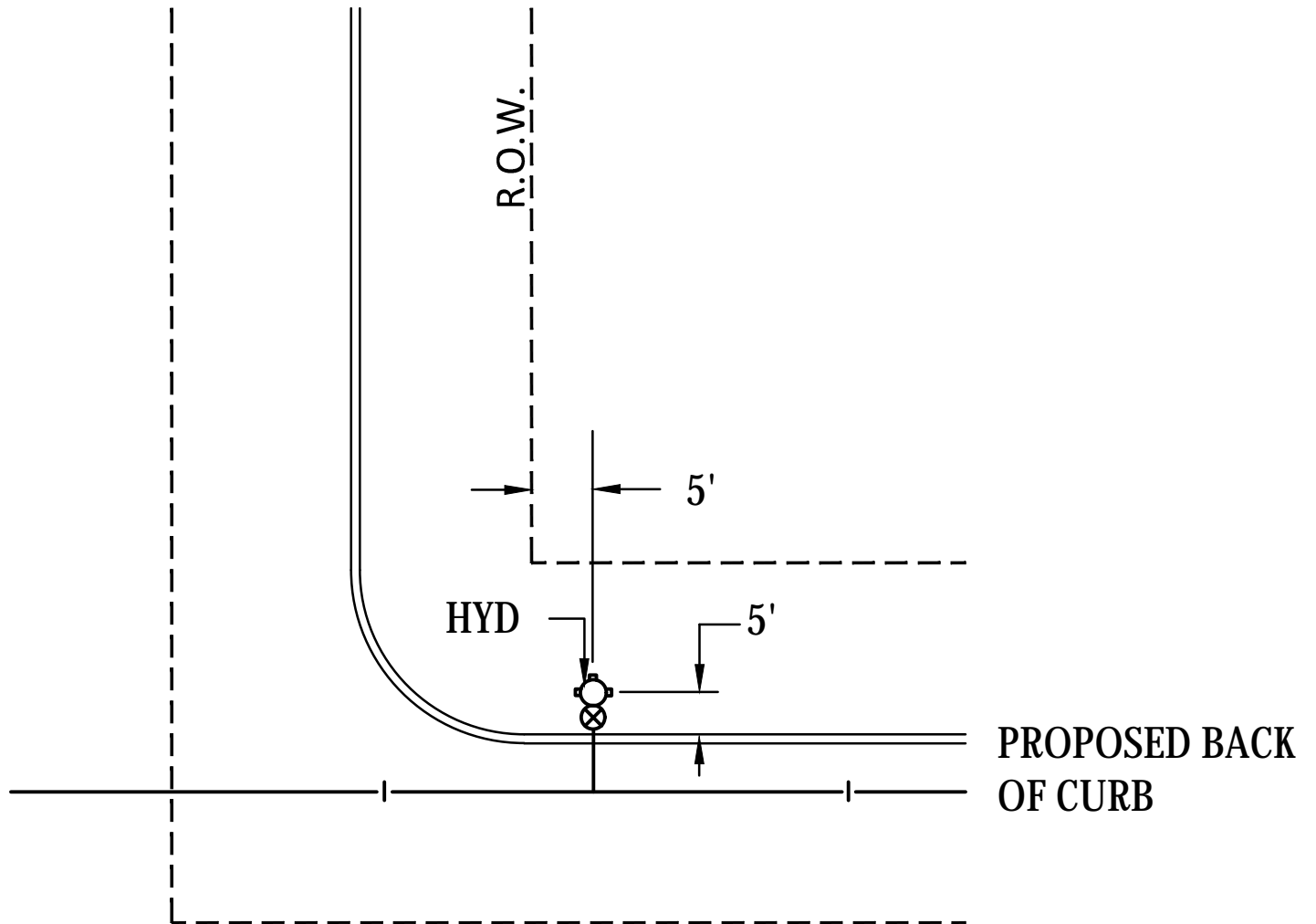


NOTE: ALL WATERMAIN BOLTS SHALL
BE CORE-BLUE T-BOLTS OR APPROVED EQUAL.



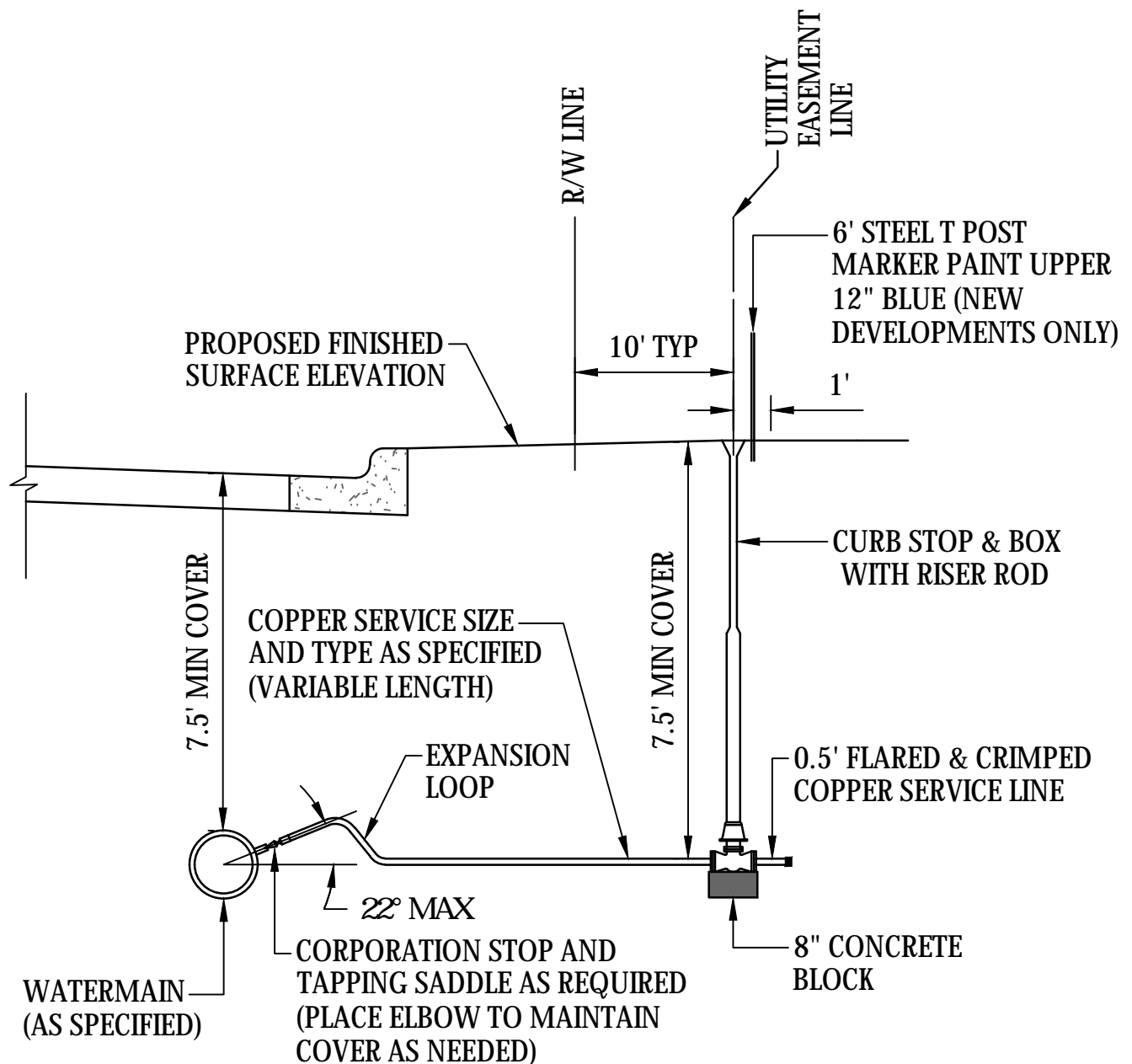
STANDARD DETAIL
DUCTILE IRON WATERMAIN TRENCH
CITY OF JORDAN

STANDARD DETAIL
NO. 6007J
DATE APRIL 2019



STANDARD DETAIL
HYDRANT LOCATION
CITY OF JORDAN

STANDARD DETAIL
 NO. 6008J
 DATE APRIL 2019



NOTE:

IN NEW DEVELOPMENTS THE
WATER SERVICE SHALL BE
INSTALLED UPSTREAM OF THE
SANITY SEWER SERVICE, AS
DETERMINED BASED ON THE
DIRECTION OF THE FLOW IN THE
CITY'S SANITARY SEWER MAIN.

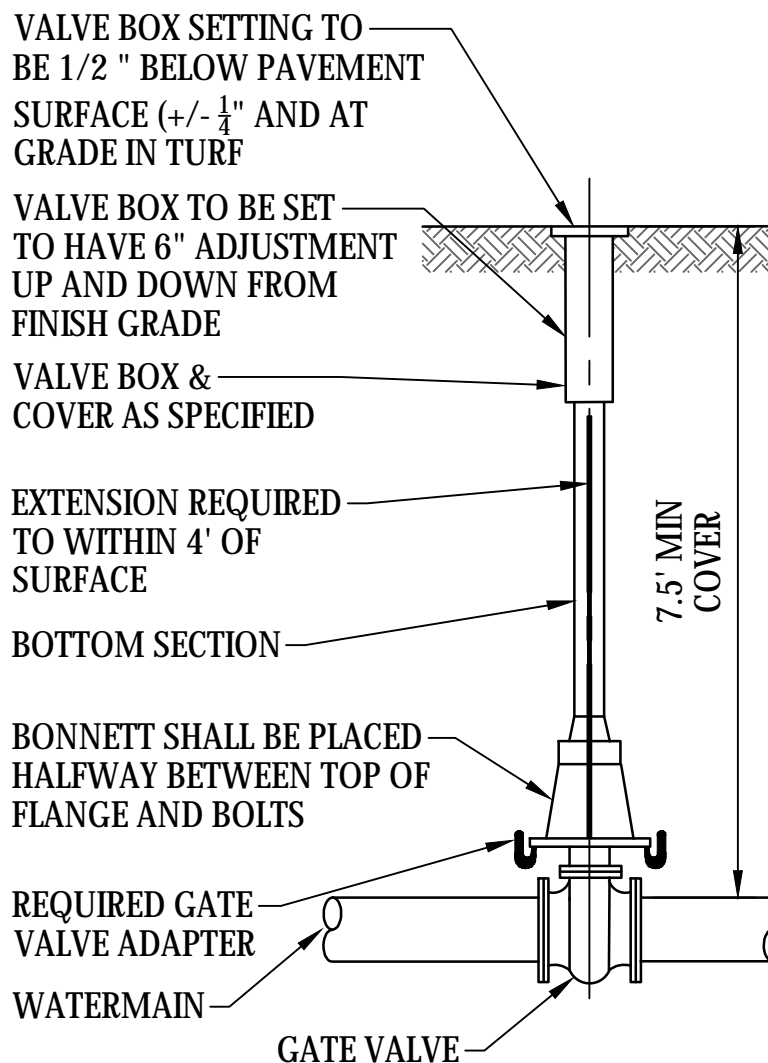


STANDARD DETAIL
WATER SERVICE INSTALLATION
CITY OF JORDAN

STANDARD DETAIL
NO. 6009J
DATE APRIL 2019

NOTES:

1. VALVE BOX SHALL BE CENTERED ON OPERATING NUTS, STRAIGHT, FREE FROM DEBRIS, AND ALL SECTIONS UNBROKEN
2. VALVES IN EASEMENTS SHALL HAVE CHANNEL POST WITNESS MARKERS WITH REFLECTIVE "GV" SIGN
3. VALVE NUT EXTENSIONS ARE REQUIRED TO BE INSTALLED WITHIN 4' OF THE SURFACE ELEVATION; BOTTOM NUT MUST NOT BE BOLTED TO VALVE NUT.
4. COMPACTION WITH MECHANICAL TAMPER AROUND VALVE BOX SHALL BE PLACED AND COMPACTED WITH 2' LIFTS TO ACHIEVE 95% COMPACTION
5. GATE VALVES LOCATED WITHIN THE CONCRETE SIDEWALK SHALL INCLUDE A METAL SEPARATOR BETWEEN THE VALVE BOX AND THE CONCRETE

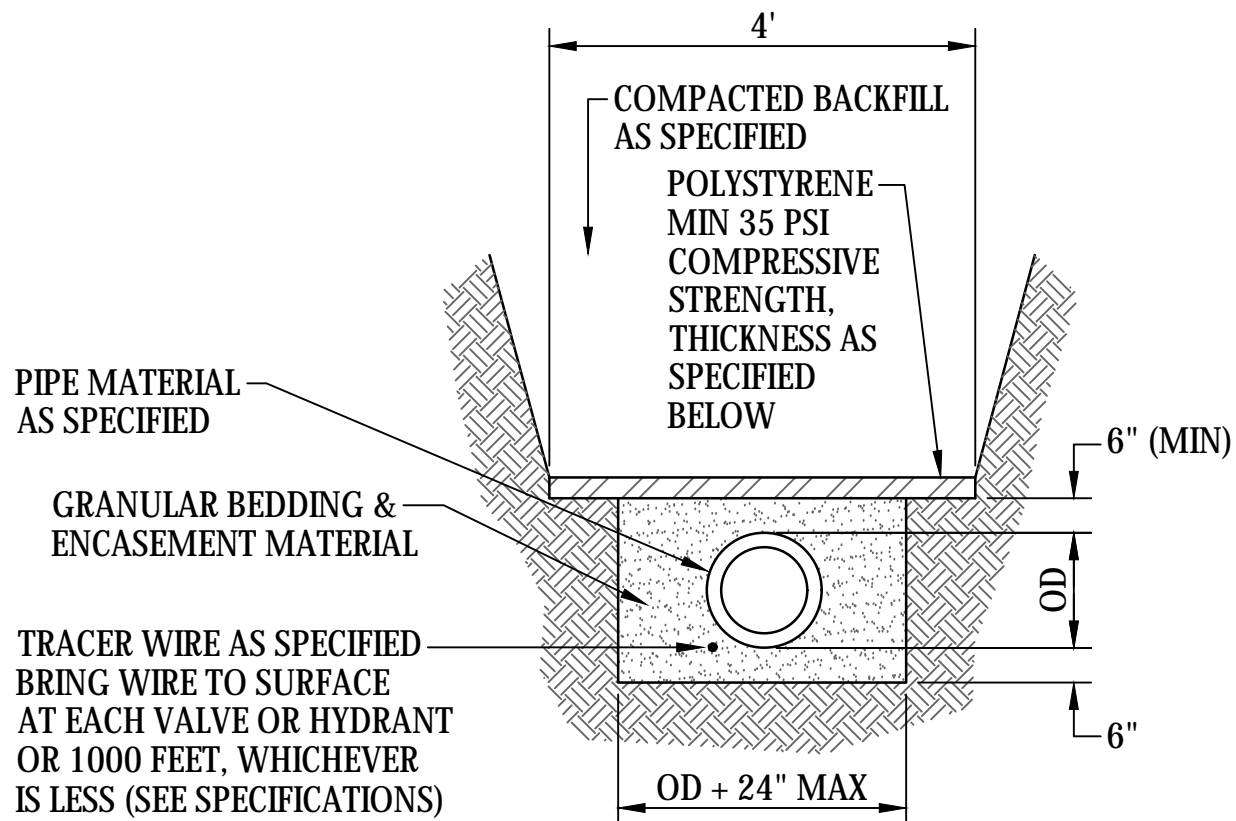


STANDARD DETAIL

GATE VALVE AND BOX INSTALLATION

CITY OF JORDAN

STANDARD DETAIL
NO. 6010J
DATE APRIL 2019



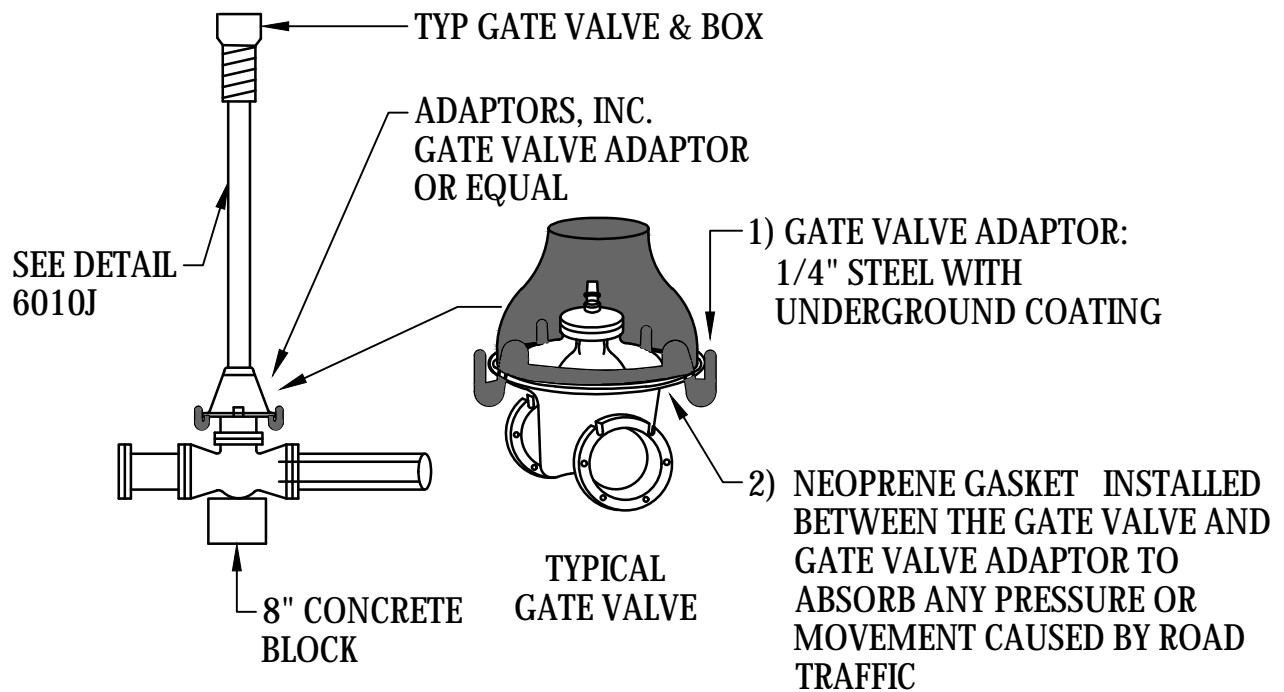
"D" DEPTH OF PIPE	"W" WIDTH OF INSULATION	"T" THICKNESS OF INSULATION
2'	12'	4'
3'	10'	4'
4'	8'	4'
5'	6'	4'
6'	4'	4'
7'	4'	4'

ALL INSULATION SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 35 P.S.I.



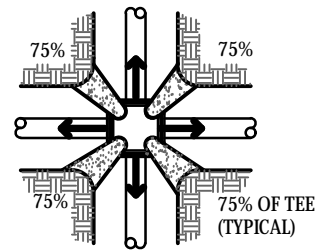
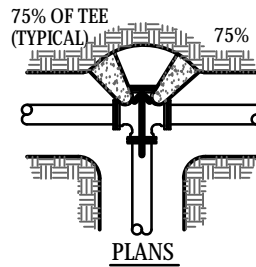
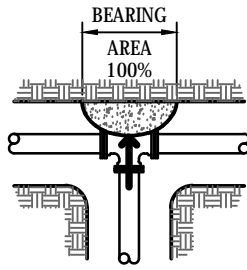
STANDARD DETAIL
WATERMAIN INSULATION
CITY OF JORDAN

STANDARD DETAIL
NO. 6011J
DATE APRIL 2019

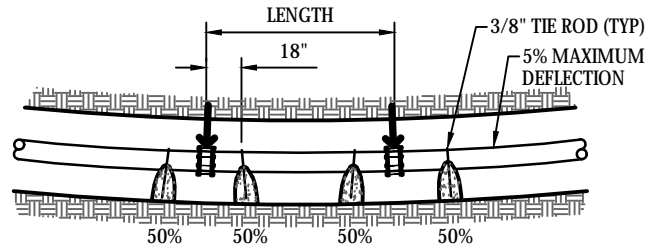
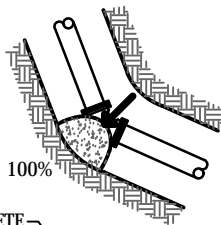
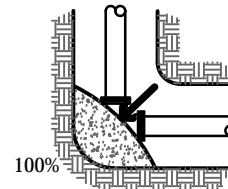
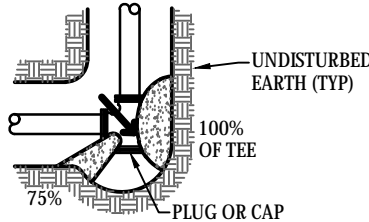
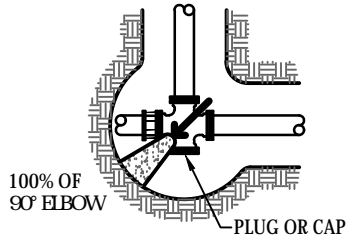


STANDARD DETAIL
GATE VALVE ADAPTOR
CITY OF JORDAN

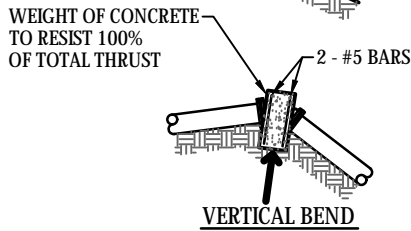
STANDARD DETAIL
NO. 6012J
DATE APRIL 2019



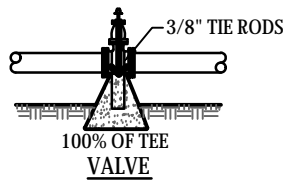
PLANS



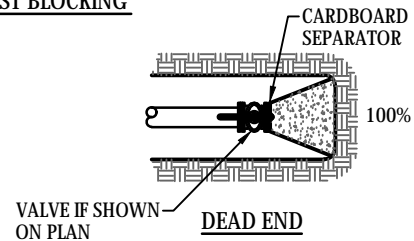
CURVE THRUST BLOCKING



VERTICAL BEND



VALVE



DEAD END

100% BEARING AREA (SQ FT)

PIPE SIZE	DEAD END OR TEE	90° ELBOW	45° ELBOW	22 1/2° ELBOW
4	2.4	3.4	1.9	0.9
6	4.9	6.9	3.8	1.9
8	8.4	11.8	6.4	3.4
10	13.7	19.3	10.5	5.4
12	19.4	27.3	14.9	7.7
14	26.3	37.0	20.1	10.3
16	34.0	47.9	26.2	13.3
18	43.9	61.8	33.7	17.2
20	54.3	76.4	41.7	21.2
24	77.9	109.8	59.8	30.5

NOTE:
BEARING AREAS ARE BASED ON 250 LB
MAXIMUM PRESSURE AND SOIL BEARING
STRENGTH OF 2000 LB/SQ FT.

NOTES:

- FIGURE (100%) AT THRUST BLOCK INDICATES PERCENT OF TOTAL THRUST TO BE APPLIED FOR BEARING AREA.
- CONCRETE FOR THRUST BLOCKS TO BE 2000 PSI.
- RESTRAINING RODS ARE REQUIRED AT ALL TEES AND AT BENDS DEFLECTING 22 1/2° OR MORE.
- WRAP THE PIPE WITH POLYETHYLENE WRAPPING PRIOR TO POURING THE THRUST BLOCK.
- SEE SOILS REPORT FOR BEARING STRENGTH OF SOIL. IN ABSENCE OF A SOILS REPORT, AN AVERAGE SOIL (SPADABLE MEDIUM CLAY) CAN BE ASSUMED TO HAVE A BEARING STRENGTH OF 2000 PSI.
- THRUST BLOCKS ARE NOT REQUIRED ON PVC WITH SOLVENT WELDED JOINTS.

ARROWS (→) INDICATE THRUST DIRECTION

SIDE THRUST PER 100 LB/SQ IN PRESSURE PER
DEGREE OF DEFLECTION

PIPE SIZE	SIDE THRUST-LB	PIPE SIZE	SIDE THRUST-LB
4	35	14	377
6	72	16	486
8	122	18	665
10	197	20	790
12	278	24	1150

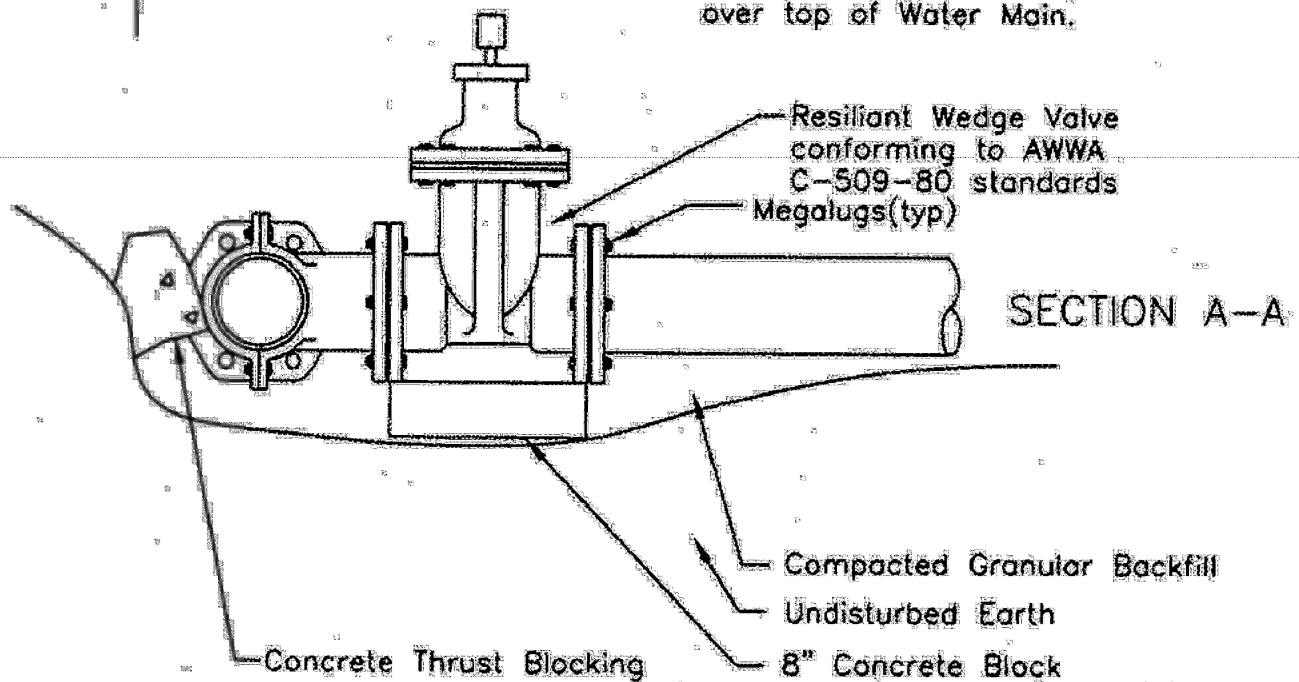
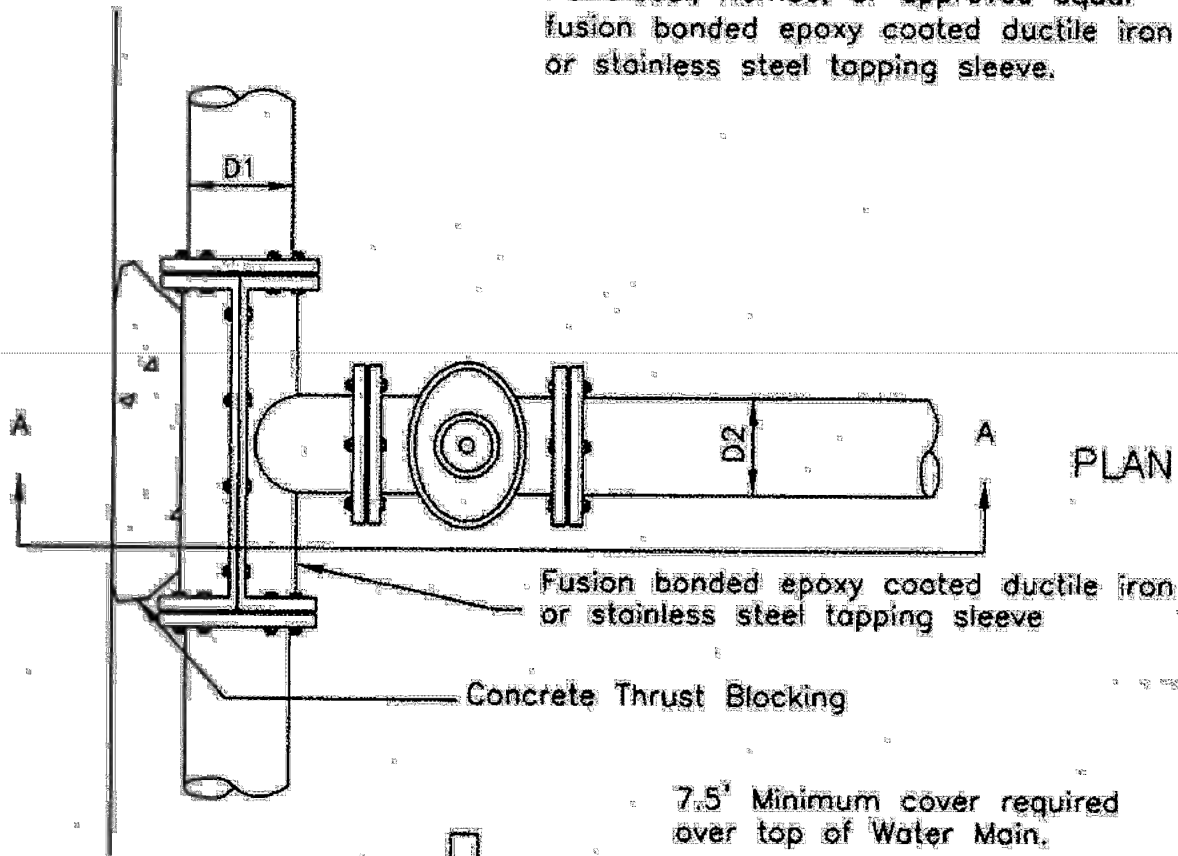
MULTIPLY THRUST BY DEGREE OF DEFLECTION TO
OBTAIN TOTAL THRUST



STANDARD DETAIL CONCRETE THRUST BLOCKS CITY OF JORDAN

STANDARD DETAIL
NO. 6020J
DATE APRIL 2019

Powerseal, Romac, or approved equal
fusion bonded epoxy coated ductile iron
or stainless steel tapping sleeve.

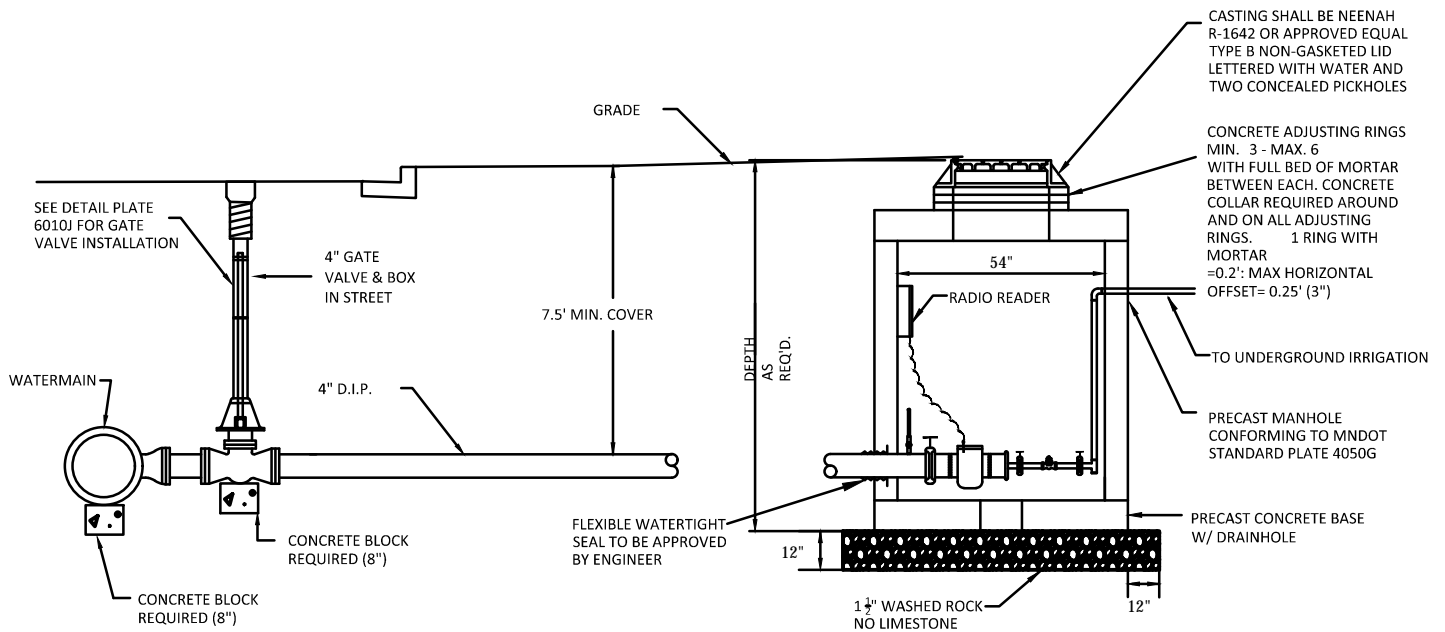


Note: All watermain bolts shall be core-blue or an approved equal



STANDARD DETAIL
WATERMAIN WET TAP
CITY OF JORDAN

STANDARD DETAIL
NO. 6023J
DATE APRIL 2019



NOTE
TO WINTERIZE, REMOVE AND DRAIN
METER, SIPHON WATER FROM FEED
LINE, BLOW OUT IRRIGATION LINES
AND REINSTALL METER.



STANDARD DETAIL

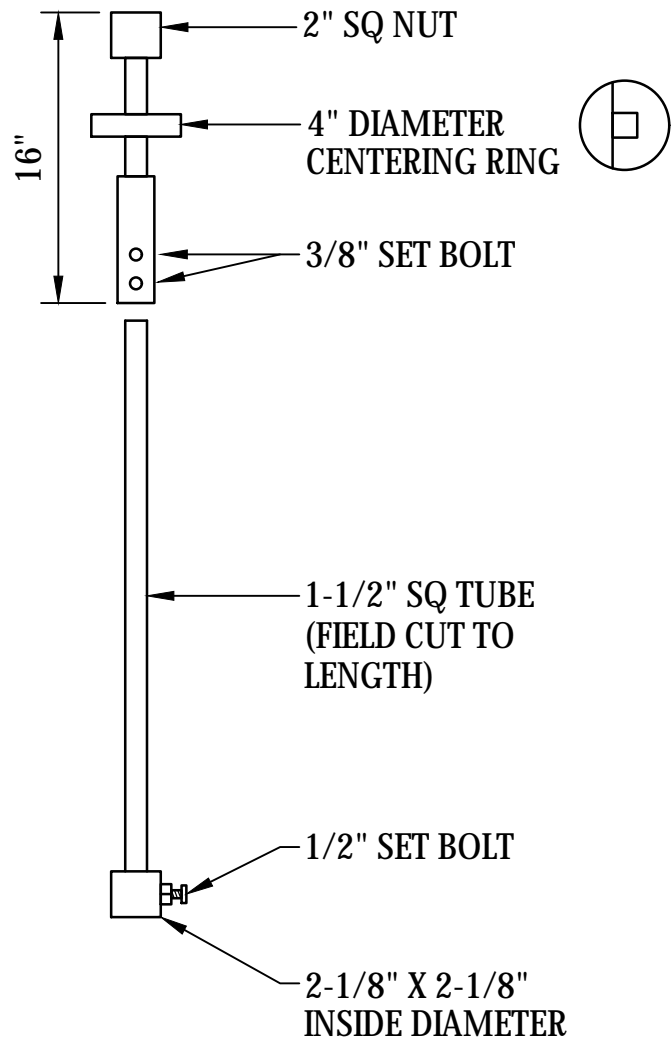
IRRIGATION SYSTEM TAP, METER AND BACKFLOW PREVENTOR ASSEMBLY

CITY OF JORDAN

STANDARD DETAIL

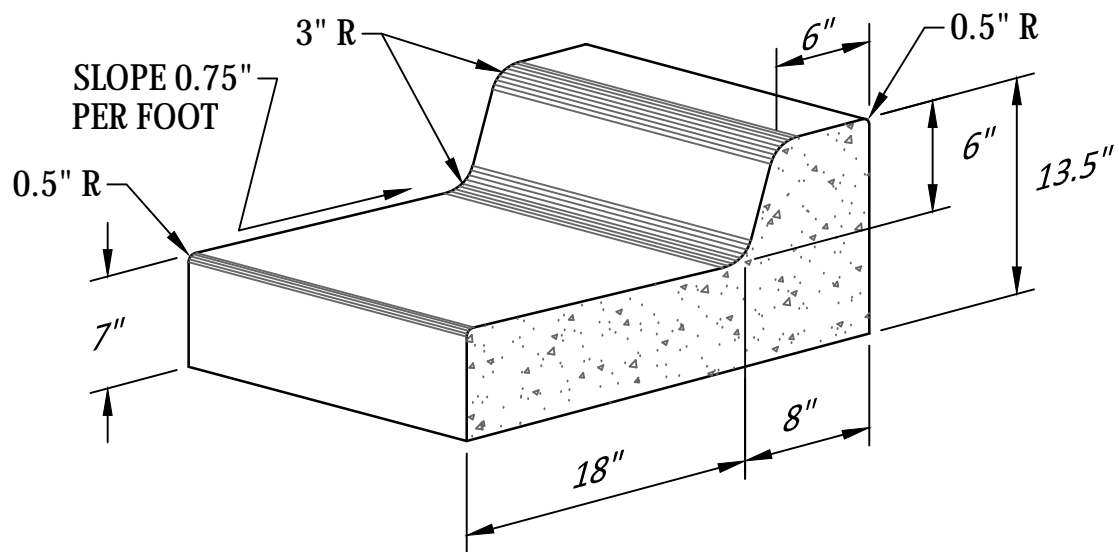
NO. 6024J

DATE APRIL 2019



STANDARD DETAIL
ADJUSTABLE VALVE EXTENSION STEM
CITY OF JORDAN

STANDARD DETAIL
 NO. 6025J
 DATE APRIL 2019

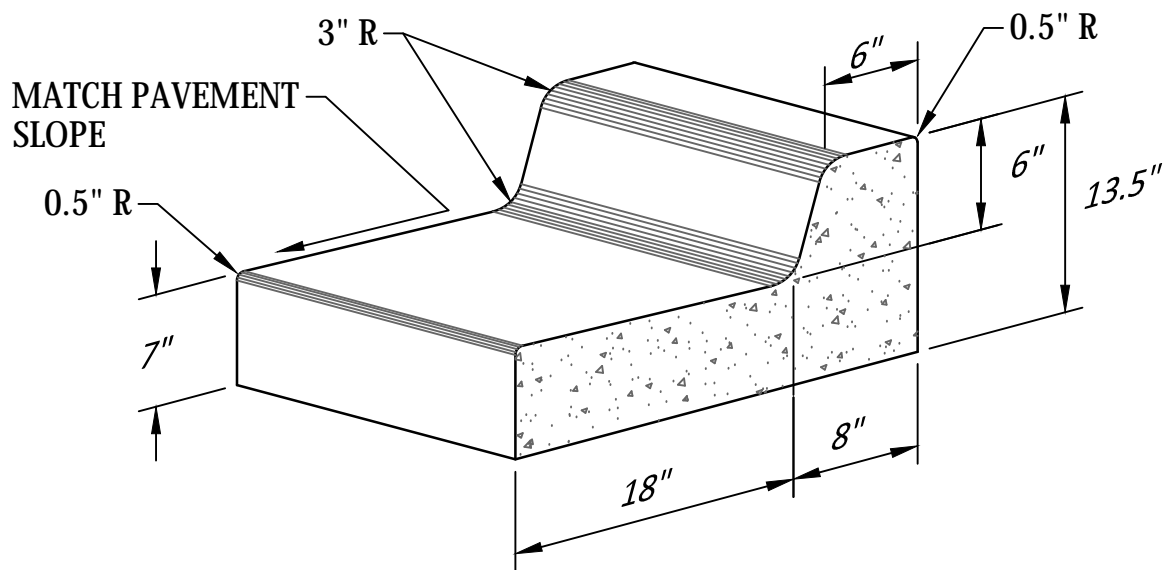


STANDARD DETAIL

B618 CONCRETE CURB & GUTTER

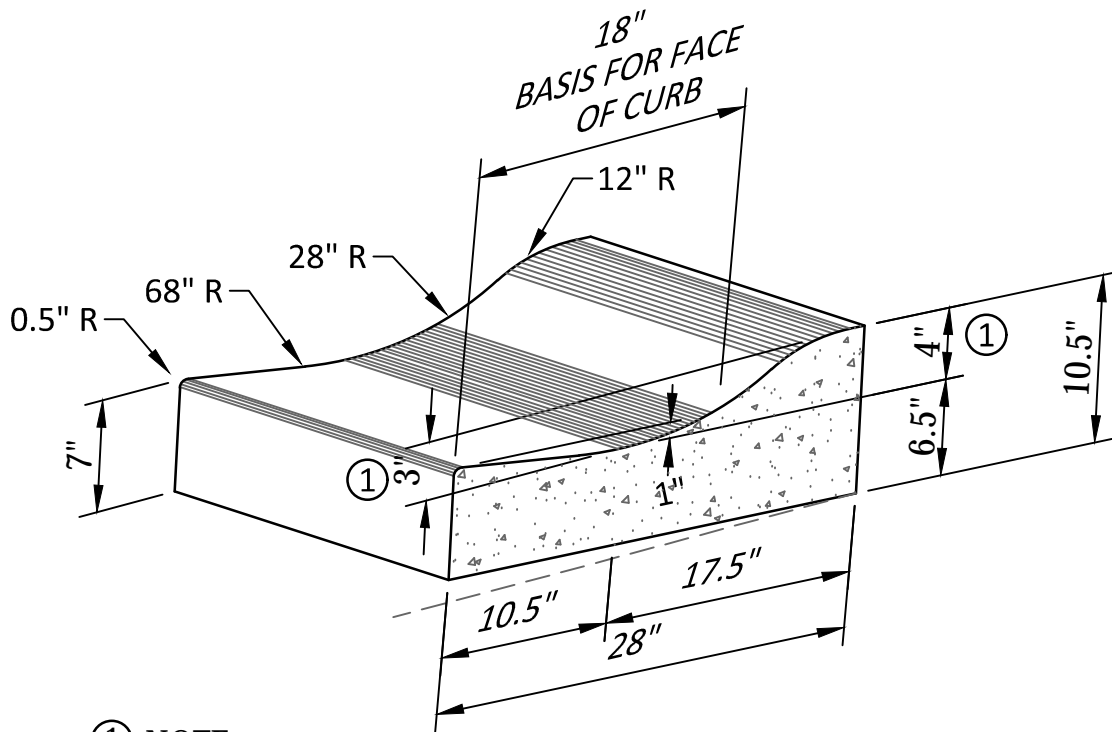
CITY OF JORDAN

STANDARD DETAIL
NO. 7001J
DATE APRIL 2019



STANDARD DETAIL
B618 CURB & GUTTER (GUTTER OUT)
CITY OF JORDAN

STANDARD DETAIL
 NO. 7002J
 DATE APRIL 2019



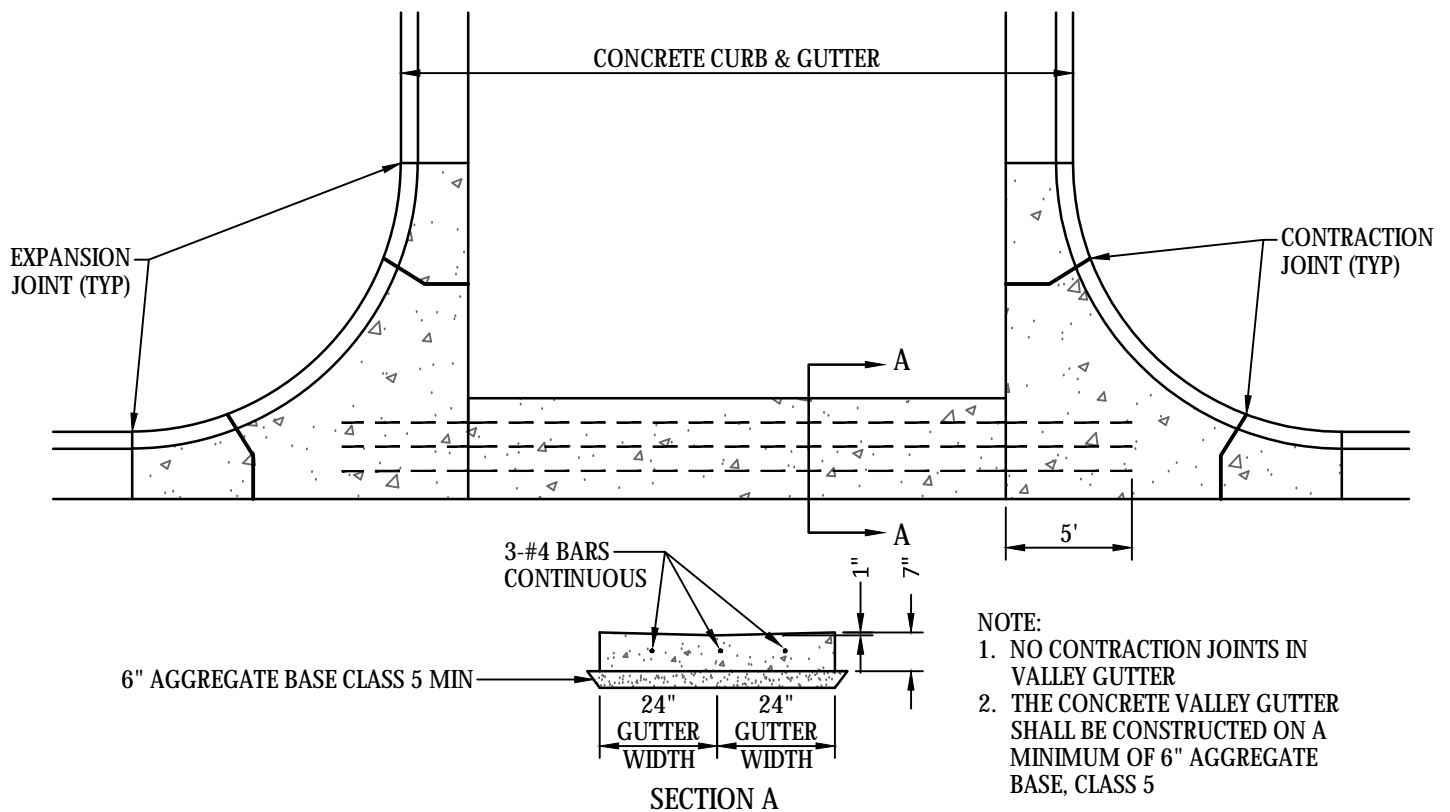
- ① **NOTE:**
 CURB SHALL BE PLACED IN A TILTED POSITION AS SUCH
 TO PROVIDE A 3" DEPTH FROM THE TOP OF CURB TO
 THE FLOWLINE WHEN MEASURED ON A LEVEL
 HORIZONTAL PLANE, AND 4" DEPTH WHEN MEASURED
 ALONG BACK OF CURB.

(MODIFIED 5418 EDINA STYLE)



STANDARD DETAIL
MOUNTABLE CONCRETE CURB & GUTTER
CITY OF JORDAN

STANDARD DETAIL
 NO. 7003J
 DATE APRIL 2019



STANDARD DETAIL
CONCRETE VALLEY GUTTER
CITY OF JORDAN

STANDARD DETAIL
 NO. 7004J
 DATE APRIL 2019

Diagram illustrating the cross-section of a retaining wall structure. The wall is 100' wide. The top layer consists of 4" CAP BLOCKS (GLUE) and 8" COMPACT BLOCKS. The top of the wall elevation is indicated as TOP OF WALL ELEV.=PER PLANS. The structure is built on a base of 8" STANDARD BLOCKS. A REINFORCING GEOGRID is shown within the structure. The vertical dimensions are 3'-4" and 2'-8". The diagram also shows the APPROXIMATE FINISHED GRADE and the 8" COMPACT BLOCKS.

4" CAP BLOCK

MODULAR RETAINING WALL BLOCK AS SPECIFIED SEALANT REQUIRED PER MNDOT APL.

NOTE: BLOCK COLOR IS NATURAL GRAY

WALL HEIGHT PER PLANS

EXCAVATION LIMITS AS STEEP AS POSSIBLE 1'H : 2'V TYP

REINFORCING GEOGRID PER ENGINEERED DRAWINGS FOR ALL WALLS OVER 4' IN HEIGHT (TO BE ROLLED OUT PERPENDICULAR TO THE WALL FACE AND PULLED TAUT PRIOR TO FILL PLACEMENT)

COMPACTED AGGREGATE BASE CL 5 (2211)

4" PVC PERFORATED PIPE, PLANS MUST SPECIFY DISCHARGE POINT SUBJECT TO APPROVAL BY THE CITY.

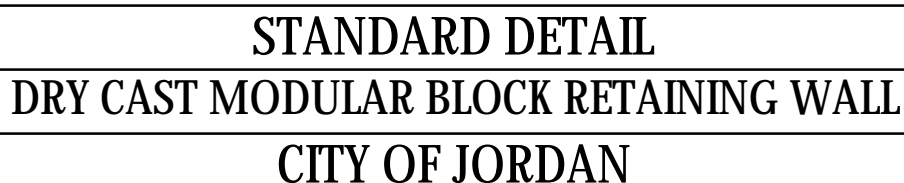
6"-12" WALL EMBEDMENT

1'

SLOPE 1:6 TYP

SECTION

1. ALL WALLS OVER 4' IN HEIGHT MUST BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER. SHOP DRAWINGS REQUIRED.
2. EASEMENT OR ROW MUST BE PROVIDED TO A DISTANCE OF 2' BEYOND ANY REQUIRED REINFORCING GRID.
3. WET CAST BLOCK WALLS OR CAST IN PLACE WALLS ARE REQUIRED WHERE WALLS ARE RETAINING PUBLIC ROADWAYS.
4. ALL PRODUCTS MUST BE PER THE MNDOT APPROVED PRODUCTS LIST (APL).



DATE APRIL 2019

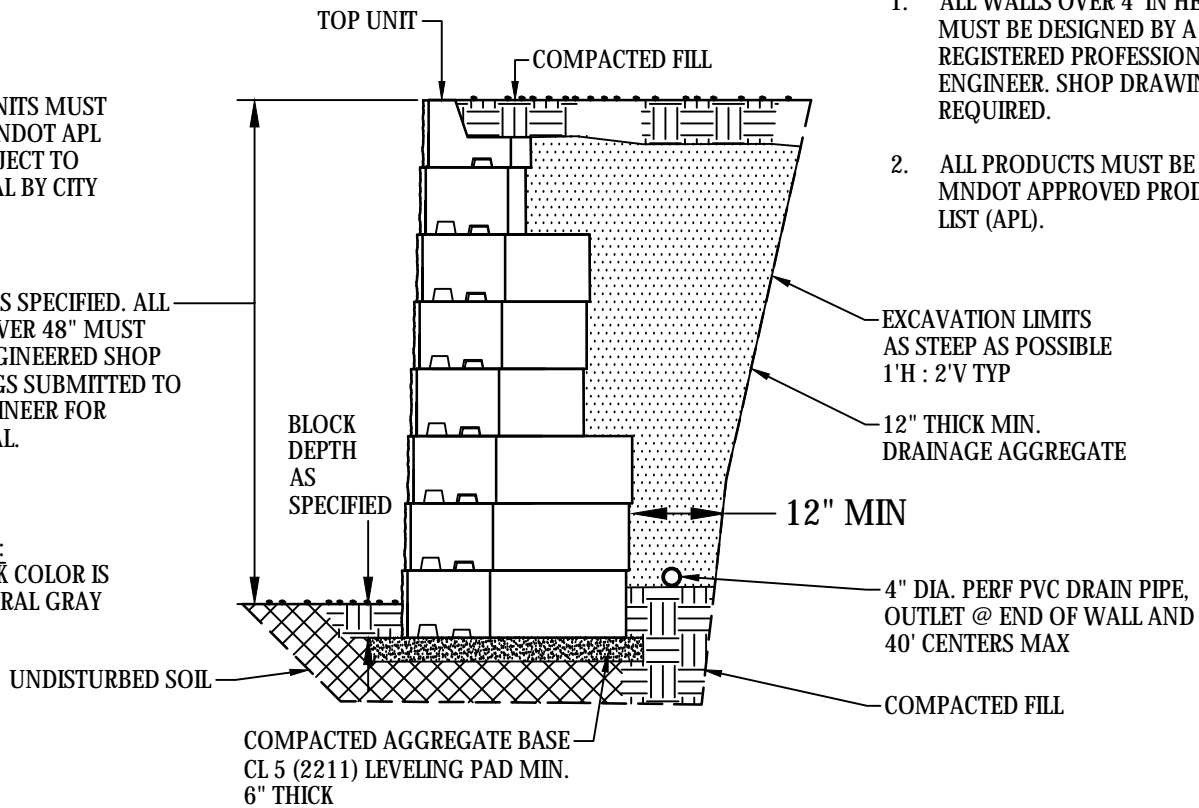
NOTE:

1. ALL WALLS OVER 4' IN HEIGHT MUST BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER. SHOP DRAWINGS REQUIRED.
2. ALL PRODUCTS MUST BE PER THE MNDOT APPROVED PRODUCTS LIST (APL).

BLOCK UNITS MUST BE ON MNDOT APL AND SUBJECT TO APPROVAL BY CITY

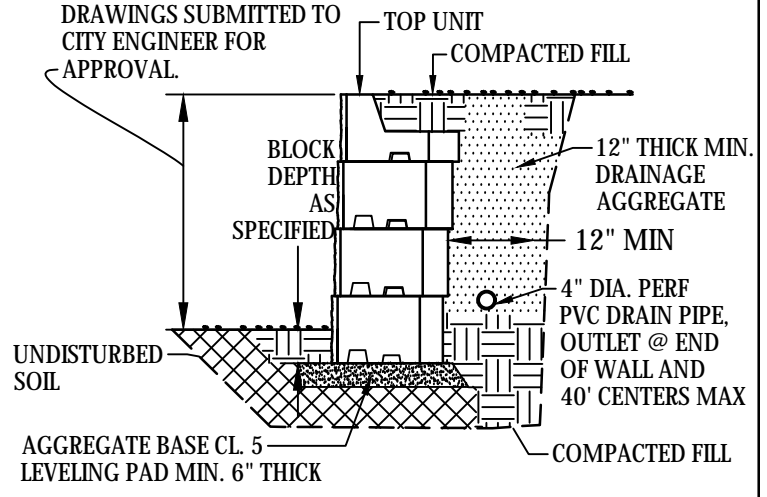
HEIGHT AS SPECIFIED. ALL WALLS OVER 48" MUST HAVE ENGINEERED SHOP DRAWINGS SUBMITTED TO CITY ENGINEER FOR APPROVAL.

NOTE: BLOCK COLOR IS NATURAL GRAY

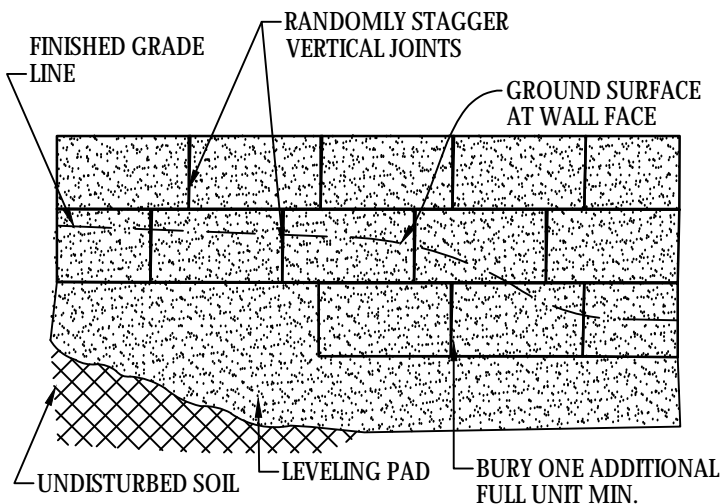


**SECTION
LARGE BLOCK RETAINING WALL
(HEIGHT >4')**

HEIGHT AS SPECIFIED. ALL WALLS OVER 48" MUST HAVE ENGINEERED SHOP DRAWINGS SUBMITTED TO CITY ENGINEER FOR APPROVAL.



**LARGE BLOCK RETAINING WALL
(HEIGHT <4')**

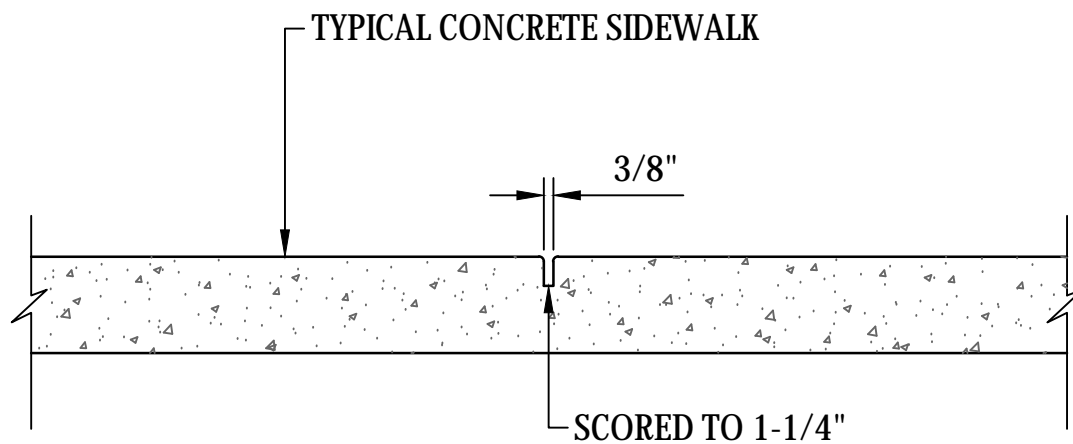


STEPPING BASE DETAIL



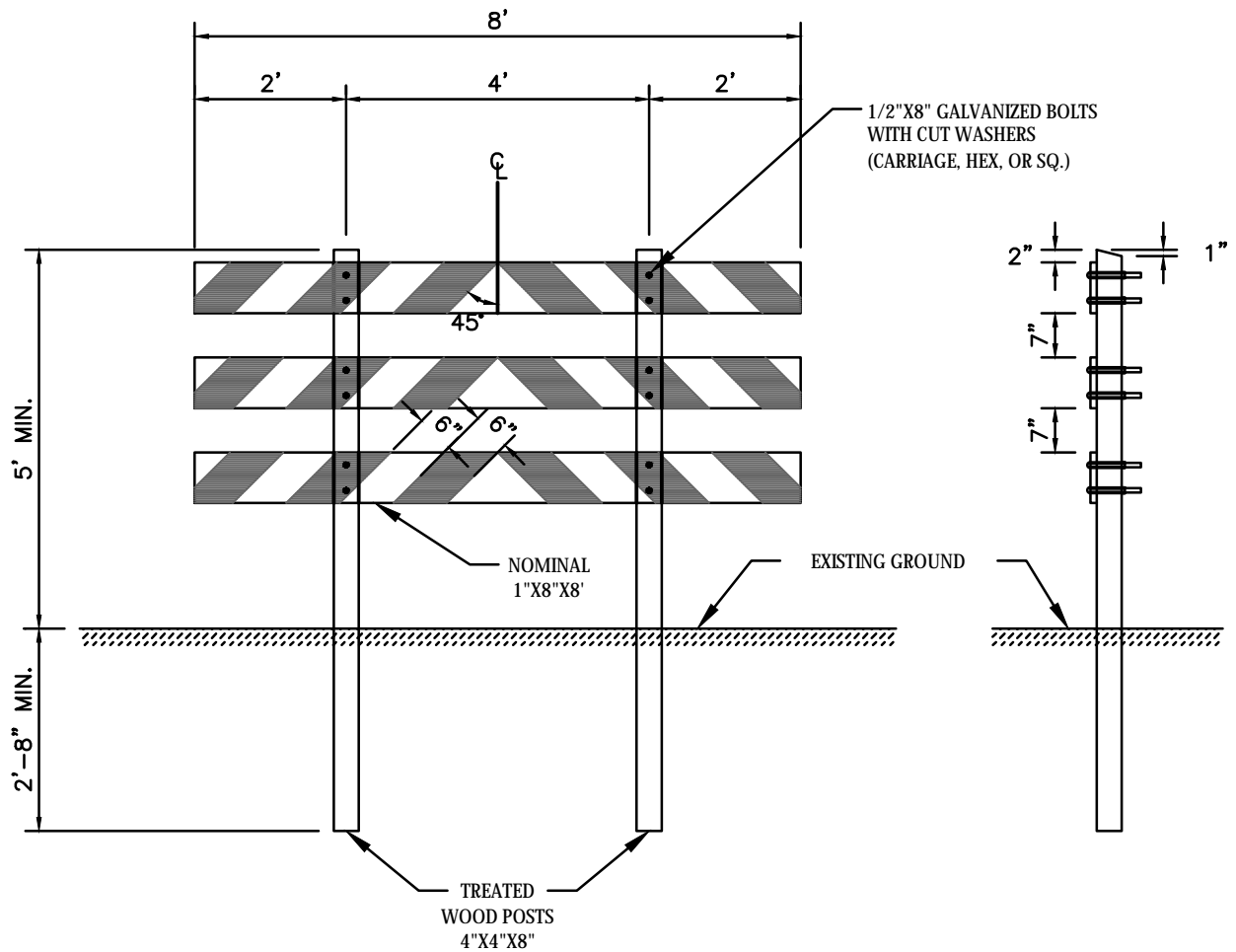
**STANDARD DETAIL
BIG BLOCK MODULAR RETAINING WALL
CITY OF JORDAN**

STANDARD DETAIL
NO. 7009J
DATE APRIL 2019



**STANDARD DETAIL
CONTRACTION JOINT
CITY OF JORDAN**

STANDARD DETAIL
NO. 7011J
DATE APRIL 2019



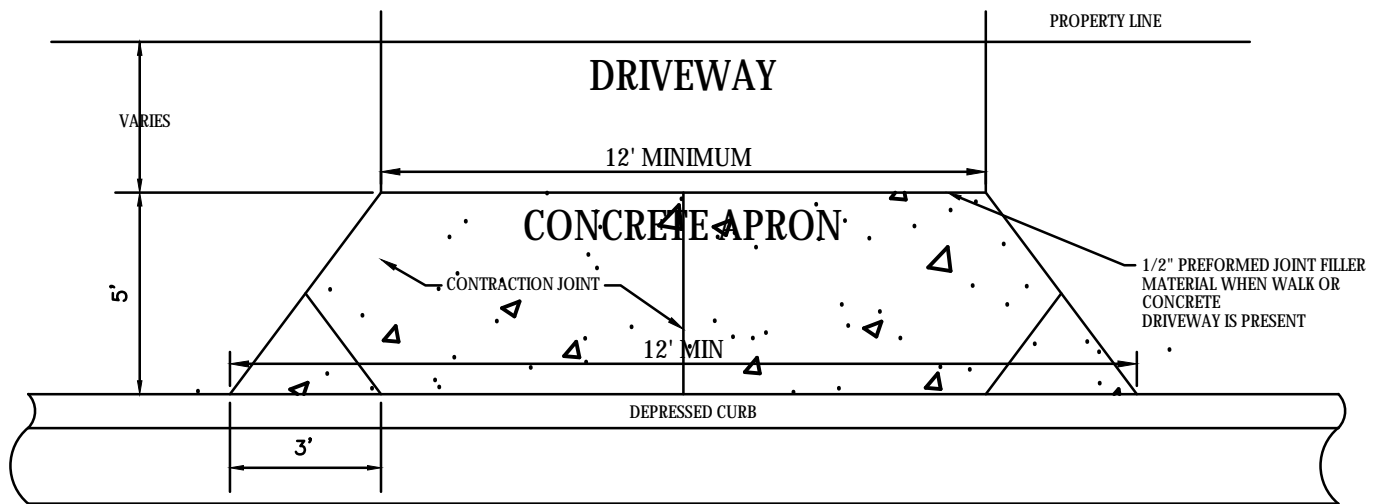
NOTES:

1. THE BARRICADE BOARD FACE SURFACE SHALL BE FULLY REFLECTORIZED IN ALTERNATE SILVER-WHITE AND RED STRIPPING, USING A 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 COATING OF WHITE WOOD PRIMER PAINT FOLLOWED BY A SECOND COAT OF WHITE EXTERIOR PAINT APPLIED ONLY TO THE SURFACE NOT COVERED WITH REFLECTIVE SHEETING.
3. THE BARRICADE BOARDS SHALL BE COMPLETELY PAINTED AND REFLECTORIZED SHEETING APPLIED BEFORE BEING INSTALLED ON THE POSTS.
4. THE PLACEMENT OF THE BARRICADE(S) SHALL BE 10' FROM THE END OF THE BITUMINOUS ROAD WITH THE BARRICADE(S) CENTERED ON THE LANES FACING THE FLOW OF TRAFFIC.
5. INSTALL WITHIN 7 DAYS OF PAVEMENT INSTALLATION

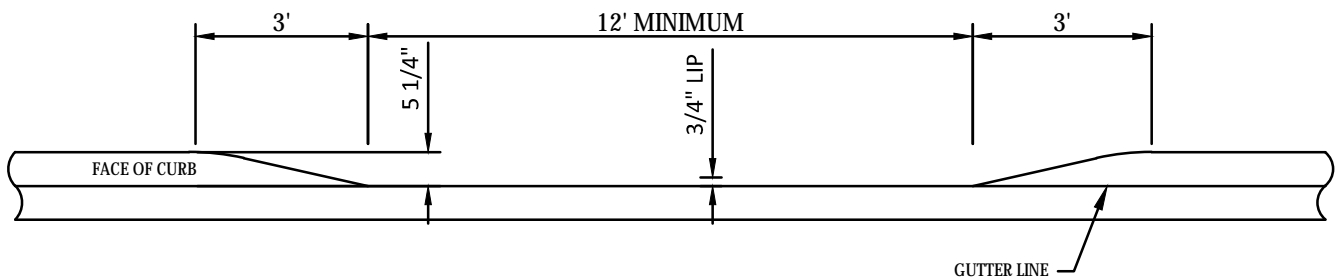


**STANDARD DETAIL
TYPICAL BARRICADE
CITY OF JORDAN**

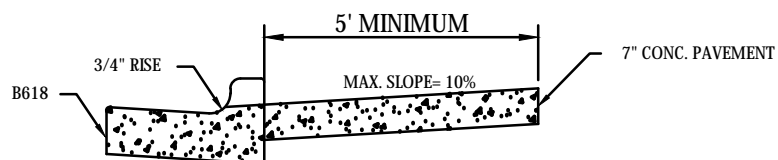
STANDARD DETAIL
NO. 7014J
DATE APRIL 2019



PLAN



ELEVATION

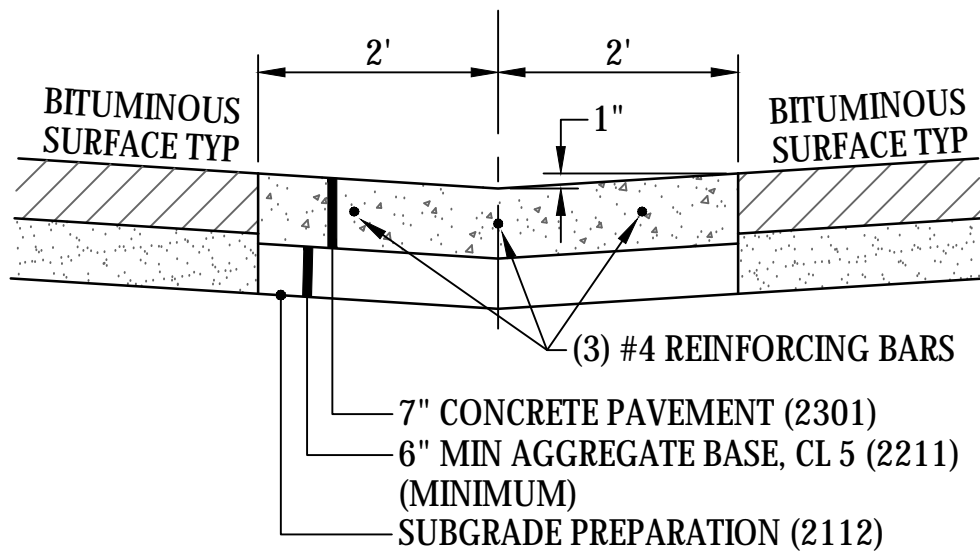


SECTION



STANDARD DETAIL
DEPRESSED CURB WITH DRIVEWAY APRON
CITY OF JORDAN

STANDARD DETAIL
 NO. 7015J
 DATE APRIL 2019



STANDARD DETAIL

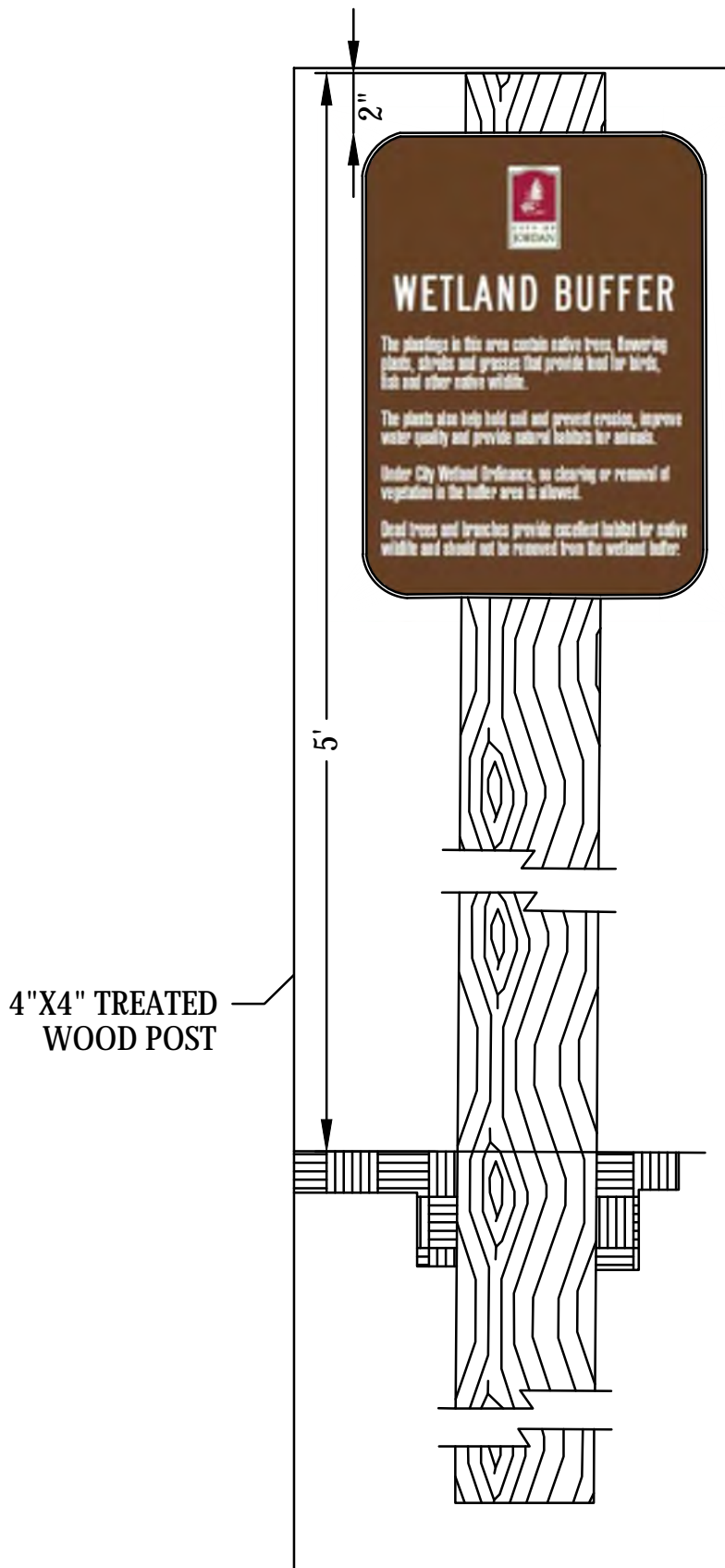
CONCRETE DRAINAGE PAN

CITY OF JORDAN

STANDARD DETAIL

NO. 7017J

DATE APRIL 2019



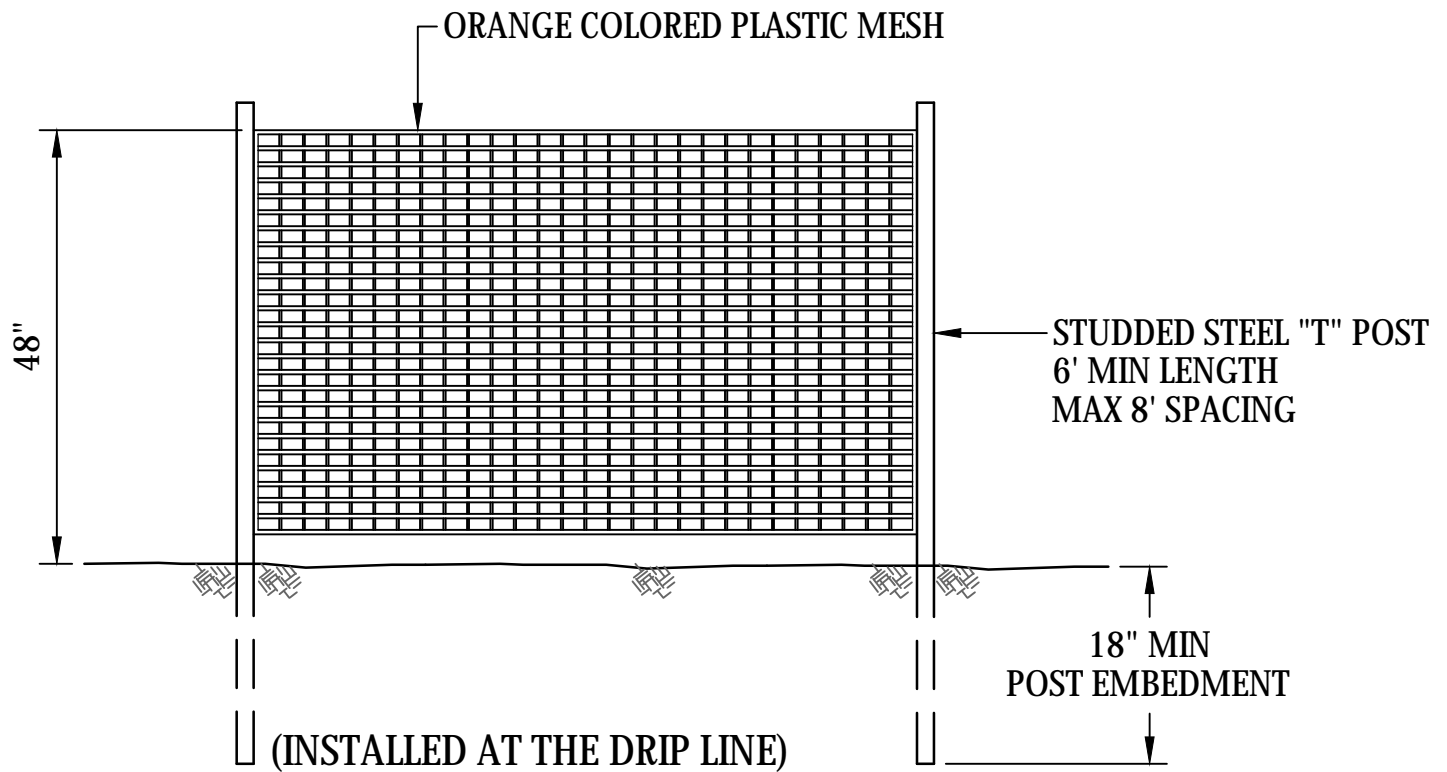
NOTES:

1. SIGNS ARE AVAILABLE FOR MANUFACTURE BY EARL F. ANDERSON (952.884.7300)
2. SIGNS SHALL BE INSTALLED ON AN 8' TALL, 4"X4" TREATED POST, SUNK 3' INTO THE GROUND. SIGN TO BE INSTALLED 2" FROM THE TOP OF THE POST.



**STANDARD DETAIL
WETLAND BUFFER SIGN
CITY OF JORDAN**

STANDARD DETAIL
NO. 8003J
DATE APRIL 2019



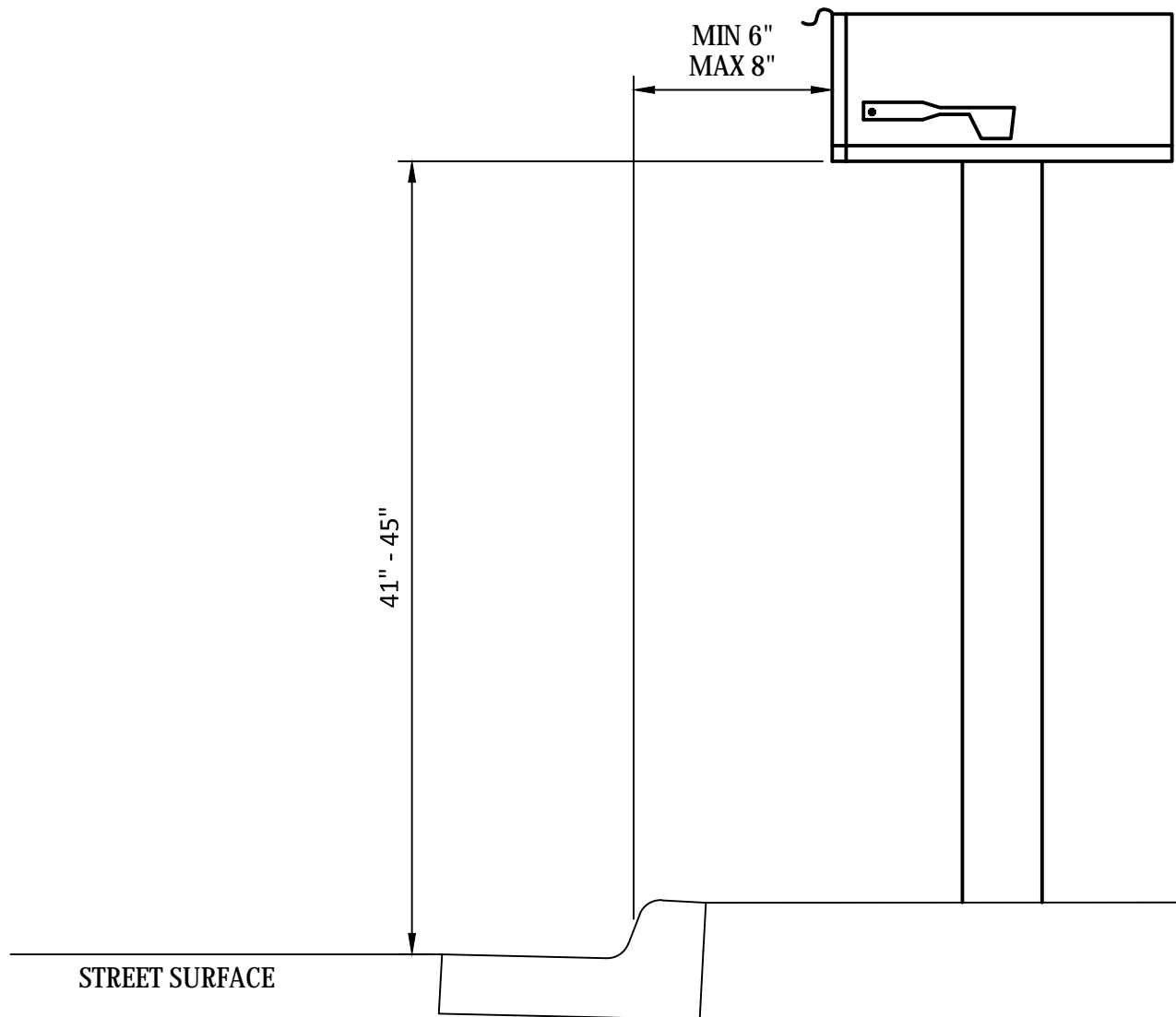
NOTES:

1. TREE PRESERVATION FENCE SHALL BE INSTALLED AROUND ALL AREAS OF NEW DEVELOPMENT AND GRADING WHERE TREES ARE IDENTIFIED IN THE PLANS TO BE PRESERVED.



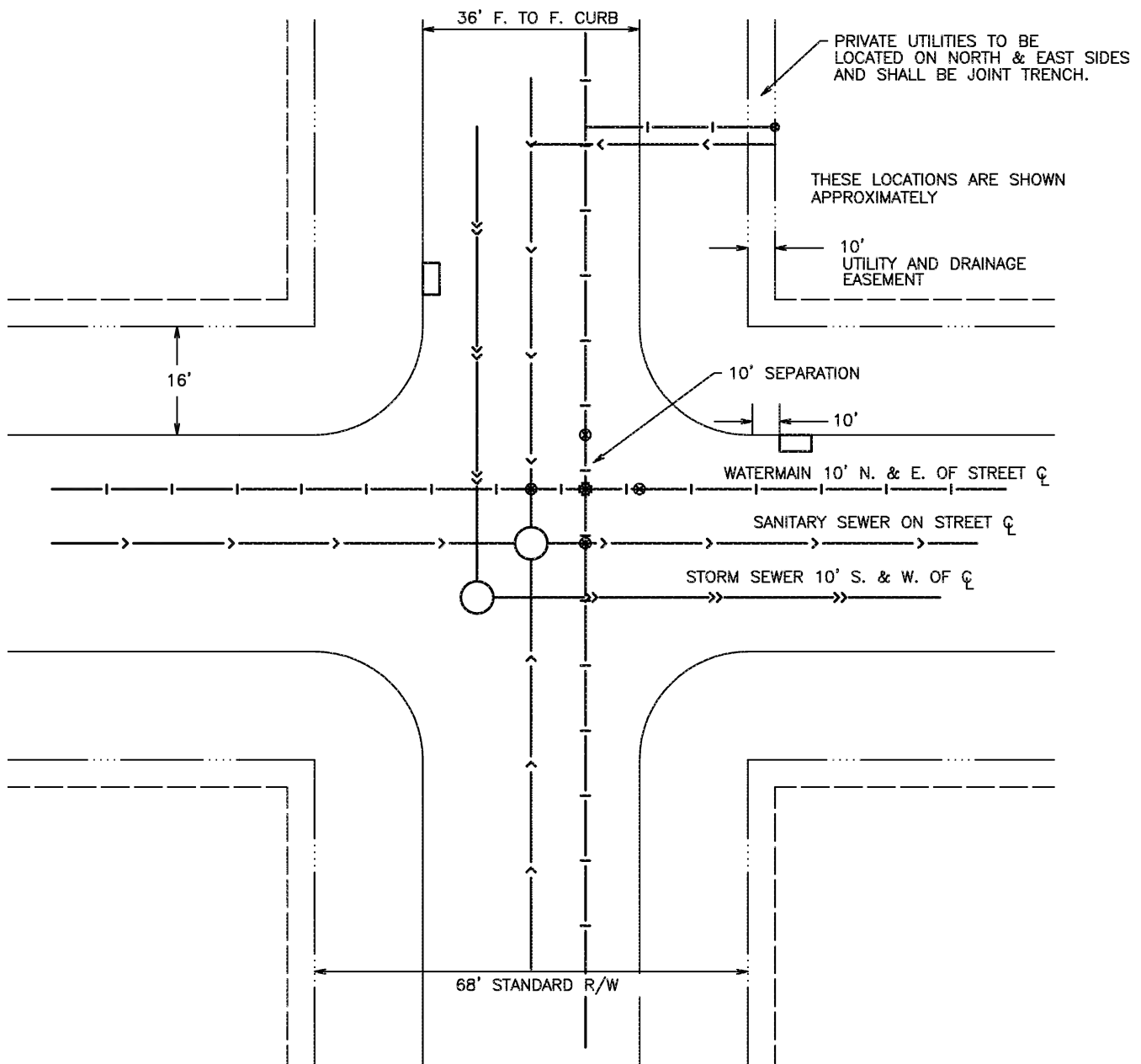
**STANDARD DETAIL
TREE PRESERVATION FENCE
CITY OF JORDAN**

STANDARD DETAIL
NO. 9009J
DATE APRIL 2019



STANDARD DETAIL
MAILBOX INSTALLATION
CITY OF JORDAN

STANDARD DETAIL
 NO. 9012J
 DATE APRIL 2019



STANDARD DETAIL

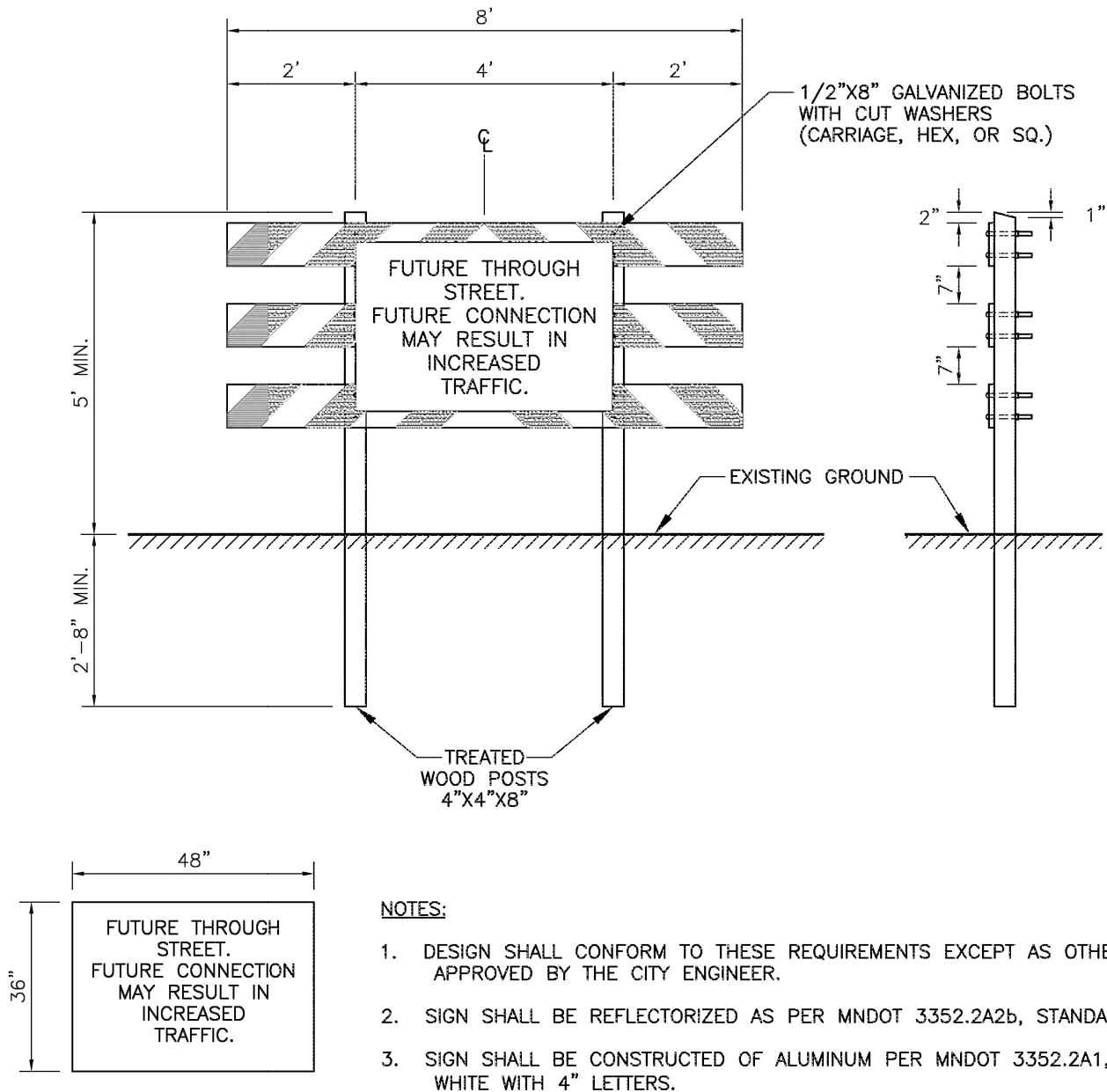
TYPICAL LOCATION OF PUBLIC UTILITIES

CITY OF JORDAN

STANDARD DETAIL
NO. 9014J
DATE APRIL 2019

NOTE:

BARRICADE AS PER JORDAN
STANDARD DETAIL PLATE 7013J



NOTES:

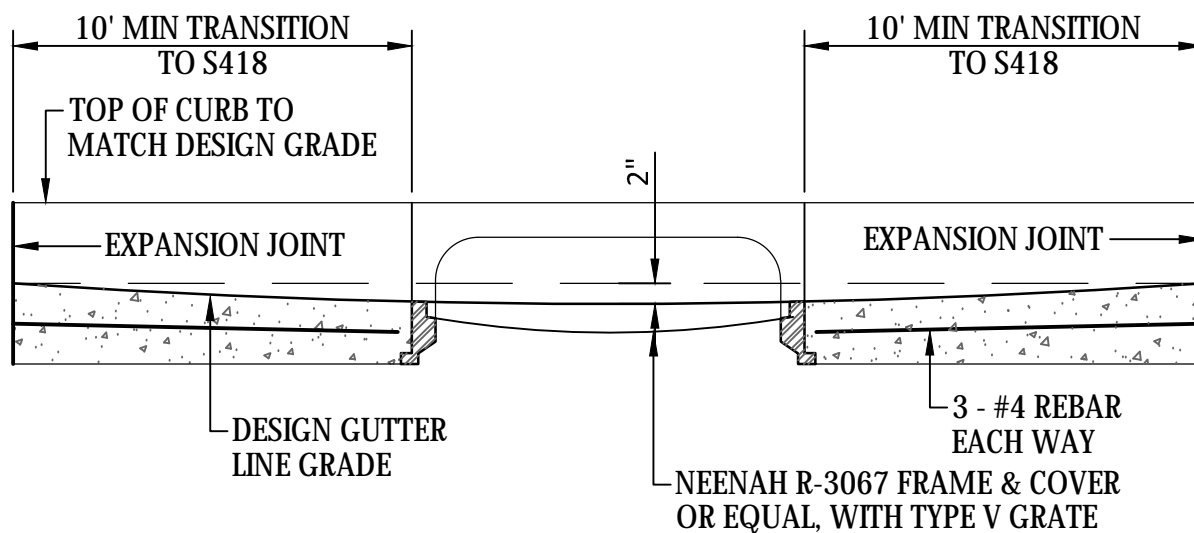
1. DESIGN SHALL CONFORM TO THESE REQUIREMENTS EXCEPT AS OTHERWISE APPROVED BY THE CITY ENGINEER.
2. SIGN SHALL BE REFLECTORIZED AS PER MNDOT 3352.2A2b, STANDARD NO. 2.
3. SIGN SHALL BE CONSTRUCTED OF ALUMINUM PER MNDOT 3352.2A1, BLACK ON WHITE WITH 4" LETTERS.



STANDARD DETAIL
FUTURE THROUGHT STREET SIGN
CITY OF JORDAN

STANDARD DETAIL
NO. 9015J
DATE APRIL 2019

A 3D perspective view of the curb and gutter assembly. It shows the R3067 casting on top of the concrete curb and gutter. The casting is labeled "R3067 CASTING TO MATCH TOP OF CURB". The concrete curb and gutter is labeled "CONCRETE B618 CURB & GUTTER". The transition from the curb to the gutter is labeled "10' MIN TRANSITION TO S418". The gutter is shown with a cross-section of the concrete and a section of the gutter channel.



TRANSITION TO B618 CURB AT CATCH BASIN

STANDARD DETAIL

NO. 70010J

DATE APRIL 2019

**STANDARD SPECIFICATIONS
AND DETAIL PLATES**

**City of Jordan
Jordan, MN**

**STANDARD SPECIFICATIONS
AND DETAIL PLATES**

for

**City of Jordan
Jordan, MN**

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.

By: _____

Carol J. Caron, P.E.

License No. 24555

Date: _____

**Bolton & Menk, Inc.
CONSULTING ENGINEERS & SURVEYORS
Mankato - Fairmont - Sleepy Eye - Burnsville - Willmar - Chaska, MN
Ames, IA**

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STANDARD DETAIL PLATES

******END OF SECTION******

Standard Specifications
Jordan, Minnesota

PART 1 -- GENERAL

1.1 MEASUREMENT AND PAYMENT

The Developer and his designated engineer shall designate the method of measurement and payment for each work item, including the incidental work. This shall be completed in a Special Provisions attached to this document.

PART 2 -- REPRODUCTIONS AND COPYRIGHT

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PART 3 -- LIMITATION OF LIABILITY

It is agreed that the City of Jordan, the City's Engineer and its representatives shall not be responsible for the means, methods, techniques, schedules or procedures of construction selected by the contractor or the safety precautions or programs incidental to the work of the Contractor. The Developer, Developer's Engineer and the Contractor shall be the only parties responsible for the construction project until final acceptance by the City of Jordan, in writing.

It is further understood and agreed that because the City of Jordan, the City's Engineer or its representatives did not prepare the Contract Documents for the project, the Developer, Developer's Engineer and Contractor waive all claims against City of Jordan, the City's Engineer and its representative arising from or in any way connected with errors, omissions, conflicts or ambiguities in the Contract Documents.

In addition, the Developer, Developer's Engineer and Contractor agree, to the fullest extent permitted by law, to indemnify and hold the City of Jordan, the City's Engineer or its representatives harmless from any damage, liability or cost, including reasonable attorneys' fees and defense costs, arising from any errors or omissions contained in the plans, specifications or other Contract Documents except for the sole negligence or willful misconduct of the City of Jordan, City Engineer or its representatives.

PART 4 -- NOTICE TO PROCEED

No work on any improvements shall commence until the City has issued a Notice to Proceed.

PART 5 -- AS-BUILT DRAWINGS

5.1 Grading

A certified grading plan shall be completed by the Developer showing finished grades at the lot corners, drainage swales between lots and pond construction. This certified grading plan is to be submitted to the City Engineer for approval in an AutoCAD, Release 2000, (*.dwg format) for overlaying and comparison with the approved construction grading plan.

5.2 Street and Utilities

The City's Engineer will be responsible for obtaining the as-built location of the sewer and water service stubs. This information will be available to the Developer's Engineer for incorporation into the as-built drawings in AutoCAD format. The Contractor shall provide to the City Engineer at least 48 hours notice of sewer and water service construction.

The Developer shall maintain records of as-built construction of all utilities and street construction. As part of final acceptance and release of final letter of credit, as-built drawings shall be completed by the Developer to the acceptance of the City Engineer. The top nut elevation of all hydrants shall be identified on the as-builts. Final as-built drawings shall be submitted to the City Engineer in both mylar and digital (AutoCAD, Release 2000) format.

PART 6 -- WARRANTY

The Developer shall warrant all work for a period of two (2) years from the date of final acceptance by the City of Jordan, as described in the Developer's Agreement. During this period, the Developer shall promptly, without costs to the City, and in accordance with the City's written instructions, correct and/ or remove and replace such defective work to the satisfaction of the City's Engineer. If the Developer does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, the City may have the defective work corrected or the defected work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work by others) will be paid by the Developer.

STANDARD SPECIFICATIONS AND DETAIL PLATES
CITY OF JORDAN
JORDAN, MN

SECTION 01110 - SUMMARY OF WORK

PART 1 -- GENERAL

1.1 PROJECT LOCATION

- A. The project is located in Jordan, MN. The project location is shown on the vicinity map in the design drawing set.

1.2 PROJECT DESCRIPTION

- A. The general scope of services anticipated are outlined on the attached bar chart diagram. Selection of specific alternates or acceptance of contractor proposed alternatives may alter the scope, as shown.
- B. The project involves but is not limited to the complete construction of public improvements for the reconstruction of several streets. Individual elements of work shall include, but are not limited to:
 - 1. Removal of bituminous pavement, concrete curb and gutter, sidewalk and driveways, pipe and other miscellaneous items.
 - 2. Clearing and grubbing.
 - 3. Street excavation.
 - 4. Sanitary sewer construction.
 - 5. Water main construction.
 - 6. Water and sewer service construction.
 - 7. Storm sewer construction.
 - 8. Concrete walk construction.
 - 9. Concrete curbing and driveway pavement construction.
 - 10. Bituminous street construction.
 - 11. Turf restoration and erosion control construction
 - 12. Traffic Control.
 - 13. Other miscellaneous work shown on the plans or specified herein.

1.3 ALTERNATE MATERIALS & METHODS OF CONSTRUCTION

- A. The Contractor may present alternative materials and/or methods of construction for consideration by the City. Proposals for such alternatives shall be in accordance with the provisions of Section 01230 - ALTERNATES / ALTERNATIVES.

1.4 CONTRACTOR USE OF PROJECT SITE

- A. The Contractor's use of the project site shall be limited to its construction operations, including on-site storage of materials and field offices. No materials shall be stored in a location as to limit access to the affected public.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 OPERATIONAL LIMITATIONS AND REQUIREMENTS

- A. The Contractor shall confine its work within the limits of the easements, public rights-of-way, and/or construction limits as shown on the plans. If the Contractor desires additional space, it shall be the Contractor's responsibility to acquire easements and/or permission, as desired.

3.2 SAFETY HAZARDS

- A. The City, City Engineer or their representatives may indicate potential safety hazards noticed at the Construction site. Discussions of this nature are intended as a service and to prevent damages unforeseen by the Contractor. However, the Contractor shall remain the only party liable for the maintenance of safe construction practices.

3.3 INTERFERENCE WITH TREES

- A. The Contractor may be required to trim tree branches that overhang the work zone as specifically identified during construction by the City Engineer, where branches are likely to be broken or excessively damaged by construction equipment and activities. Branches which are accidentally damaged during construction shall be trimmed immediately. All trimmed ends shall be coated with an appropriate coating material.
- B. The Contractor shall protect existing trees within close proximity of the construction from stripping and root damage. Roots extending into excavations shall be cut before excavating in their vicinity. Roots cut or otherwise damaged shall be coated with an appropriate protective dressing prior to backfilling.
- C. No direct compensation for tree protection and interference shall be made, unless specifically identified in the Schedule of Unit Prices.

******END OF SECTION******

SECTION 01310 – COORDINATION

PART 1 -- GENERAL

1.1 SEQUENCE OF CONSTRUCTION

- A. A project management network scheduling tool (i.e., critical path (CPM), etc.) or a DETAILED bar chart shall be employed by the Contractor for cost value reporting, planning and scheduling of all work required under the Contract Documents. This schedule shall show the order in which the Contractor proposes to execute the work with dates on which it proposes to start the various phases of the work and the estimated completion date of each phase. The Contractor shall submit to the City Engineer his intended schedule within 10 working days prior to commencing construction. **The Contractor is required to show the initial critical path (CPM) of tasks to be performed.**
- B. Unless otherwise approved by the City Engineer, the schedule shall also include an anticipated payment schedule for the volume of work to be completed each month. This schedule shall indicate the Contractor's intention and ability to complete the work within the contract times, as specified in Article 3 of the Agreement.
- C. The Preconstruction Conference as outlined in Section 01315 will not be conducted until the schedule is submitted. In addition, no construction staking shall be provided until the schedule is submitted by the Contractor and reviewed by the City Engineer.

1.2 WORKING HOURS

- A. Except in connection with safety or emergency situations, all work at the site shall be performed during daylight hours.
- B. The Contractor shall notify the City and City Engineer of any work planned on Saturday, Sunday, or any legal holiday at least 48 hours prior to such work.
- C. The Contractor shall coordinate any construction or hauling activity in the vicinity of churches, schools, medical facilities, and funeral homes. The Contractor shall be cognizant of the disruptive effects of continued construction during funerals. The City reserves the right to temporarily stop construction within one block of, and during the time of, any funeral procession. No compensation shall be granted to the Contractor due to temporary delays caused by funerals.

1.3 TRAFFIC CONTROL

- A. See reference Specification 01555.

1.4 COORDINATION WITH BUSINESSES AND PRIVATE PROPERTY OWNERS ADJACENT TO THE PROJECT

- A. The Contractor shall notify all property owners and occupants adjacent to the project 2 days in advance to allow moving machinery and/or vehicles or other items that may be blocked in or damaged due to the upcoming construction in the area. Access to the properties shall be restored as soon as possible after each phase of construction.

1.5 COORDINATION WITH UTILITY COMPANIES

- A. The Contractor is responsible for working with public and private utility companies in protecting and/or relocating existing or new utility lines located near and affected by this construction.

1. Coordination with the utility companies is very important and should be considered in planning the work and the associated extra costs involved.
 2. Private utility companies are responsible for their own lines and are so obligated under City Code Agreements to protect and/or relocate their utilities, if required to install new City owned utilities in a given area.
- B. The Contractor shall consult with the City's maintenance personnel when working around or performing the required sanitary sewer installations.
- C. The Contractor shall also work with the City's maintenance personnel to provide for scheduled water shut-downs in a given area and to provide for continued water service to the properties along the project throughout the duration of the project.
- D. The Contractor shall work with all utility companies, as necessary, to allow for installation and for maintenance of service of gas, power, lighting, telephone, cable TV, etc. in the boulevards or across the streets prior to final shaping of aggregate base and/or topsoil. This coordination with the utility companies is the responsibility of the Contractor and is considered incidental to the construction and no additional compensation shall be granted.

1.6 COOPERATION WITH FIRE & EMERGENCY DEPARTMENTS

- A. The Contractor shall coordinate all work requiring shutting down water service or limiting access to buildings by emergency equipment with the fire & emergency departments. This shall include notification of the daily construction schedule by the Contractor.

1.7 COOPERATION WITH OTHER CONTRACTORS

- A. The Contractor shall cooperate with other contractors performing construction on other projects in the vicinity of this Project, including but not limited to allowing access for the delivery of equipment and materials.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

****END OF SECTION****

SECTION 01315 - PROJECT MEETINGS

PART 1 -- GENERAL

1.1 SUMMARY

A. Pre-construction Conference

1. Prior to the start of the work, a joint meeting will be held with representatives of the Contractor, the City, the City Engineer, and any other interested parties. This meeting is intended to introduce the various key personnel from each organization and to discuss the start of the work, order of work, labor and legal requirements, insurance requirements, method of payment, shop drawing requirements, protection of existing facilities, location of disposal and stockpile areas, and other pertinent items associated with the project.
2. The Contractor shall be prepared to discuss his proposed detailed construction progress schedule. The construction schedule shall be subject to the review of the City, City Engineer and applicable agencies.

B. Construction Progress Meetings

1. Meetings will be held between the City, Contractor and City Engineer for the purpose of reviewing the project schedule or the status of the project. These meetings will be arranged by the City, and/or City Engineer, as deemed necessary.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

******END OF SECTION******

SECTION 01330 – SUBMITTALS

PART 1 -- GENERAL

1.1 SUMMARY

- A. The Contractor shall submit three (3) copies of all required submittals and sample items as noted below. The City Engineer will review them with reasonable promptness. The Contractor shall make all required corrections and file with the City Engineer three (3) corrected sets for final review. If the Contractor requires more than two (2) reviewed copies, the Contractor shall submit additional sets.
- B. The responsibility for completeness of submittals lies with the Contractor. If the City Engineer and/or City signs the submittal with no exception taken, such action shall not absolve the responsibilities of the Contractor in any way.

1.2 ITEMS TO BE SUBMITTED

- 1. Written Progress Management Schedule Tool (as defined in Section 01310) - to be reviewed at the Preconstruction Conference. See Article 3 of 00500 Agreement for contractual time requirements.
- 2. Concrete Mix Design
- 3. Gradation Test Results from 2 separate tests, as required in Source Quality Control provisions of individual sections contained herein, from material stockpiles of aggregates to be used on this project. These tests may be run by the Contractor or its supplier during aggregate production.
- 4. Geotextile Fabrics - Certificates of Compliance.
- 5. Sanitary Sewer and Sanitary Sewer Service
 - (a) Manhole structure - shop drawings.
 - (b) Manhole casting - shop drawings.
 - (c) Piping and fittings - Certificates of Compliance.
 - (d) Final video tape and log.
- 6. Storm Sewer, Subdrain and Sump Drain Lines
 - (a) Manhole and catch basin structure - shop drawings.
 - (b) Manhole and catch basin casting - shop drawings.
 - (c) Piping and fittings - Certificates of Compliance.
- 7. Watermain and Water Service Lines
 - (a) Hydrants - Certificates of Compliance.
 - (b) Valves & boxes - Certificates of Compliance.
 - (c) Pipe & fittings - Certificates of Compliance.
 - (d) Corporation stops, saddles, curb stops, curb boxes, copper pipe - Certificates of Compliance.
- 8. Seeding - Certificates of Compliance for seed mixture.
- 9. Trees & Shrubs - Certificates of Compliance.
- 10. Lift Stations
 - (a) Pumps & panels - shop drawings

- (b) Valve manhole - shop drawings.
- (c) Valves - shop drawings and Certificates of Compliance.
- (d) Maintenance and operations manuals.

11. Materials Safety Data Sheets (MSDS)

- (a) The Contractor shall provide Material Safety Data Sheets (MSDS) on all appropriate materials for the City's records.
- (b) The Contractor shall maintain an orderly file of material safety data sheets at the job site.

1.3 RECORD DRAWINGS

- A. The CONTRACTOR shall maintain at the construction site one complete set of drawings suitably marked to show all deviations from the original set of drawings and other information as specified. Supplementary sketches shall be included, if necessary, to clearly indicate all work as constructed. Sanitary and water service tie-in or stub-out locations shall show station and distances left or right of the survey control centerline. Existing sanitary and water service piping material type and size at the tie-in locations shall be noted also. (A service record form is attached for the Contractor's use.).
- B. All manholes and valves shall be located with tie-off dimensions to known items on the plans or in the field to enable the Contractor or City personnel to locate these structures for adjustment.
- C. All work shall be clearly shown and the record drawings shall be satisfactory to the CITY in order to insure that adequate information is indicated to show the actual construction. The complete set of the record drawings shall be submitted to the CITY ENGINEER prior to submittal of the final Application for Payment. Failure of the CONTRACTOR to maintain an up-to-date set of record drawings on the project site shall be reason to withhold payments. All underground lines shall be determined from the record drawings.

1.4 MATERIAL SAFETY DATA SHEETS

- A. The Contractor shall maintain an orderly file of material safety data sheets at the job site.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 SUBMITTAL ROUTING

- A. All submittals shall be submitted to the Contractor for review and approval prior to submission to the City Engineer.
- B. All submittals shall be accompanied by a letter of transmittal that identifies the submitted item and review action required.

3.2 RESPONSIBILITY

- A. The City Engineer's review of a submittal shall not relieve the Contractor from the responsibility for deviation from the drawings and specifications unless the Contractor has, in writing, called the City Engineer's attention to the deviations at the time of submission; nor shall it relieve the Contractor from the responsibility of errors in the submittals.

- B. All submittals shall be reviewed by the City Engineer prior to their incorporation into the project. If materials are installed without prior review, they will be subject to removal, at the Contractor's expense, if the material is found to be non-conforming to the Specifications.

****** END OF SECTION ******

SECTION 01410 - REGULATORY REQUIREMENTS

PART 1 -- GENERAL

1.1 SUMMARY

- A. Applicable codes and standards referred to in these specifications shall establish minimum requirements for equipment, materials, construction and shall be superseded by more stringent requirements of drawings and specifications when and where they occur.
- B. All equipment furnished and installed under the contract shall be designed, fabricated, assembled, installed, and placed into service. The equipment will conform to the applicable provisions of the Federal and State Safety and Health Standards, including but not limited to Federal Occupational Safety and Health Regulations for Construction; the Division of Environmental Health, Minnesota Department of Health; the Minnesota Pollution Control Agency; the Department of Natural Resources; the Minnesota Department of Transportation, Division of Highways; the Minnesota Industrial Commission and ordinances of the City that apply to this work.
- C. All construction methods and tools shall comply with commonly accepted standards for safety and health of personnel engaged on construction, including but not limited to Federal Occupational Safety and Health Regulations for Construction; the Division of Environmental Health, Minnesota Department of Health; the Minnesota Pollution Control Agency; the Department of Natural Resources; the Minnesota Department of Transportation, Division of Highways; the Minnesota Industrial Commission and ordinances of the City that apply to this work.
- D. Any conflicts between specifications and applicable codes and standards shall be referred to the City Engineer.

1.2 PERMITS OBTAINED BY CITY

- A. The City has applied for the following permits from appropriate authorities. It is anticipated that permission to proceed will be authorized prior to execution of Contract. The Contractor shall perform all work and conduct itself in full accordance with the requirements of the applicable permit:
 - 1. Minnesota Pollution Control Agency (MPCA) - Extension of sanitary sewers.
 - 2. Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit - The Contractor and City shall jointly apply for this permit once the contract is awarded.
 - 3. Minnesota Health Department - Extension of water mains.
 - 4. Minnesota Department of Transportation (Mn/DOT) - Work within right-of-way.
 - 5. Minnesota Department of Transportation (Mn/DOT) - Access Driveway Permit
 - 6. Utility installation within a County right-of-way.
 - 7. Utility installation within the railroad right-of-way.
- B. The Contractor shall be responsible for posting any bonds which may be required as a condition to any permit, listed above.

1.3 PERMITS OBTAINED BY CONTRACTOR

- A. The Contractor shall secure and pay the cost of any other permits not mentioned below, which may be required including but not limited to:

1. Work within City right-of-way permit.

1.4 WORK WITHIN A RAILROAD RIGHT OF WAY

A. The Contractor shall comply with all provisions of Mn/DOT Specification 1708.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

******END OF SECTION******

SECTION 01420 - SPECIFICATION REFERENCE

PART I -- GENERAL

1.1 GENERAL CONDITIONS

- A. The "Standard General Conditions of the Construction Contract" (No. 1910-8, 1996 Edition), prepared by Engineers Joint Contract Documents Committee, and issued and published jointly by Professional Engineers in Private Practice (a Practice Division of the National Society of Professional Engineers), American Consulting Engineers Council, American Society of Professional Engineers and the Construction Specifications Institute, and Supplementary Conditions shall govern the work of all persons engaged in the performance of the Contract.

1.2 WATERMAIN, SANITARY SEWER AND STORM SEWER CONSTRUCTION

- A. Watermain, sanitary sewer and storm sewer construction shall conform to the applicable provisions of the "Standard Utilities Specifications for Trench Excavation and Backfill/Surface Restoration Watermain and Service Line Installation and Sanitary Sewer and Storm Sewer Installation" as published by the City Engineers Association of Minnesota, (CEAM) 1999 Edition.
- B. Copies of the Standard Utilities Specifications are available at a nominal charge from:

League of Minnesota Cities - CEAM
c/o Mary-Margaret Zindren
145 University Avenue, West
St. Paul, MN 55103-2044
651-215-4034
- C. References to the standard specifications shall serve to supplement or modify the referenced specification. Portions of referenced specifications not specifically affected by the supplemented information of modification shall remain in effect as originally written.
- D. **THREADED ITEMS** - All threaded items furnished under this contract, including but not limited to mechanical joint connectors, flanged joint connectors, mainline valves, saddles, corporation stops, curb stops, hydrants, and air release valves shall be furnished to the nominal size as specified with ENGLISH threads. Should the Contractor choose to supply any items with metric threads, the Contractor shall supply full shop drawings of the item(s) with special attention drawn to the metric thread designation proposed.

1.3 GRADING, STREET AND SURFACE IMPROVEMENTS

- A. All of Divisions II and III, and any specifically referenced Division I sections of the Minnesota Department of Transportation (Mn/DOT), "Standard Specifications for Construction", 2000 Edition, together with all the Supplemental Specifications and Mn/DOT Technical Memoranda in force 30 calendar days prior to bid date and referencing the use of English units of measure, shall apply to all construction performed under this Contract except as modified in these Specifications. Unless noted, the requirements in the Specifications are in addition to the Mn/DOT Specification section being referenced.

Mn/DOT Division	Applicable
I	Only when specifically referenced
II & III	Always

- B. Whenever the word "Contracting Authority," "Department" or "City" is used in the sense of ownership as part of these Specifications and Contract, it shall mean City as defined in the Agreement.
- C. References to the standard specifications shall serve to supplement or modify the referenced specification. Portions of referenced specifications not specifically affected by the supplemented information or modification shall remain in effect as originally written.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

- 3.1 THE CONTRACTOR SHALL HAVE THE FOLLOWING DOCUMENTS AT THE SITE AT ALL TIMES DURING THE CONSTRUCTION:
 - A. The applicable edition of Mn/DOT Standard Specification for Highway Construction.
 - B. Any Supplemental Specifications to the applicable edition of Mn/DOT Standard Specification for Highway Construction.
 - C. Any Technical Memoranda specifically referenced or linked to the execution of the Contract Documents.
 - D. Mn/DOT Standard Plates Manual.
 - E. Minnesota Manual of Uniform Traffic Control Devices (MN MUTCD), 2001.
 - F. Project Manual
 - G. City Standard Specifications and Detail Plates
 - H. Approved Construction Plans and Specifications

******END OF SECTION******

SECTION 01425 -- ABBREVIATIONS

PART 1 -- GENERAL

1.1 WHEREVER THE FOLLOWING ABBREVIATIONS ARE USED, THEY SHALL HAVE THE MEANINGS INDICATED:

- A. AASHTO American Association of the State Highway and Transportation Officials
- B. ACI American Concrete Institute
- C. AI The Asphalt Institute
- D. ASTM American Society for Testing and Materials
- E. AWWA American Water Works Association
- F. CEAM City Engineer's Association of Minnesota
- G. CLFMI Chain Link Fence Manufacturers Institute
- H. Mn/DOT Minnesota Department of Transportation
- I. OSHA Occupational Safety and Health Administration
- J. PCA Portland Cement Association

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

******END OF SECTION******

SECTION 01450 - QUALITY CONTROL

PART 1 -- GENERAL

1.1 SUMMARY

A. TESTS AND INSPECTIONS

1. Where tests or inspections are required by these Specifications and Special Provisions, the Contractor shall employ and arrange for, at its expense, the services of an independent testing laboratory approved by the City Engineer to perform the tests utilizing recognized standard procedures and criteria. All tests and inspections, listed in this Section with all its subparagraphs shall be the direct responsibility of the Contractor.
2. The City may perform televised inspection of any and/or all under construction included in this project, at its own expense, at any time prior to final payment. All deficiencies discovered in the course of such investigation shall be corrected at the Contractor's expense and, the City's satisfaction, prior to final payment.
3. Additional testing of on-site and backfill materials for specified density, gradation, and/or soundness may be performed by the City's soil consultant at the City's expense. The Contractor, however, shall be responsible for the City's cost incurred for re-testing any areas which failed the initial density or material testing.
4. The Contractor shall provide access to the site and all work thereon for all required construction observation and testing.

B. NOTICE

1. The Contractor shall notify the City Engineer or his representative a minimum of 48 hours prior to any major construction activity such as, but not limited to, placement of aggregate base, placement of concrete curb & gutter, paving of any layer of bituminous, etc. Failure to provide this notice shall be grounds to suspend or delay such activity.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

*******END OF SECTION*******

SECTION 01550 - MAINTENANCE OF HAUL ROADS & TEMPORARY ACCESS

PART 1 -- GENERAL

1.1 MAINTENANCE

- A. The Contractor shall notify and obtain the approval of the City Engineer for the use of all haul roads and construction easement areas within the City limits not specifically noted below. The Contractor will be required to deliver new materials and dispose of all excavated material plus removal items only on designated haul roads. This also applies to equipment entering and leaving the project site such as backhoes and front end loaders.
- B. The Contractor shall maintain and repair any damage to haul roads. Maintenance shall include, but not be limited to, the following: blading, patching, signing, graveling and dust control. This work will be at the Contractor's expense, without any direct compensation being made other than the payment received for Contract items.
- C. The Contractor shall be responsible for all roadbed maintenance over backfilled trenches and roadbed subgrade during the construction period.

1.2 REFERENCED SPECIFICATION

- A. Mn/DOT Specification 1515, Control of Haul Roads
- B. Mn/DOT Specification 2051, Maintenance and Restoration of Haul Roads.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Reclaimed bituminous and salvaged aggregate base may be used for temporary access surfacing. No additional compensation shall be granted for the installation, removal and disposal of materials utilized in this way.

******END OF SECTION******

SECTION 01555 - MAINTENANCE AND CONTROL OF TRAFFIC

PART 1 -- GENERAL

1.1 SUMMARY

A. Traffic Control

1. All traffic control methods shall conform to the provisions of the latest edition of the Minnesota Manual of Uniform Traffic Control Devices (MN MUTCD), including its supplements.
2. The Contractor shall furnish, install, maintain and remove all traffic control devices including, but not limited to, construction signs, barricades and barricade weights, traffic marking tape, and warning lights which are needed for the guidance, warning and control of traffic adjacent to and through this project.
3. The Contractor shall provide sufficient surveillance of the traffic control devices to insure compliance during the entire construction period. The Contractor shall furnish names, addresses, and phone numbers of at least two (2) local individuals responsible for the traffic control devices to:

The City Engineer
The City
Local Law Enforcement Agencies
4. The Contractor shall schedule the work to cooperate fully with residential and business property City's abutting the project to minimize the time of restricted access to their property during the construction period. Driveway access to any property adjacent to the construction zone shall be restricted no more than seven days to allow for curing of the concrete curb and driveway pavement.
5. The cost of maintaining vehicular and pedestrian traffic on temporary aggregate surfaced drives, walkways, including the eventual removal of the aggregate material, shall be considered incidental to traffic control.
6. If it is necessary to enter upon a right-of-way controlled by the County or Minnesota Department of Transportation, the Contractor shall notify the appropriate agency before commencing construction within the right-of-way.
7. In the event that any of the above right-of-way require traffic to be detoured around the construction zone, the Contractor shall prepare the detour route with the appropriate Agency representatives. The Contractor shall provide and maintain all signing and other traffic control required. The affected Agency shall be notified by the Contractor before re-routing traffic. Dust control and road maintenance of the by-pass route shall be the Contractor's responsibility.
8. The Contractor shall be responsible for securing a site for storage of construction equipment and materials.

B. General Construction and Traffic Requirements

1. The parking of Contractor's Vehicles that obstruct any traffic control devices will not be permitted.

1.2 COMPENSATION

- A. All costs for work described in this Section shall be considered incidental and no direct compensation shall be granted, unless it is specifically identified in the *Bidding Documents*.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The traffic control devices required along the project corridor shall be delivered and installed prior to the start-up of the work.
- B. The Contractor shall maintain traffic through the intersections whenever possible.

******END OF SECTION******

SECTION 01562 - AIR, LAND AND WATER POLLUTION

PART 1 -- GENERAL

1.1 AIR AND WATER POLLUTION

- A. 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, and in accordance with the provisions of Mn/DOT 1717 as modified below.
- B. The Contractor shall perform dust control operations whenever necessary to prevent the production of dust in amounts damaging to property, vegetation, animals, or persons in the vicinity of the construction. The Contractor shall be responsible for any damage resulting from dust originating from the construction. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility under these Contract provisions.
- C. The Contractor shall provide and maintain all sanitary accommodations for use by employees.
- D. All solid waste material shall be disposed by the Contractor in accordance with the local and State solid waste disposal regulations.

1.2 USE OF CHEMICALS

- A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of another classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture.
- B. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instruction of the manufacturer.

1.3 EROSION CONTROL

- A. The Contractor shall furnish and install the necessary materials and equipment to control soil erosion within and from the construction site.

1.4 COMPENSATION

- A. No direct compensation will be paid for air, land and water pollution control, including but not limited to temporary check dams, dikes, berms, silt fences, sediment basins, culverts, hay bales, and the application of water, unless specifically identified as a payable unit of work.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 EROSION CONTROL

- A. Requests for erosion control installation or maintenance shall be accomplished within 24 hours of written notification and shall also include evenings and weekends as required or deemed necessary by the City or the City Engineer.

3.2 DUST CONTROL

- A. Requests for water to be placed for dust control shall be accomplished within 4 hours of notification and shall also include evenings and weekends as required or deemed necessary by the City or the City Engineer.

****END OF SECTION****

SECTION 01770 - PROJECT CLOSEOUT

PART 1 -- GENERAL

1.1 FINAL INSPECTION

- A. After the cleaning up of the work, premises, and all other areas and structures connected with the performance of the contract, the work as a whole, shall be examined by the City Engineer and City; and, any workmanship or materials found not meeting the requirements of the specifications shall be identified and included on a punch list given to the Contractor.
- B. The Contractor shall, at its own expense, promptly remove, replace, repair, or otherwise correct the deficiencies with good and satisfactory workmanship and material to the satisfaction of the City and City Engineer.
- C. In the event that the Contractor does not satisfactorily remove, replace, repair, or otherwise correct the deficiencies within thirty (30) calendar days after receipt of the punch list, the City reserves the right to employ the services of other contractors and/or service organizations to conduct the necessary work and deduct any and all associated costs from final payment to the Contractor. The entry of such other agents on the project to perform this work will not relieve the Contractor from any of its warranty, maintenance or start-up obligations.

1.2 PROJECT ACCEPTANCE

- A. The project shall be accepted after the final examination has been conducted and all settlement, defects, damages, etc., discovered during the previous examination have been remedied.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

****** END OF SECTION ******

TECHNICAL SPECIFICATIONS
STANDARD SPECIFICATIONS AND DETAIL PLATES
CITY OF JORDAN
JORDAN, MN

SECTION 02220 - REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the removal of pavement and miscellaneous structures as indicated on the drawings or as specified herein.

1.2 SPECIFICATIONS REFERENCES

- A. Mn/DOT Specification Section 2104 shall apply to the removal of pavement and miscellaneous structures, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.3 SUBMITTALS

- A. No exception to the referenced specification is made.

PART 2 -- PRODUCTS

2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Remove existing bituminous, curb and gutter, walks, drives, steps and other specified items where shown on the plans and/or required for the construction of the project.
- B. Saw cut bituminous and concrete surfaces prior to excavation, to produce a clean-cut breakage joint.
- C. Dispose of all concrete and bituminous removal items, rubbish and debris outside of the construction zone. It shall be the Contractor's responsibility to secure all required permits and pay all fees associated with the disposal of the material and to secure the disposal site.
- D. Remove existing mailboxes, street signs and similar structures which must be removed to construct the project. Restore these facilities to the original location or a location designated by the City, when work has progressed past the location of the structure. The Contractor shall reinstall or replace those structures which are damaged or lost during the course of construction with new materials or components.
- E. The Contractor shall take full responsibility to protect structures or other surface improvements from damage that are not to be removed. If damage to these facilities occurs due to the construction of the project, the Contractor shall replace or repair them.
- F. The City will designate which existing hydrants, valves and boxes, manhole castings and other items removed as part of the construction, are to be salvaged. All other items shall be disposed by the Contractor.

- G. In general, all existing watermain, sanitary sewer and storm sewer pipe being replaced by new improvements shall be considered as debris and removed during the construction process. In certain instances, existing pipes may be abandoned in place, with the approval of the City Engineer.
- H. Where existing pipes are to be abandoned in place, the exposed pipe ends shall be bulkheaded shut with a watertight non-shrink concrete grout at a thickness of not less than one pipe diameter.

****END OF SECTION****

SECTION 02230 - CLEARING AND GRUBBING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to clearing and grubbing trees, stumps and brush as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2101 shall apply to clearing and removing trees, stumps and brush, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

- 2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. All trees, stumps, brush, seed, grass, roots or other undesirable material within the construction limits shall be disposed of by the Contractor.
- B. Disposal methods shall be approved by the City Engineer and shall meet all local, State and federal regulations.
- C. Burning or burial will not be allowed within city limits.

******END OF SECTION******

SECTION 02240 - DEWATERING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the dewatering of trenches as necessary to construct the elements shown on the drawings or as specified herein.

- 1. This item shall be considered exempt from the requirements of Supplementary Condition 11.03.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2451.3C shall apply to the dewatering of trenches, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. None

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall furnish and install all necessary discharge piping and obtain all permits, easements, rights-of-way, etc. to convey and discharge the water at a sufficient distance from the project area to eliminate recharge of the ground water at the project site.
- B. Water from dewatering operations shall not be discharged where it will pond or cause damage to cropland or personal property due to the presence of standing or flowing water.
- C. Water shall be discharged into temporary sedimentary basins prior to ultimate discharge into natural streams or waterways where its impact will have negligible impact.
- D. Existing and/or proposed sanitary system(s) shall not be used as an outlet for the dewatering operations.

******END OF SECTION******

SECTION 02310 - EXCAVATION & EMBANKMENT - SITE GRADING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the excavation and embankment of the site improvements as indicated on the drawings or as specified herein.

1.2 DEFINITIONS

- A. Building Pad - The area under any proposed building, or an area delineated on the plans as the site for a future building.
- B. Building Pad Hold-Down - The elevation that the proposed building pad is to be constructed to. This elevation does not represent the finished grade elevation of the proposed building.
- C. Compacted Volume (CV) -- The volume of material actually placed as determined by computing the difference between original and final cross-sections by the average end area method.
- D. Excavated Volume (EV) -- The volume of material actually excavated as determined by computing the difference between original and final cross-sections by the average end area method.
- E. Excess Material - Material that is not needed to complete the earthwork balance.
- F. Structural Improvements - For the purposes of this specification, structural improvements shall refer to any roadway, sidewalk, trail, building, sign, or other improvements requiring suitable soil to support the anticipated loadings.
- G. Subcut - Excavation performed below the proposed subgrade or building pad hold-down elevation shown on the plans for the purposes of removing unsuitable material.
- H. Subgrade - The top surface of a roadbed upon which the pavement structure (including aggregate base and/or granular subbase) is to be constructed. This is also a general term denoting the soil foundation upon which a proposed improvement is to be placed.
- I. Suitable Material - Sand, silty sand or low plasticity clay soils with no organic content. The City Engineer shall make the final determination as to what material will be considered suitable.
- J. Topsoil - Any soil, generally black in color, containing organic material.
 - 1. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the City Engineer to be unsuitable for fill or embankment construction.

1.3 SPECIFICATION REFERENCES

- A. Mn/DOT Specification No. 2105 shall apply to the excavation and embankment for the site improvements, except as modified herein.
- B. Section 01270 Measurement and Payment of these Specifications, if included, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

PART 3 -- EXECUTION

3.1 GENERAL

- A. Excavated topsoil and suitable material for reuse in the project shall be segregated and stockpiled at a site selected by the Contractor.
- B. All excavations shall be kept free of water during the placement of fill.
- C. The Contractor shall utilize methods and equipment for excavating that will minimize the disturbance to the subgrade. The use of backhoes rather than scrapers or front-end loaders may be required to minimize repeated passes of equipment over wet subgrade soils.
- D. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheepfoot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.
- E. Sufficient common excavation shall be utilized by the Contractor to replace the soil shrinkage from excavation which occurs through the course of construction handling and compaction. The Contractor shall make his own estimate of the amount of shrinkage that will occur.
- F. Topsoil
 - 1. Topsoil shall be salvaged and stockpiled in locations shown on the plans or in areas requiring final turf establishment, as approved by the City Engineer.
 - 2. Once the salvaged topsoil is stockpiled, the Contractor shall make an estimate of any potential shortage or surplus of topsoil possible in meeting the other provision of this Contract and notify the City Engineer of the estimate.
 - 3. The first priority in re-distributing the topsoil on site shall be to meet the minimum depths required over the entire project area.
 - 4. In areas requiring final turf establishment with no proposed or anticipated structural improvements (building pads, etc.), topsoil shall be spread uniformly to a minimum depth of 6-inches.
 - 5. In areas requiring final turf establishment with proposed or anticipated structural improvements (building pads, etc.), topsoil shall be spread to a depth of 2 to 4-inches.
 - 6. In areas not requiring final turf establishment with proposed or anticipated structural improvements, no topsoil shall be placed.
- G. Material suitable for curb backfill shall be segregated and stockpiled at a site selected by the Contractor. Following curb construction, the material shall be placed behind the curb, allowing for a minimum of 6-inches of topsoil.
- H. In areas where filling above the existing grade is necessary to establish the final designed elevation, the Contractor shall fully remove the topsoil and organic material to the level of stable underlying sand or clay prior to backfilling with suitable embankment material.
- I. The Contractor shall make his own determination as to whether the proposed grading has been completed according to the plans. When the Contractor determines that the grading has been completed, he will notify the City Engineer. Neither the City or the City Engineer will provide any intermediate acceptance of the grading improvements until all of the grading has been completed and all topsoil has been spread.

3.2 EXCAVATION AND EMBANKMENT IN AREAS WITH PROPOSED STRUCTURAL IMPROVEMENTS.

- A. All vegetation, topsoil, organic, or other unsuitable materials shall be excavated from the area below the structural improvement. Due to the variability of soils, the depth of the excavation in these areas is expected to vary significantly throughout the site. The excavated area shall be inspected by the geotechnical engineer as specified in Field Quality Control.
- B. Subcut excavations shall be laterally oversized a distance of one (1) foot beyond the edges of the proposed structural improvement for each foot of excavation depth (1:1 oversizing). The extents of the structural improvement areas shown on the plans do not necessarily show this 1:1 oversizing.
- C. Fill placed from the bottom of the subcut to the subgrade or building pad hold down elevation shall be selected material from the excavation or borrow material. Such material shall consist of suitable material as defined above. Clay fill shall be moisture-conditioned to within 2% above or below the optimum moisture content determined from the Standard Proctor compaction test.
- D. The embankment material shall be spread in 6 to 8 inch loose lifts.
- E. In all roadway and pavement areas, the Contractor shall perform a roll test on the subgrade prior to placing any portion of the pavement structure. The roll test shall be performed with a fully-loaded tandem truck. Soils which rut or deflect 1-inch or more shall be corrected by scarifying, drying, and recompacting the soils. Subgrade excavation shall only be performed as directed by the City Engineer.
- F. Subgrade excavation shall be performed only when the City Engineer and the Contractor both agree that the in-place soil can not be made suitable by scarifying, drying, and recompacting. Such excavation shall be backfilled with suitable excess common excavation material, stabilizing aggregate, granular borrow or select granular borrow, as directed by the City Engineer. If the Contractor proceeds without approval from the City Engineer, all work and material to restore the roadbed to the proper grade shall be at the Contractor's expense.

3.3 EXCAVATION AND EMBANKMENT IN AREAS WITH NO PROPOSED STRUCTURAL IMPROVEMENTS

- A. Topsoil or unsuitable material may be used to construct embankments in areas with no structural improvements.

3.4 COMPACTION

- A. All embankment grading shall be compacted using:
 - 1. Under areas with proposed paved or structural improvements, Specified Density Method :
 - (a) 100% Standard Proctor dry density within 3 feet of the proposed sub-grade or building pad hold-down elevation.
 - (b) 95% of the maximum Standard Proctor dry density below 3 feet from the proposed sub-grade or building pad hold-down elevation.
 - 2. Under areas with no proposed paved or structural improvements, Quality Compaction Method.

3.5 SOURCE QUALITY CONTROL

- A. The Contractor shall arrange for having the following testing performed:
 - 1. One (1) gradation test per each 500 tons or 275 cubic yards (CV) of select granular borrow.

2. One (1) gradation test per each 500 tons or 275 cubic yards (CV) of stabilizing aggregate, select granular borrow
- B. All testing shall be performed by an independent testing laboratory approved by the City Engineer.

3.6 FIELD QUALITY CONTROL

- A. The Contractor shall arrange for and pay all costs associated with having the following testing and inspections, with written certification, performed:
 1. Areas with Proposed Structural Improvements:
 - (a) One (1) compaction test (including Standard Proctor) per each 500 SY per each 3 foot of depth of embankment.
 - (b) Building Pads shall have a minimum of one (1) compaction test (including Standard Proctor) per each 3 foot of depth of embankment for each pad.
 - (c) Inspection following the removal of unsuitable material and prior to placement of embankment material to insure that all topsoil and unsuitable material has been removed, and that the exposed subgrade has sufficient bearing capacity for the anticipated structural improvement.
- B. The Contractor shall notify the City Engineer 24 hours prior to completing the removal of topsoil and unsuitable material in areas with proposed structural improvements to insure that appropriate inspection may be performed.
- C. All testing shall be performed by an independent testing laboratory. All inspection shall be performed under the direct supervision of a licensed Geotechnical Engineer who shall provide written certification of the results.
- D. Samples for testing shall be taken from material in place, in building sites and/or paved areas. All sampling methods shall be approved by the City Engineer.
- E. The Contractor shall coordinate the site grading and inform the City Engineer when the roadway subgrade is ready for test rolling, prior to installing any aggregate base. The City Engineer may order some subgrade correction prior to allowing the installation of aggregate base.
- F. Should any of the specified tests or inspections fail, the Contractor may arrange and pay for additional tests or inspections as may be necessary to satisfy the City Engineer that the specified requirements have been met.

END OF SECTION

SECTION 02315 - APPLICATION OF WATER

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the application of water as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification No. 2130 shall apply to the application of water, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall secure his own source of water. The Contractor may contact the City to determine whether water is available from the City and the associated cost.
- B. The Contractor shall apply water as may be required to obtain proper compaction for all dust control, street construction, and embankment construction.

******END OF SECTION******

SECTION 02320 - TRENCH EXCAVATION, BEDDING AND BACKFILL

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to maintenance of utility service, trench excavation, bedding and backfill necessary for the construction of underground utilities and structures, as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Reference CEAM Specification No. 2600 shall apply to excavating, installing bedding, and backfilling all trench excavation construction necessary for the completion of work, except as modified herein.
 - 1. All references to Mn/DOT specifications shall mean the specific edition, including Supplemental Specifications and Technical Memoranda as identified in Section 01420 of these Specifications.
 - 2. CEAM Specification 2600.3.A1 Maintenance of Traffic is hereby deleted, See Section 01555 of these Specifications..
 - 3. CEAM Specification 2600.3.A2 Establishing Line and Grade is modified by Section 01720 of these Specifications.
 - 4. CEAM Specification 2600.3.A3 Protection of Surface Structures:
 - (a) Street signs shall be considered as items of essential service.
 - (b) The last sentence in the third paragraph is deleted.
 - 5. CEAM Specification 2600.3.A5 Removal of Surface Improvements - All rubble and debris to be disposed of off-site, shall be disposed of at a location secured by the Contractor and in a manner in compliance with applicable Local, State and Federal regulations.
 - 6. CEAM Specification 2600.3.B3 Excavation Limits and Requirements - OSHA limitations shall also apply to the top of trench width determination. The seven day written notice is waived if changing soil conditions and OSHA compliance apply.
 - 7. CEAM 2600.3.C1 Jacking/Boring - The Contractor is responsible for protecting all existing utilities above the elevation of the pipe invert minus 2 times the wall thickness of the casing pipe being installed. In addition, bentonite materials shall not be permitted to flow back into the excavation during the non-open cut construction.
 - 8. CEAM 2600.3.F1 Turf Restoration is hereby deleted, See Section 02920 of these Specifications.
 - 9. CEAM 2600.3.F1 Pavement Restoration is hereby deleted, See applicable sections of these Specifications.
 - 10. CEAM 2600.4 Method of Measurement Paragraphs B and C are hereby deleted. See applicable sections of these Specifications.
- B. Reference Mn/DOT Specification No. 2451 shall apply to granular materials for foundation, bedding and encasement of utility line construction, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.3 SUBMITTALS

- A. No exception to the referenced specification is made.

PART 2 -- PRODUCTS

2.1 GRANULAR MATERIALS

- A. Aggregate Bedding - Granular foundation material (rock) shall meet Mn/DOT specification 2451 for aggregate bedding as modified below. This material may be required for stabilization of the foundation below the pipe bottom, around the pipe fittings and under fire hydrants. The material shall be crushed rock meeting the following gradation by weight. The use of the material shall be reviewed by the City Engineer prior to the installation of the material.

Sieve Size	Percent Passing
1½"	95 - 100
¾"	20 - 60
# 4	0 - 5

- B. Granular Backfill - Granular backfill material to be used above the pipe zone up to the top of subgrade if unsuitable native material is encountered shall conform with MN/DOT Specification 3138, Class 3, modified to permit the following gradation limits. The use of the material shall be reviewed by the City Engineer prior to the installation of the material.

Sieve Size	Percent Passing
1½"	100
# 4	35 - 100
# 10	20 - 80
# 40	5 - 40
# 200	0 - 15

- C. Granular Bedding and Encasement - Bedding and encasement materials used in the pipe zone area (6" below the pipe to 12" over the pipe) shall meet the same gradation and specification as granular backfill, above.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Temporary Service

1. It will be necessary to maintain utility service during the construction period. Before proceeding with the project, the Contractor shall establish a work plan and submit the plan to the appropriate utility personnel and the City Engineer for review and comment. The plan shall outline the method to be used to maintain service to the affected consumers and estimate the duration of any anticipated interruptions of service. The Contractor is the sole party responsible to notify the Utility and consumers who may be affected by limitations and/or interruption of utility service.

2. Planned service interruptions shall not exceed six (6) hours in any 72 hour period unless previously approved by the Utility.
3. **The Contractor shall coordinate water main shut-downs with the water utility at least 24 hours prior to the requested shut-down.**
4. If needed, the Contractor shall furnish, install and maintain equipment to bypass and control the storm and/or sanitary sewer flow around the construction zone. Failure to operate and maintain the bypass equipment could result in direct damage claims as well as consequential damage claims to the Contractor.

3.2 EXCAVATION AND PREPARATION OF TRENCH

A. Interference and Protection of Underground Structures

1. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor shall be required to remove and restore, or protect the utility.
2. The inverts of existing sewers (storm & sanitary), culverts, subdrains, etc. shall be protected during construction. The Contractor is responsible to inspect and clean, if necessary, all lines which have become compromised by the construction operations.

B. Excavation Limits and Requirements

1. The trench for all flexible pipe shall be undercut six-inches below the pipe barrel to permit the installation of granular bedding or foundation material.
2. The trench for all rigid pipe shall be undercut three-inches below the pipe barrel to permit the installation of granular bedding or foundation material.
3. The Contractor shall install and operate a dewatering system to maintain all trenches free of water wherever necessary. The Contractor shall make his own subsurface investigations and determine what dewatering methods to utilize to prevent such damage.
4. The Contractor shall be responsible for any damage to adjacent structures or buildings caused by the dewatering operations
5. Use of granular foundation material in lieu of performing dewatering is permitted, at the Contractor's expense unless previously approved by the City Engineer.

C. Preparation and Maintenance of Foundation

1. Flexible Pipe Materials

- (a) In ordinary trench conditions, the pipe shall be bedded in compacted granular bedding which extends from 6" below the bottom of the pipe to the spring line of the pipe. The Contractor shall bed and encase the pipe in ASTM Class II bedding and encasement material to 90% Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser.
- (b) Where the trench foundation has been found to be unstable and not suitable for bedding, the Contractor shall install compacted aggregate foundation material from 6" below the bottom of the pipe to the bottom of the pipe. Bedding material shall then be placed to the spring line of the pipe.

2. Rigid Pipe Materials

- (a) In ordinary trench conditions, the pipe shall be bedded in compacted granular bedding which extends from 3" below the bottom of the pipe to the spring line of the pipe. The Contractor shall bed and encase the pipe in ASTM Class II bedding and encasement material to 90% Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser.

- (b) Where the trench foundation has been found to be unstable and not suitable for bedding, the trench shall be undercut until acceptable conditions are found. The Contractor shall then install compacted foundation material to meet the line and grade specified on the plan.

3.3 INSTALLATION OF PIPE AND FITTINGS

- A. The Contractor shall keep accurate records as to the location of the service connections, field tile, utility crossings, etc. either constructed or encountered during the construction. Measurements to service lines shall be taken from the two nearest permanent structures (i.e., hydrants, valves, manholes, buildings) as directed by the City Engineer. Final payment for the project will not be made until the information is in the possession of the City.
- B. When connection to an existing conduit is required at an existing or proposed manhole, the Contractor shall expose and verify the elevation of the existing conduit prior to laying any pipe toward, or away from, the connection point. If the elevation of the existing conduit does not match the elevation shown on the plans, the Contractor shall notify the City Engineer, at which time the City Engineer may adjust the proposed grades.
- C. Connection and Assembly of Joints
 - 1. For sanitary sewer, watermain, forcemains, and culverts, all joints shall be water tight.
 - 2. For storm sewers and subdrains, all joints shall not permit the intrusion of soil or backfill materials.
 - (a) If reinforced concrete pipe is used, the Contractor may at its own discretion choose to wrap each joint with a geotextile filter fabric, as specified, rather than place mastic in the joint.
- D. Bulkheading Open Pipe Ends
 - 1. The Contractor shall furnish, install and maintain a temporary, water-tight plug adequately blocked in place to prevent flooding of the existing downstream sewer system. The plug shall be placed at the beginning of the project or at the end of each working day at the end of the day's operation.
 - 2. When flows are diverted from an existing sewer or tile to be abandoned in place, the Contractor shall construct a water-tight plug on the open end of the abandoned pipe.
 - 3. Permanent watertight plugs shall be constructed with an approved concrete grout with a thickness of not less than 1 pipe diameter.

3.4 BACKFILLING OPERATIONS

- A. Flexible Pipe Materials
 - 1. Granular material shall be furnished, placed and compacted to bed and encase the pipe to an elevation 12 inches above the pipe bell the full width of the trench. If the depth of cover becomes critical according to manufacturer's recommendations, the Contractor shall bed and encase the pipe in ASTM Class II bedding and encasement material to 90% Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser.
- B. All trench backfill shall be compacted in accordance with the Specified Density Method :
 - 1. Under areas with proposed paved or structural improvements:
 - (a) 100% Standard Proctor from the proposed pavement subgrade elevation down 3 feet.
 - (b) 95% Standard Proctor from the bottom of excavation up to 3 feet below the subgrade elevation
 - 2. Under areas with no proposed paved or structural improvements:
 - (a) 95% Standard Proctor

3.5 SOURCE QUALITY CONTROL

A. The City may arrange for having the following testing performed:

- (a) One (1) gradation test per each 500 tons or 275 cubic yards (CV) of granular material.

3.6 FIELD QUALITY CONTROL

A. The City may arrange for having the following testing performed:

- 1. One (1) compaction test (including Standard Proctor) on subgrade per each 300 lineal feet of trench per 3 feet of depth
- B. The Contractor shall cooperate fully with the individuals performing the tests.
- C. Samples for testing shall be taken from material in place, in the trench at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.
- D. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the City Engineer that the requirements have been met.

****END OF SECTION****

SECTION 02330 - EXCAVATION AND EMBANKMENT - ROADWAY & PAVEMENT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to the excavation and embankment for roadways and pavements as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2105 shall apply to excavation and embankment, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Stabilizing aggregates for use in backfilling subgrade excavations shall be material generally produced and referred to as "1 1/2-inch dust free aggregate" or other coarse aggregate found to be in general compliance by the City Engineer. Aggregate base, Class 5 may also be used at the direction of the City Engineer.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.
- B. Subgrade excavation shall be performed, as directed by the City Engineer, for the removal of any unstable soils which may be encountered. Such excavation shall be backfilled with suitable excess common excavation material or stabilizing aggregate as directed by the City Engineer. If the Contractor proceeds without approval from the City Engineer or City, all work and material to restore the roadbed to the proper grade shall be at the Contractor's expense.
- C. Once the subgrade has been test rolled and accepted by the City Engineer, no traffic or construction equipment shall be permitted to operate directly on the subgrade without the prior approval of the City Engineer. All equipment shall be restricted to operating only in areas where the aggregate base has been installed to its full design depth.
- D. Material suitable for curb backfill shall be segregated and stockpiled at a site selected by the Contractor. Following curb construction, the material shall be placed behind the curb to the subgrade level of the topsoil.
- E. The Contractor shall salvage and stockpile all topsoil removed during the course of the construction. This topsoil shall be used where required for turf establishment as directed by the City Engineer.

- F. Sufficient excavated material shall be utilized by the Contractor to replace loss volume due to soil shrinkage from trench excavation which may occur through the course of construction. The Contractor shall make his own determination of the amount of shrinkage that will occur.
- G. All embankment shall be compacted using the Specified Density Method :
 - 1. Under areas with proposed paved or structural improvements:
 - (a) 100% Standard Proctor from the proposed pavement subgrade elevation down 3 feet.
 - (b) 95% Standard Proctor from the bottom of excavation up to 3 feet below the subgrade elevation
 - 2. Under areas with no proposed paved or structural improvements:
 - (a) 95% Standard Proctor

3.2 SOURCE QUALITY CONTROL

- A. The Contractor shall arrange for having the following testing performed:
 - 1. One (1) gradation test per each 500 tons or 275 cubic yards (CV) of select granular borrow.
 - 2. One (1) gradation test for stabilizing aggregate.
- B. Samples for testing shall be taken from material in stock at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.

3.3 FIELD QUALITY CONTROL

- A. "Blue top" stakes shall be provided by the Contractor at 100 foot intervals to confirm that the subgrade is constructed to the required grades and elevations. Methods other than "blue top" staking may be allowed, if approved by the City Engineer.
- B. The Contractor shall arrange for and pay all costs associated with having the following testing performed:
 - 1. One (1) compaction test (including Standard Proctor) on subgrade per each 500 SY of roadway per each 3 feet of subgrade excavation depth.
- C. All testing shall be performed by an independent testing laboratory approved by the City Engineer.
- D. The Contractor shall cooperate fully with the individuals performing the tests.
- E. Samples for testing shall be taken from material in place, in the roadway at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.
- F. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the City Engineer that the requirements have been met.

****END OF SECTION****

SECTION 02335 - SUBGRADE PREPARATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to the subgrade preparation as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2112 shall apply to the subgrade preparation, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 NO EXCEPTION TO THE REFERENCED SPECIFICATION IS MADE.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.
- B. The Contractor shall disc, scarify, shape and compact the upper six inches of the street subgrade or existing base, adding water or drying as may be necessary to give uniform and desired density.
- C. If the subgrade is unstable and the instability is due to excessive moisture, the subgrade shall be scarified and dried over a reasonable time period. When the material has reached acceptable moisture limits, the material shall be returned to the roadbed and compacted into place to the proper elevation. The roadbed will once again be test rolled. If the material continues to be unstable, the City Engineer may authorize the removal of the undesirable material as subgrade excavation.
- D. Once the subgrade has been test rolled and accepted by the City Engineer, no traffic or construction equipment shall be permitted to operate directly on the subgrade without the prior approval of the City Engineer. All equipment shall be restricted to operating only in areas where the aggregate base has been installed to its full design depth.
- E. The subgrade shall be compacted in accordance with the Specified Density Method :
 - 1. Under areas with proposed paved or structural improvements:
 - (a) 100% Standard Proctor from the proposed pavement subgrade elevation down 3 feet.
 - (b) 95% Standard Proctor from the bottom of excavation up to 3 feet below the subgrade elevation
 - 2. Under areas with no proposed paved or structural improvements:
 - (a) 95% Standard Proctor

3.2 FIELD QUALITY CONTROL

- A. "Blue top" stakes shall be provided by the Contractor at 100 foot intervals to confirm that the subgrade is constructed to the required grades and elevations. Methods other than "blue top" staking may be allowed, if approved by the City Engineer.
- B. The compacted subgrade shall be test rolled using a fully loaded aggregate truck (tandem) in a pattern approved by the City Engineer. The subgrade stability shall be considered adequate when the surface shows less than one (1) inch of yielding or rutting after one pass, or as otherwise approved by the City Engineer.
- C. The Contractor shall arrange for and pay all costs associated with having the following testing performed:
 - 1. One (1) compaction test (including Standard Proctor) on subgrade per 500 SY of roadway.
- D. All testing shall be performed by an independent testing laboratory approved by the City Engineer.
- E. The Contractor shall cooperate fully with the individuals performing the tests.
- F. Samples for testing shall be taken from material in place, in the roadway at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.
- G. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the City Engineer that the requirements have been met.

****END OF SECTION****

SECTION 02340 - GEOTEXTILE FABRIC - ROAD CONSTRUCTION

PART 1 -- GENERAL

1.1 SUMMARY

1. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to geotextile fabric - road construction as indicated on the drawings or as specified herein. This material will only be used if unstable areas are encountered, as determined by the City Engineer.

1.2 SPECIFICATION REFERENCES

- A. Reference Mn/DOT Specification No. 3733 shall apply to the geotextile fabric - road construction, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. The fabric to meet the requirements of Mn/DOT 3733, Type V, unless otherwise shown on the plans.

2.2 SOURCE QUALITY CONTROL

- A. The Contractor shall furnish certified copies of manufacturer's test results on geotextile samples indicating conformance to the required specifications. The test results shall be furnished to the City Engineer at least ten (10) days prior to the intended installation date.
- B. The City Engineer may make random checks to assure compliance with the specifications.
- C. Non-conforming products will be subject to rejection.
- D. Approved materials will be accepted on the basis of brand name labeled on the geotextile itself or its container.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Prior to installing geotextile fabric, the prepared subgrade surface shall be relatively smooth and free of stones, sticks or other debris or irregularities that could puncture the geotextile.
- B. If multiple pieces of geotextile are required, adjacent strips shall be field or factory sewn with "J" stitching. In lieu of sewing, an 18" strip overlap is permitted, provided there is no potential for the geotextile strips to separate.
- C. Wrinkles and folds in the geotextile shall be removed by stretching and staking, as required.
- D. The geotextile shall be secured to prevent displacement during subsequent operations.
- E. No traffic or construction equipment will be permitted to operate directly on the geotextile.

- F. Once the geotextile is placed and prior to the placing of aggregate cover, the Contractor shall allow the City Engineer sufficient time to conduct a personal observation of the geotextile to determine that no holes, rips, tears or similar defects have occurred and that sewing/overlap have been properly installed. All defects determined during the observation shall be patched or replaced prior to placing aggregate cover.
- G. The aggregate cover shall be end dumped onto the geotextile. The initial deposit of material may be graded to the design thickness but at no time shall equipment be allowed on the geotextile with less than eight (8) inches of aggregate cover. Following compaction of the initial layer, all remaining material shall be placed as specified.
- H. Construction shall be conducted parallel to road alignment. Vehicular turning shall not be allowed on the first lift of cover material, unless approved by the City Engineer. All ruts that form during the construction shall be immediately filled to maintain the minimum aggregate cover.
- I. Unless otherwise shown on the plans, the geotextile fabric shall be placed to the back of the curb or to the inside edge of the edge drain filter trench, whichever is closest to the centerline of the roadway.

****END OF SECTION****

SECTION 02370 - TEMPORARY EROSION & SEDIMENT CONTROL

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to temporary erosion control as indicated on the plans or as specified herein or as directed by the City Engineer.
- B. Three distinct elements of temporary erosion control are the responsibility of the Contractor:
 - 1. Erosion Control --The requirement is to prevent the separation of soil particles from the soil surface and is generally met with good construction practices.
 - 2. Rapid Stabilization - This stabilization process is directed at areas of a critical or unique characteristic to prevent the separation of soil particles from the soil surface. This work may be required at any time during the contract on small areas that may or may not be accessible with normal equipment.
 - 3. Sediment Control -- The installation and maintenance of barrier control devices across drainage ways to prevent fugitive soil particles from leaving the site.
- C. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the associated erosion control and excavation items. Such items of work include but are not limited to:
 - 1. Complying with the MPCA "General Storm Water Permit", where applicable.
 - 2. Maintaining clean exit areas or roads from the site.
 - 3. Sweeping adjacent streets clean of excess soil.
 - 4. Cleaning storm sewers, drain tiles and culverts that have been partially or completely obstructed by sediment that originated from the site.
 - 5. Geotextile fabric for rock installation.
 - 6. Geotextile fabric to wrap prefabricated inlet protection devices.
 - 7. Aggregate to anchor and act as a filter for prefabricated inlet protection devices.
 - 8. Aggregate associated with the construction of temporary sediment traps.
 - 9. Emergency erosion control mobilization.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2573 shall apply to temporary erosion control.
- B. Mn/DOT Specification Section 3889 shall apply to ditch checks.
- C. Mn/DOT Technical Memorandum No. 02-15-ENV-04 shall apply. In the event of a difference between Specification 2573 and the Technical Memorandum, the Technical Memorandum shall apply.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Erosion Control

1. No exception to the referenced specification.

B. Rapid Stabilization

1. **Method 1** – Type 1 mulch @ 2 tons/acre and disc anchoring.
2. **Method 2** – Applying type 1 mulch and tacking it with type 1 hydraulic soil stabilizer @ 200 pounds/acre.
3. **Method 3** – Seed mixture 190RS @ 20 pounds/1,000 gallons.
 - (a) Fertilizer 10-10♦-20 @ 100 pounds/1,000 gallons.
 - (b) Type 6 Hydraulic Soil Stabilizer 625 pounds/1,000 gallons.
 - (c) Water ratio 1,000 gallons.
4. **Method 4** – Erosion Control Blanket, Category III.
 - (a) Seed Mixture 190RS @ 2 pounds/100 square yards.
 - (b) Fertilizer 10-10♦-20 @ 8 pounds/100 square yards.
5. **Method 5** – Rip Rap Class 1
 - (a) Geotextile Type III.

C. Sediment Control Devices

1. "Bale Check" as specified in the referenced specification.
2. "Silt Fence":
 - (a) Heavy Duty, as specified in the referenced specification.
 - (b) Preassembled, as specified in the referenced specification.
 - (c) Machine sliced, as specified in the referenced specification.
3. InfraSafe prefabricated sediment control barrier as manufactured by Royal Environmental Systems, or approved equal. Unless otherwise shown on the plans, barrier devices shall be wrapped with geotextile fabric or surrounded with aggregate to filter the water during periods of limited flow.
4. Ditch Checks
 - (a) Type 3 – Bioroll Blanket System
 - (b) Type 7 – Rock Check

PART 3 -- EXECUTION

3.1 GENERAL

- A. Prior to construction, the City, City Engineer and Contractor shall observe the existing storm water outfall system and discharge area and shall document the existing conditions. Upon completion of

♦ Phosphorous content at the time of stabilization shall be as noted, unless the local jurisdiction or the State restrict the use of phosphorous to some lesser percentage. In that event, the local jurisdiction percentage shall apply. If no local standard exists, the State restriction shall apply, once it becomes effective (January 1, 2004).

surface restoration (i.e., paving and turf establishment), the storm water outfall system and discharge area shall be observed and all increased sediment deposits shall be removed and disposed of by the Contractor. All increases in sediment deposits shall be considered to have originated from the project site.

- B. Prior to construction, the City, City Engineer and Contractor shall review the project to identify critical areas that could require rapid stabilization during the construction process, and develop a plan to either mitigate disturbance to those areas or identify the methods of rapid stabilization most appropriate.
- C. Exit areas or roads shall be kept clean of excess soil by routine sweeping.
- D. The Contractor shall salvage, transport and place cohesive materials excavated from the work for use in constructing the berm for temporary sediment traps.

3.2 CONSTRUCTION REQUIREMENTS

- A. A goal of the project during construction is to get the cleanest water possible into the storm drainage systems as quickly as possible and protect critical and unique areas. Every effort shall be required by the Contractor to achieve these goals.
- B. The Contractor shall control drainage and erosion on the project including: haul roads, temporary construction, waste disposal sites, plant and storage locations, and borrow pits, other than commercially operated sources. The contractor shall clean up the area, shape the area to allow storm runoff with a minimum of erosion and/or siltation, replace topsoil, and establish vegetative cover to the satisfaction of the City Engineer on areas where the potential for pollution has been increased due to the Contractor's operations.
- C. If Contractor fails to install and/or perform the appropriate erosion, rapid stabilization and sediment control practices, as determined by the City Engineer, the City Engineer may issue a written order to the Contractor. The Contractor shall respond within 24 hours with sufficient personnel, equipment and/or materials and conduct the **required work**.
- D. When the City Engineer determines that the erosion, rapid stabilization and/or sediment control practices installed by the Contractor have failed, the Contractor shall correct the cause and alleviate all sediment deposition, to the fullest extent possible. If the corrective action is not taken in a timely manner, the City Engineer may issue a written order to the Contractor. The Contractor shall respond within 24 hours with sufficient personnel, equipment and/or materials and conduct the **required work**.
- E. Unless the project has received approval or certification for depositing fill into surface waters, the Contractor shall remove all deltas and sediment deposited in drainage ways or catch basins and re-stabilize the areas where sediment removal results in exposed soil. The removal and stabilization shall take place within 7 calendar days of discovery unless precluded by legal, regulatory, or physical access restraints. If precluded, removal and stabilization must take place within 7 calendar days of obtaining access. The Contractor is responsible for contacting all local, regional, State, and Federal authorities before working in surface waters and obtaining applicable permits.
- F. Where applicable, the Contractor will be required to co-sign for a "General Storm Water Permit" for construction activity with the Minnesota Pollution Control Agency (MPCA). The application form and information is included an appendix of these specifications. The City will initiate the Permit process and pay the required "Application Fee." The Contractor will be required to comply with all of the terms and conditions of the Permit which also includes performing the required inspections of the erosion control devices and maintaining an Inspector's Log for the MPCA Storm Water Permit. A copy of the proposed log form is available from the City Engineer.

3.3 EROSION CONTROL

- A. Unless precluded by snow cover, all exposed soil areas, including topsoil stockpiles, shall have temporary erosion control or permanent cover for the exposed soil areas within the following time frames (For the purpose of this provision, exposed soil areas do not include surcharge areas or stockpiles of sand, gravel, aggregate, concrete, or bituminous.):

Type of Slope	Temporary Protection or Permanent Cover Where the Area Has Not Been, or Will Not Be, Worked by the Contractor for:
Steeper than 1 Vertical to 3 Horizontal	7 Days
Between 1:3 and 1:10	14 Days
Flatter than 1:10	21 Days

3.4 RAPID STABILIZATION

- A. Unless precluded by snow cover, all exposed soil areas, including topsoil stockpiles, with a continuous positive slope within 100 feet of surface waters, or from a curb, gutter, storm sewer inlet, temporary or permanent drainage ditch, or other storm water conveyance system, shall have rapid stabilization or permanent cover for the exposed soil areas within the following time frames (For the purpose of this provision, exposed soil areas do not include surcharge areas or stockpiles of sand, gravel, aggregate, concrete, or bituminous.):

Type of Slope	Temporary Protection or Permanent Cover Where the Area Has Not Been, or Will Not Be, Worked by the Contractor for:
Steeper than 1 Vertical to 3 Horizontal	7 Days
Between 1:3 and 1:10	14 Days
Flatter than 1:10	21 Days

- B. The City Engineer may order the work at any time during the contract and will be for small critical areas, which may or may not be accessible with normal equipment. These methods should be used for areas within 100 feet of Waters of the State and to stabilize the critical areas within the timeframe designated in the NPDES permit.
- C. Minimum Areas / Quantities for application (approximate)
1. **Method 1** - 1-2 acres.
 2. **Method 2** - 1-2 acres.
 3. **Method 3** - 4,000 gallons.
 4. **Method 4** - 200-400 square yards.
 5. **Method 5** - 10-20 tons.
- D. Placement
1. Shaping of the area prior to placement of any of the materials shall be as directed by the City Engineer.
 2. Method 1, Apply type 1 mulch and anchor with disc anchoring - Prior to placement the soil surface shall be in a loose condition so that the **mulch** can be anchored. The mulch shall be placed in the areas directed by the City Engineer and to obtain approximately 90% ground coverage. Wherever

possible the mulch shall be placed by blower equipment and in inaccessible areas may have to be placed by hand. Immediately after placement, the mulch shall be anchored with a disc-anchoring tool per specification 2575.3H.

3. **Method 2, Apply type 1 mulch and tack it with type 1 hydraulic soil stabilizer.** - The same placement procedure applies, as in Method 1 except the mulch shall be sprayed with type 1 hydraulic soil stabilizer at a rate of 220 g/ha (200 pounds/per acre) per specification 2575.3H. No disc anchoring.
4. **Method 3, Hydro spread of seed, fertilizer and hydraulic soil stabilizer.** - Rate of slurry application shall be variable depending on surface roughness, slope configuration and degree of undulation. Amount of material applied shall be such to obtain 100% soil surface coverage. To obtain the coverage, two (2) passes may be necessary. In inaccessible areas, the mix may be pumped through a hose.
5. **Method 4, Hand install seed, fertilizer and erosion control blanket.** - The fertilizer seed and erosion control blanket shall be placed as described in 2575.3 The upgrade end of each blanket strip shall be buried at least 150mm (6 inches) in a vertical check slot. Staples shall be placed at seams, and throughout the blanket at a maximum spacing of 2 feet.
6. **Method 5, Place geotextile and rock in various configurations.** - Rock and geotextile shall be placed in the areas and to the configurations directed by the City Engineer.

3.5 SEDIMENT CONTROL DEVICES

- A. The Contractor shall install Sediment Control Devices where control is required and/or where directed by the City Engineer. The control measures as shown on the plans shall be considered the minimum requirements with additional measures required dependent on construction sequencing and scheduling.
- B. Inlet Protection shall be used around catch basins and/or other surface water accesses to any existing or proposed storm water conveyance system.
- C. The Contractor shall take all steps necessary to prevent excess soil erosion of the project. Temporary erosion control devices shall be constructed, maintained and left in place to such time as permanent erosion control measures are in place or instructed to remove them by the City Engineer.
- D. The Contractor shall construct temporary sediment traps with granular outlets within the disturbed road way area and shall stockpile a sufficient quantity of suitable fill material to regrade sedimentation ponds and temporary ditches to match the subgrade elevation.

****END OF SECTION****

SECTION 02375 - GEOFIBER EROSION CONTROL MATS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the installation of geofiber erosion control mats as shown on the drawings, as specified herein, and/or as specified by the City Engineer.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 3888 shall apply, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Geofiber erosion mats shall be manufactured of synthetic fibers for the stabilization of erosion-prone slope surfaces. All geofiber mats shall be filamentous, nylon material with not less than 0.5 percent by weight of carbon black and minimum filament diameter of 0.40 mm. Mat weight shall be approximately 0.75 pounds per square yard with a minimum mat thickness of 0.70 inches. Tensile strengths in the mat roll length and width directions shall be a minimum of 140 and 80 kilograms per meter, respectively.
- B. The mat material shall be ENKAMAT, type 7020 as manufactured by American Enka Company, or approved equal conforming to the specified characteristics.
- C. Staples for anchoring the erosion mats shall be No. 11 gage, or heavier, wire, "U"-shaped with a length of not less than 18 inches from the top of the curve to the end of the staple and a head width of 2 inches.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Where shown on the Plans, the Contractor shall furnish and install a geofiber erosion control matting as shown in the detail on the Plans.
- B. The Contractor shall fill and grade the designated surface to the line and grade shown on the Plans to form a shallow swale in the detention pond bank.
- C. The geofiber mats shall be installed along the graded area where shown on the Plans and marked in the field. Starting at the upper end, roll out the center mat along the center of the swale. Repeat with side strips overlapping the center strip or subsequent inside strips by 3-inches. Place staples along the overlap at 3 to 5 foot intervals. Staked, shingle style joints with a 6-inch minimum overlap shall be used where roll length make transverse joints unavoidable.
- D. All outside edges including upstream and downstream end of the mats shall be stapled and anchored to a depth of 12-inches and extended outward another 12-inches at the 12-inch bury depth to prevent undercutting of mats. Contractor shall conform to manufacturer's recommendations regarding use of check slots.

****END OF SECTION****

SECTION 02377 - RIPRAP

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to construct the rip-rap and geotextile fabric as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 251 I shall apply to the construction of rock rip-rap, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. The material to be used shall be the class rip-rap and fine filter aggregate shown on the plans as specified in Mn/DOT Specification 3601.
- B. The geotextile fabric shall meet the requirements of Mn/DOT 3733, Type IV, unless otherwise shown on the plans.
- C. The Contractor may choose the type of filter material, except as restricted for geotextile filters, unless the type is specified on the plans.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. No exception to the referenced specification is made.

******END OF SECTION******

SECTION 02445 - JACK & AUGER STEEL CASING

PART 1 -- GENERAL

1.1 SUMMARY

1. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of a steel casing as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. See Mn/DOT Specification 2105 for Quality Compaction Methods
- B. Mn/DOT Policy Statement, Reference : Highways 90-1, dated July 27, 1990.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. RAILROAD CROSSINGS

1. The casing shall be new welded or seamless steel pipe conforming to the Standards of ASTM A53, Grade B with a yield strength of 36,000 psi. The wall thickness for the pipe to be bid shall be:

Nominal Pipe Diameter	Minimum Wall Thickness	Nominal Pipe Diameter	Minimum Wall Thickness
Inches	Inches	mm	mm
Under 14	0.250	Under 355	6.3
14 and 16	0.282	355 and 406	7
18	0.312	457	8
20	0.344	508	8.8
22	0.375	558	10
24	0.406	609	10
26	0.438	660	11
28 and 30	0.469	711 and 762	12
32	0.500	813	13
34 and 36	0.531	863 and 914	13.5

B. STREET AND HIGHWAY CROSSINGS

1. casing pipe shall be welded steel pipe, new material, with a minimum yield strength of 35,000 PSIG (pounds per square inch gauge). The following minimum wall thickness shall be used:

Outside Casing Diameter	Minimum Wall Thickness
12" to 24"	0.250"
30"	0.375"
36" to 42"	0.500"

PART 3 – EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall bore and auger a steel casing using equipment that encases the hole as the earth is removed. Boring without the concurrent installation of the casing pipe will not be permitted. All joints in the casing pipe shall be welded throughout the full circumference of the casing.
- B. Casing pipe shall be installed in such a manner that will not disrupt traffic.
- C. The introduction of water into the excavation is prohibited.
- D. The Contractor shall install the carrier through the casing pipe using supports or cradles constructed of permanent materials to support the entire length of the carrier pipe in the casing. Support material shall be installed both under and over the carrier pipe to prevent shifting of the pipe. The line and grade at any point within the carrier pipe shall not vary by more than 0.05 foot from the line and grade designated. Following installation of the carrier pipe in the casing, the casing pipe shall be blown full of sand and the annular space at the ends of the casing pipe shall be filled with appropriate concrete grout to form a watertight seal.

*****END OF SECTION*****

SECTION 02446 - TRENCHLESS PIPELINE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to trenchless pipeline construction. Various methods will be considered, providing they can generally follow the design profile in constructing the pipeline from the starting access point to the ending access point without the need to excavate an intermediate access.
 - 1. The INSTALLER for all forms of trenchless pipeline installation shall meet or exceed the experience requirements as stated in CEAM 2600.3.C2.

1.2 SPECIFICATION REFERENCES

- A. This specification references ASTM D1248 and D3350, and PPI PE 3408, and for potable water systems AWWA C906 which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this specification and the above referenced sections, this specification will govern.
- B. Reference CEAM Specification No. 2600.3 Non-Open Cut Pipe Installation shall apply to the water main and service line construction, except as modified herein or as shown on the plans.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.3 SUBMITTALS

- A. Items shall be submitted to the City Engineer
 - 1. The diameter, wall thickness and type of material to be used. Pipe strength determination shall include calculations based on new material properties and long term properties.
 - 2. The manufacturer's certificates of compliance with provisions of the referenced standards and these specifications.
 - 3. A copy of the license or certificate verifying the trenchless construction equipment manufacturer's or licensor's approval of the INSTALLER.
 - 4. Evidence of the INSTALLER's experience including a list of similar projects completed, within the previous 2 years.
 - 5. In lieu of the requirement of previous experience by the INSTALLER with the technique and equipment associated with trenchless pipeline construction, the manufacturer of the trenchless construction equipment may provide an experienced representative on site during the set-up, fusing, trenchless construction, back reaming, and insertion phases of the entire project.
 - (a) If the Bidder anticipates exercising this option, a statement from the manufacturer of the trenchless construction equipment agreeing to this requirement shall be included with the bid.
- B. Video Tapes
 - 1. All video tapes and construction logs, or copies thereof, shall become the property of the City.
 - 2. Two copies of all video tapes shall be submitted: One to the City and one to the City Engineer.

C. Construction Profile

1. The Contractor shall monitor and plot the constructed pipeline profile to scale throughout the length of the trenchless construction.
 - (a) The horizontal profile shall be on a consistent scale where 1 inch measures no more than 100 feet.
 - (b) The Contractor shall note on the profile any deviations (horizontal or vertical) from the planned alignment which encroach on the separation space as required by CEAM 2600.3.A2.
 - (c) The Contractor shall note on the profile any horizontal deviations in excess of 4 feet from the planned alignment.
 - (d) The vertical profile shall be on a consistent scale where 1 inch measures no more than 10 feet.
2. Duplicate copies of the profile shall be submitted.

PART 2 -- PRODUCTS

2.1 PIPE MATERIAL & STRUCTURAL REQUIREMENTS

- A. All pipe shall be made from virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
- B. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, and/or other deleterious faults.
- C. The internal material color shall be light and reflective to facilitate better viewing with televising equipment.
- D. Any section of pipe with a gash, blister, abrasion, nick scar, or other deleterious fault greater than 10 percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above, may be cut out and butt-fused in accordance with the procedures herein.
- E. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from site.

F. INTERNAL PIPE DIAMETERS

- (a) The actual inside barrel diameter of the pipe used shall not be less than that of DIP, Class 52 for the corresponding nominal pipe size.

ACTUAL INTERIOR PIPE DIAMETERS FOR VARIOUS PRESSURE PIPE MATERIALS					
Nominal	DIP - CI 52		HDPE 4000	HDPE 4100	PVC
	w/o coating	w/ coating	DR 11 ductile sizes	DR 11 steel sizes	DR 18 ¹ Restrain Joint
4	4.220	4.095	3.909	3.633	4.266
6	6.280	6.155	5.620	5.349	6.134
8	8.390	8.265	7.375	6.963	8.044
10	10.400	10.275	9.041	8.679	9.866
12	12.460	12.335	10.750	10.293	11.734

¹

CertainTeed, Certa-Lok Restrained Joint Catalog, 1993, page 4.

ACTUAL INTERIOR PIPE DIAMETERS FOR VARIOUS PRESSURE PIPE MATERIALS					
Nominal	DIP - CI 52		HDPE 4000	HDPE 4100	PVC
	w/o coating	w/ coating	DR 11 ductile sizes	DR 11 steel sizes	DR 18 ¹ Restrain Joint
14	14.520	14.332		11.301	12.444
16	16.600	16.412	14.170	12.915	14.222
18	18.680	18.492	15.925	14.532	
20	20.780	20.592	17.590	16.146	
22				17.760	
24	24.920	24.732	21.014	19.374	

G. WASTE WATER APPLICATIONS - FORCEMAINS & GRAVITY SEWERS

1. Restrained Joint DIP Pipe and Fittings

- (a) Flex-Ring Joint Pipe (DIP), as manufactured by American Ductile Iron Pipe or equal. The pipe shall be pressure pipe with a 350 psi working pressure for diameters up to and including 12 inch, and 250 psi for diameters 14 inch to and including 20 inch. Structurally stronger pipe may be needed to ensure resistance to damaging stresses relative to the trenchless construction technique.
- (b) Joints shall be Flex-Ring Restrained Joint couplings as manufactured by American Ductile Iron Pipe or equal.

2. High Density Polyethylene (HDPE) Pipe and Fittings

- (a) The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE3408) conforming with the minimum structural standards of ASTM D3350 with cell classification 345434C as manufactured by Driscopipe 4000/4100 Series, or equal. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34 material.
- (b) The grade used shall be resistant to aggressive soils or corrosive substances present.. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast iron pipe equivalent outside diameters.
- (c) The dimension ratio (DR) shall be 11.
- (d) HDPE pipe shall have butt-fused joints.
- (e) In gravity sewers with grades less than 0.80%, the lower 1/3 of the fusing bead shall be removed.
- (f) The Contractor shall verify the lengths of conduit necessary in the field before fabrication.
- (g) Polyethylene fittings and adaptors shall be butt-fused, EHMW-HDPE, PE3408 meeting the same resin requirements as specified for the pipeline. In addition, the fittings shall meet the applicable requirements of ASTM D2513 and ASTM D3261.
- (h) Mechanical joint forcemain joints shall be restrained using ductile iron clamps (series Ebaa Iron, Inc. or equal) supplied with a sufficient number of ductile iron bolts to restrain the working and test pressures for this application.

3. Restrained Joint PVC Pipe and Fittings

- (a) Restrained Joint Polyvinyl Chloride (PVC) pressure pipe with a 150 psi working pressure. The working pressure dictates a maximum standard dimension ratio (DR) of 18, however, structurally stronger pipe may be needed to ensure resistance to damaging stresses relative to the trenchless construction technique. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D-543.
- (b) Restrained joints shall be Certa-Lok C900/RJ Restrained Joint PVC couplings as manufactured by CertainTeed, or equal.

H. POTABLE WATER APPLICATIONS

1. Restrained Joint DIP Pipe and Fittings

- (a) Flex-Ring Joint Pipe (DIP), as manufactured by American Ductile Iron Pipe or equal. The pipe shall be pressure pipe with a 350 psi working pressure for diameters up to and including 12 inch, and 250 psi for diameters 14 inch to and including 20 inch. Structurally stronger pipe may be needed to ensure resistance to damaging stresses relative to the trenchless construction technique.
- (b) Joints shall be Flex-Ring Restrained Joint couplings as manufactured by American Ductile Iron Pipe or equal.

2. High Density Polyethylene (HDPE) Pipe and Fittings

- (a) The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE3408) conforming with the minimum structural standards of ASTM D3350 with cell classification 345434C as manufactured by Driscopipe 4000/4100 Series, or equal. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34.
- (b) The pipe to be used shall be (HDPE) pressure pipe conforming to the requirement of AWWA C-906 of a 160 psi working pressure. The grade used shall be resistant to aggressive soils or corrosive substances present. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast iron pipe equivalent outside diameters.
- (c) The dimension ratio (DR) shall be 11.
- (d) HDPE pipe shall have butt-fused joints.
- (e) The Contractor shall verify the lengths of conduit necessary in the field before fabrication.
- (f) Polyethylene fittings and adaptors shall be butt-fused, EHMW-HDPE, PE3408 meeting the same resin requirements as specified for the pipeline. In addition, the fittings shall meet the applicable requirements of ASTM D2513 and ASTM D3261.
- (g) Mechanical joint forcemain joints shall be restrained using ductile iron clamps (series Ebaa Iron, Inc. or equal) supplied with a sufficient number of ductile iron bolts to restrain the working and test pressures for this application.

3. Restrained Joint PVC Pipe and Fittings

- (a) Restrained Joint Polyvinyl Chloride (PVC) pressure pipe conforming to the requirements of AWWA C-900 and a 150 psi working pressure. The working pressure dictates a maximum standard dimension ratio (SDR) of 18, however, structurally stronger pipe may be needed to

ensure resistance to damaging stresses relative to the trenchless construction technique. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D-543.

- (b) Restrained joints shall be Certa-Lok C900/RJ Restrained Joint PVC couplings as manufactured by CertainTeed, or equal.

I. ELECTRIC CONDUIT APPLICATIONS

1. The pipe material shall conform to the minimum structural standards of ASTM D3350 with cell classification 345434C and F-714 for wall thickness tolerances.
2. The dimension ratio (DR) shall be 11.
3. The Contractor shall verify the lengths of conduit necessary in the field before fabrication.
4. A PE to PVC adapter shall be furnished and installed at each end of the placed conduit. The PVC end inside diameter shall match the PE inside diameter. The PVC end shall be schedule 40.
5. Each end of the conduit shall be gradually sloped upward to an elevation 3-feet below the existing ground grade. A PVC cap shall be furnished and installed at the end of each electric conduit.

J. STEEL CASING APPLICATIONS

K. RAILROAD CROSSINGS

1. The casing shall be new welded or seamless steel pipe conforming to the Standards of ASTM A53, Grade B with a yield strength of 36,000 psi. The wall thickness for the pipe to be bid shall be:

Nominal Pipe Diameter	Minimum Wall Thickness	Nominal Pipe Diameter	Minimum Wall Thickness
Inches	Inches	mm	mm
Under 14	0.250	Under 355	6.3
14 and 16	0.282	355 and 406	7
18	0.312	457	8
20	0.344	508	8.8
22	0.375	558	10
24	0.406	609	10
26	0.438	660	11
28 and 30	0.469	711 and 762	12
32	0.500	813	13
34 and 36	0.531	863 and 914	13.5

L. STREET AND HIGHWAY CROSSINGS

1. Casing pipe shall be welded steel pipe, new material, with a minimum yield strength of 35,000 PSIG (pounds per square inch gauge). The following minimum wall thickness shall be used:

Outside Casing Diameter	Minimum Wall Thickness
12" to 24"	0.250"
30"	0.375"
36" to 42"	0.500"

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS:

A. FUSING/FABRICATION

1. Polyethylene Pipe

- (a) The pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint prior to insertion. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations and specifications.
- (b) Threaded or solvent welded joints or connections are not permitted.
- (c) Fusing shall be performed by personnel certified as fusion technicians by the manufacturer of the polyethylene pipe and/or the fusing equipment.
- (d) The butt-fused joints shall maintain true alignment and shall have uniform roll-back beads from the fusing process. The joint shall be watertight and shall have a tensile strength equal to that of the pipe.
- (e) Adequate cooling time shall be allowed prior to the release of the pressure from the fusing unit.
- (f) All joints shall be subject to acceptance by the City Engineer prior to insertion.
- (g) All defective joints shall be cut out and replaced.

B. BLOCKING AND ANCHORING OF PIPE

1. A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Pre-cast concrete thrust blocks and other restraining devices such as adjustable rods or cables, shall be provided at all bends or wherever the force main changes direction.
2. HDPE pipe shall be anchored and restrained against pipe relaxing at all manhole connections, all connections between new and existing pipes, and all transitions between pipe types. HDPE flanged adapters connecting to anchored flanged fittings are approved as detailed on the plans. Alternative anchoring techniques may be considered, provided that the alternative is submitted in writing to the City Engineer.

C. INSTALLATION OF PIPELINES THROUGH CASINGS

1. The Contractor shall install the carrier pipe through the casing pipe using supports or cradles constructed of permanent materials to support the entire length of the carrier pipe in the casing. Support material shall be uniformly spaced and located on three sides of the carrier pipe to prevent shifting of the pipe as detailed on the Plans. The line and grade at any point within the carrier pipe shall not vary by more than 0.5 foot from the horizontal plan line and 0.2 foot from the vertical grade. Following the installation of the carrier pipe in the casing, the ends of the pipe shall be sealed with an appropriate grout to form a watertight seal.
2. Once the carrier pipe is securely installed inside the casing pipe, the Contractor shall fill the annular space with sand fill.

D. TRENCHLESS METHODOLOGY

1. The remaining specifications in this section pertain to directional drilling techniques as the most common type of trenchless technology. Other trenchless technologies may also be used, provided that the Contractor submits a set of specifications for the proposed alternate technology.

(a) DRILLING

- (1) The Contractor shall initially drill a pilot hole which follows the route of the pipeline to be constructed.
- (2) The Contractor shall monitor the route taken by the drilling unit utilizing the downhole survey calculation methods discussed in API Bulletin D20 entitled *Directional Drilling Survey Calculation Methods and Terminology*. A surface monitoring system may be allowed in lieu of the downhole calculation method. Approval of surface monitoring shall be at the discretion of the City Engineer based on the City Engineer's evaluation of the particular system proposed for use.
- (3) The Contractor shall provide the City Engineer with an "asbuilt" profile of the pilot hole prior to the back reaming and pipe insertion as which time the City Engineer shall review it for tolerance compliance.
- (4) The back reamer shall be designed to create a void in the surrounding soil through which the new pipe may be threaded.
- (5) The size of the reaming tool shall be in accordance with the manufacturer's specifications to achieve the sizing indicated on the plans, or in the Schedule of Unit Prices.
- (6) Upon commencement, pipe insertion shall be continuous and without interruption from one structure to another, except as approved by the City Engineer.

(b) INSERTION

- (1) Drill holes shall only be allowed at locations approved by the City Engineer.
- (2) In so far as possible, the equipment used shall be located in such a way as to minimize the noise impact on surrounding properties.
- (3) The Contractor shall utilize a disconnect swivel which shall be set to limit the stress within the pipe to less than its elastic limit.
- (4) The Contractor shall install all necessary pulleys, rollers, bumpers, alignment control devices and other equipment necessary to protect the pipe from damage during insertion.

Dragging the pipe on the ground is not permitted. All break over bends should be made with a radius long enough to insure that the pipe is not overstressed.

- (5) Lubrication, as recommended by the manufacturer, may be used during installation.
- (6) Buoyancy control may be used during pull back.
- (7) The manufacturer's recommended cooling/relaxation time, but not less than 4 hours, shall pass after insertion is complete and before the connection of services, sealing of the annular space, and/or the backfilling of the insertion pit. A sufficient excess of new pipe, but not less than four inches (4") shall protrude into terminating structures.
- (8) The annular space at each structure shall be sealed with a material recommended by the manufacturer for a minimum of eight inches (8") to form a smooth, uniform, watertight joint.
- (9) Under no circumstance shall the pipe be stressed beyond its elastic limit.

3.2 FIELD QUALITY CONTROL

A. TOLERANCES

1. General

- (a) Terminating connections to existing structures and conduits shall be made with a smooth grade for the adjacent 50 feet and shall permit the appropriate hydraulic operation at the conduit connection.
- (b) Periodically, the City Engineer may require the Contractor to excavate a verification pit to expose the conduit for the City Engineer to determine compliance with the line and grade specified. As long as tolerances are being met, as determined by the City Engineer, the frequency shall not exceed 2 excavations in each 500 feet or be required in obviously inaccessible locations. The Contractor shall then backfill, compact and restore the surface of the excavation.

2. Pressure Systems

- (a) Horizontal alignment of the finished profile shall be within 2 feet of the planned alignment.
- (b) Vertical alignment of the finished profile shall be within 2 feet of the planned vertical alignment but in no event shall the invert elevation be closer to the existing ground surface or the future proposed ground surface, whichever is lower, than the minimum bury depth shown on the plans.
- (c) The final vertical alignment shall not conflict with future proposed gravity conduit grades shown on the plans, if any.
- (d) The final vertical alignment of forcemains shall not have high points which could permit the development of air locks at any location other than those identified on the plans.

3. Gravity Systems

- (a) Horizontal alignment of the finished profile shall be within 2 feet of the planned alignment.
- (b) Vertical alignment of the finished profile shall be within 0.3 feet of the planned vertical alignment but in no event shall the invert elevation prevent the appropriate hydraulic operation with upstream or downstream conduits.

- (c) The final vertical alignment shall not conflict with future proposed gravity conduit grades shown on the plans, if any.
- (d) The final vertical alignment shall not have sags, which could permit sediment to accumulate at any location.
- (e) The final vertical alignment of gravity conduits (storm and sanitary) shall not be shallower than the basement elevations of adjoining properties less adequate vertical distance to allow gravity piping from the basement to reach the installed conduit.

B. POST TELEVISIONING

- 1. After completion of the project, the Contractor shall perform a televised inspection of the line. The video tape shall include a voice description, as appropriate, with stationing of services and intermediate structures, if any.
- 2. The rate of movement of the televising camera shall not exceed 30 feet per minute.
- 3. Televising shall be conducted in a downstream direction, unless otherwise approved by the City Engineer.
- 4. On gravity sewer systems immediately PRIOR to televising, the televising contractor shall discharge sufficient water into each line televised to fill any sags.
- 5. The Contractor shall submit a written report with the video tape to the City.
- 6. Televising shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by close circuit television. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent proper operation and it shall be noted so that these conditions can be corrected. A video tape and suitable log shall be kept for later reference by the City.

C. PRESSURE TESTING

- 1. Trenchless conduit used as carrier pipe:
 - (a) Watermain – Refer to the requirements in Section 02510 – Domestic Water Systems.
 - (b) Forcemain – Refer to the requirements in Section 02335 - Forcemains.
 - (c) Gravity sewer - The Contractor shall to perform a hydrostatic pressure test as specified in CEAM Specification 2611.3G to a pressure of 100 p.s.i.
- 2. Trenchless conduit is used as a host pipe (electrical conduits, casings, etc.):
 - (a) Sewer Casings – No pressure test required.
 - (b) Electrical - The City Engineer may require the Contractor to perform an air pressure test as specified in CEAM Specification 2621.

****END OF SECTION****

SECTION 02510 - DOMESTIC WATER SYSTEM

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to water main and service line construction as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Reference Section 02320 of these Specifications for trench excavation, bedding and backfill, except as modified herein.
- B. Reference CEAM Specification No. 2611 shall apply to the water main and service line construction, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.3 SUBMITTALS

- A. Work plan for temporary service.

PART 2 -- PRODUCTS

2.1 WATER MAIN MATERIAL

- A. The following water pipe materials will be allowed for use on this project:
 - 1. Ductile Iron Pipe, Class 52 with conductive gaskets or conductivity strips shall be used.

2.2 WATER MAIN FITTING MATERIALS

- A. The following pressure pipe fitting materials will be allowed for use on this project:
 - 1. Mechanical Class 350 ductile iron, cement lined fittings shall be used. Adaptors, back-up rings, and oversize sleeves shall be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings shall be long mechanical joint.
 - 2. All fittings, valves, hydrants and retaining rods shall be protected by using sacrificial zinc anode caps such as 175P190 Protecto Caps as manufactured by Ebaa Iron or an approved equal. Contractors shall supply 2 Protecto Caps per mechanical joint gland installed.
 - 3. All fittings, valves, hydrants, etc. shall be secured utilizing COR-BLUE T-BOLTS as manufactured by NSS Industries or approved equal.
- B. All fittings shall have been manufactured in the year of construction or prior calendar year.

2.3 FIRE HYDRANTS

- A. Hydrants shall be Waterous "Pacer" with threads currently in use by the City. They shall be for a cover depth of 7'-6", unless otherwise noted on the plans. The break-off height shall be 16-inches. The Contractor shall install all hydrants so that the center of the nozzle is 24-inches above the finished grade.
- B. All hydrants shall have been manufactured in the year of construction or prior calendar year.

- C. The local fire department shall be contacted before ordering hydrants to obtain the correct nozzle threads and type of operating nut and cap bolts.

2.4 VALVE AND VALVE HOUSING

- A. All water valves shall have been manufactured in the year of construction or prior calendar year.

B. Valve Housing

1. Cast-iron screw type valve boxes shall be installed where indicated on underground valves. The cast-iron valve boxes shall be of either the two piece or three piece style and shall be furnished with a stay-put cover with raised letters indicating "WATER." The shaft shall be 5 1/4" inside diameter.
2. All valve box assemblies shall be furnished with a valve umbrella anchorage assembly. The valve umbrella anchorage assembly shall be manufactured by Adaptor, Inc., Oak Crest, WI, or equivalent.
3. High Density Polyethylene valve housings will not be allowed on this project.

C. Gate Valves

1. All valves up to and including 12" diameter to be furnished and installed on the water main shall be AWWA C-509-80, non-rising stem, iron body, resilient-sealed gate valves, with two-inch square opening nut rated for a 200 psi working pressure. These valves shall be Kennedy Ken-Seal or approved equal. All valves shall open 'left'.

D. Butterfly Valves

1. All valves greater than 12" diameter to be furnished and installed on the water main shall be AWWA C-504, as manufactured by Mueller, Clow, M & H, or an approved equal. All valves shall open 'left'.
2. All butterfly valves shall be manufactured with the rubber seat bonded to the body. Valve discs shall be furnished with 316 stainless steel seating edge.

2.5 WATER SERVICE PIPE AND FITTINGS

A. Fittings

1. Water service pipe and fittings shall conform to the provisions of 2611.2D and the following:
 - (a) Saddles shall be provided for all corporation stops larger than 1 1/2 inches.
 - (b) The water service materials style commonly used by the Utility are:

Item	Main Type	Ford	A. Y. McDonald		Mueller
Corporation Stop:		FB600-3 or FB600-4	4701		Mueller H-15000 Series.
Service Saddle:	DIP	101B, 202B, or equal.	3801		Mueller DB Series, or equal. Single Strap, 250 psi Working Pressure.
	PVC	S90, or equal.			Mueller 13000 Series, or equal. Single Strap, 250 psi Working Pressure.
Curb Stop:		B22-333M or B22-444M	6104		Mueller H-15154, Mach. II Oriseal.

Curb Box:		EM2-80-56, or equal	5614		Mueller H-10300 Series; Minneapolis Tap, 7' to 8'-0" Adjustable.
Stationary Rod					Mueller 84274 (81 inches)
Coupling Fitting:					Mueller H-15000 Series.

2. Curb boxes shall be eight feet long at full extension and shall be adjusted as required to match finished grade. Curb boxes shall be provided with a stationary rod.
3. All copper fittings shall be flared type. Compression type will not be allowed.
4. The listed fittings are to be considered as a basis for quality. The Utility should be contacted before ordering to verify the manufacturers' type and style.

2.6 RESTRAINED JOINT RETAINER GLANDS

- A. No exception to the referenced specification is made.

2.7 POLYETHYLENE ENCASEMENT

- A. No exception to the referenced specification is made.

2.8 TRACER WIRE

- A. The tracer wire shall be equal to 10 gauge bare solid copper wire, type THHN / THHW.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Temporary Service

1. Before proceeding with the project, the Contractor shall establish a work plan and submit the plan to the utility personnel and City Engineer for review and comment. The plan shall outline the method to be used to maintain service to the affected consumers and estimate the duration of any anticipated interruptions of service. The Contractor is the sole party responsible to notify the Utility and consumers who may be affected by limitations and/or interruption of water service. Planned service interruptions shall not exceed six (6) hours in any 72 hour period unless previously approved by the Utility.
2. **The Contractor shall coordinate watermain shut-downs with the water utility at least 24 hours prior to the requested shut-down.**

3.2 INSTALLATION OF PIPE AND FITTINGS

A. Aligning and Fitting of Pipes

1. The Contractor, together with the utility's personnel, shall jointly examine and operate all curb stops and mainline valves prior to final acceptance.

B. Blocking and Anchoring of Pipe

1. A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Pre-cast concrete thrust blocks and other restraining devices such as adjustable rods or cables, shall be

provided at all bends, tees, hydrants and plugged crosses or wherever the water main changes direction or dead ends. Valves shall be tied to the nearest tee.

C. Polystyrene Insulation

1. The Contractor shall install polystyrene insulation in those areas where the water main or services may be susceptible to frost or freezing, or as directed by the City Engineer.

D. Water Service Installation

1. Field flaring shall be performed with current standards of the plumbing industry and manufacturer recommendations.
2. The Contractor shall imprint the concrete face of curb at the locations of the utility service locations in accordance with City standards.
3. The Contractor shall keep accurate records as to the location of the service connections, as specified in the referenced specification. Final payment for the project will not be made until the information is in the possession of the City.
4. No warranty is expressed or implied as to the location, size or material type of existing service lines. The Contractor shall furnish and install all fittings required to make the connections.
5. The Contractor shall install new service pipe, at 7 foot bury depth, from the corporation stop to the property line, or as shown on the plans, or as directed by the City Engineer.
6. The water services shall be constructed after the main has been hydrostatically tested and disinfected.
7. The corporation stops shall be opened prior to complete backfilling to verify that no leakage occurs in the service line.

E. Polyethylene Encasement and Tracer Wire Installation

The Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.

1. The Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.
2. At junctions of non-conductive water main materials with conductive water main materials, the Contractor shall electrically connect the conductive water main with the tracer wire adjacent to the non-conductive material.
3. If a non-conductive water main material is used, the Contractor shall install a continuous tracer wire adjacent to, and below the spring-line of the water main. Approximately 1% slack shall be maintained in the wire by installing 101 feet of wire for each 100 feet of pipe length. The wire shall be electrically tied to each valve by extending the wire to ground surface inside the valve box and attaching it to the valve box with stainless steel screws. The wire shall be electrically tied to each hydrant assembly by extending the wire up the hydrant and securely attaching it to one of the break-off flange bolts. All connections shall receive a coat of an approved bituminous rust preventative material such as Koppers 505, or equal. The Contractor shall successfully complete a conductivity test of the installed tracer wire system prior to final acceptance.

3.3 FIELD QUALITY CONTROL

- A. No exception to the referenced Specification is made unless a non-conductive water main is installed, in which case the conductivity requirements, as specified are deleted and the conductivity requirement shall be to demonstrate the electrical continuity of the tracer wire.

3.4 HYDROSTATIC TESTING AND DISINFECTION

- A. Leakage tests shall be conducted at a 150 psig test pressure with no drop in pressure. Individual tests from valve to valve are required. These tests shall be conducted prior to the bacteriological tests required with the disinfection of the main.
- B. Water services, including corporation and curb stops, shall be tested. The Contractor may choose to include services at the time of watermain testing (150 psig) or as a separate operation at a reduced pressure of 100 psig. If performed separately, testing shall be done with the corporation stops open.
- C. The Contractor shall disinfect the watermain in accordance with the provisions of AWWA Standard Specification C-651, Disinfecting Watermains. After performing and obtaining passing hydrostatic test results, two samples of the water, taken 24 hours apart, shall be taken from each section of the new pipe and sent to an approved testing laboratory to establish the bacteriological conditions prior to placing the line in service. In the event unsatisfactory results are obtained, the Contractor shall take whatever steps are necessary to correct the sanitary conditions. The Contractor shall then re-take the bacteriological tests until a satisfactory results are obtained.

****END OF SECTION****

SECTION 02530 - PIPE SEWERS - SANITARY

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to sanitary sewer and service lateral construction as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Reference Section 02320 of these Specifications for trench excavation, bedding and backfill, except as modified herein.
- B. Reference CEAM Specification No. 2621 shall apply to the gravity sewers and service laterals construction, except as modified herein.
- C. Reference Mn/DOT Specification No. 2506 shall apply to manholes and castings, except as modified herein.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.3 SUBMITTALS

- A. Work plan for temporary service
- B. Final video tape and log of post construction televised inspection.
- C. See Section 01330 - Submittals for additional requirements.

PART 2 -- PRODUCTS

2.1 SEWER PIPE AND FITTINGS

- A. Under Existing or Proposed Buildings
 - 1. All underground sewers installed through areas to be occupied by buildings shall comply with all appropriate provisions of the State of Minnesota Plumbing Code, Minnesota Rules Chapter 4715.0570.
 - 2. Permitted pipe materials shall be: (The 6B designations are from the plumbing code.):
 - (a) 6B (1), PVC Schedule 40, un-threaded, ASTM D2665, with fabricated fittings ASTM D3311.
 - (b) 6B (1), PVC Schedule 80, threaded or un-threaded, cellular core, ASTM F891, with fabricated fittings ASTM D3311.
 - (c) 6B (3), PVC Schedule 40 (14 - 24 inch only), ASTM D1785, with ASTM D3311 fittings.
 - (d) 6B (4), PVC Schedule 40 and 80, SDR 21 and SDR 26 (6 inch and larger)
 - 3. All pipe and fittings must be laid on a continuous granular bed. Installation must comply with ASTM D2321.

B. Solid Wall Polyvinyl Chloride (PVC) Pipe

1. 4" through 6" Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D-3034 for the Standard Dimension Ratio (SDR) of 26, unless otherwise specified on the plans.
2. 8" through 15" Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D-3034 for the Standard Dimension Ratio (SDR) of 35, for depths of less than 20 feet., unless otherwise specified on the plans. The SDR for depths exceeding 20 feet shall be 26, unless otherwise specified on the plans.
3. Over 15" Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM F679 with a minimum wall thickness for a minimum pipe stiffness of 46.
4. WYES : All wyes and tees shall be heavy duty.
5. The connection shall be push-on with elastomeric gasketed joints, which are bonded to the inner walls of the gasket recess of the bell socket.
6. The pipe grade used shall be resistant to aggressive soil and corrosive substances in accordance with the requirements of ASTM D-543.

C. Ductile Iron Pipe (DIP)

1. No exception to the referenced specification is made.

D. Reinforced Concrete Pipe (RCP)

1. No exception to the referenced specification is made.

2.2 MANHOLES

A. Precast Concrete Manholes

1. Sanitary sewer manholes shall conform to the Mn/DOT Standard Plate No. 4007C, unless otherwise shown on the plans, including integral base sections and rubber gasketed tongue and groove joints. All pipe openings shall have integral cast watertight seal.
2. Reinforced polypropylene plastic steps shall be furnished for all sanitary sewer manholes eight or more feet in depth.

B. Castings

1. All casting assemblies shall meet the certification requirements of the Minnesota Department of Transportation and be manufactured by a Mn/DOT approved source.
2. The type of casting assembly to be used shall be Mn/DOT 700-7 frame with Mn/DOT 712 with gasketed cover, concealed pick hole and no lug, unless otherwise specified on the plan.

C. Chimney Seal

1. Chimney seals accepted for use, when specified as shown in the plans, shall be one of the following listed as standard of quality:
 - (a) InfriShield (exterior only)
 - (b) Cretex (exterior or interior)

D. Adjusting Rings

1. Only concrete adjusting rings shall be permitted.

PART 3 -- EXECUTION

3.1 INSTALLATION OF PIPE AND FITTINGS

A. Sanitary Main Installation

1. No exception to the referenced specification is made.

B. Sewer Service Installation

1. The Contractor shall imprint the concrete curb at the locations of the utility service locations in accordance with City standards.
2. The Contractor shall dye water test all existing sanitary sewer service line connections cut, severed or encountered during the construction to determine whether they are still active. Those service lines which are no longer in use shall be abandoned by plugging the severed upstream end with a suitable watertight plug.
3. The exact number of service connections, i.e., new service lines or connection to existing service lines, is unknown. The quantities listed on the proposal are approximate. Final payment shall be based upon the number constructed for the various diameter of services constructed.
4. The Contractor shall keep accurate records as to the location of the service connections constructed. Measurements to service line shall be taken from the two nearest permanent structures (i.e., hydrants, valves, manholes, buildings) as directed by the City Engineer. Final payment for the project will not be made until the information is in the possession of the City.
5. The Contractor shall install new service pipe from the wye branch to the property line, as shown on the plans.
6. At the end of all services which are not immediately connected to working services, the Contractor shall furnish and install a wood or metal pole which extends to just below the ground surface. If wood is used, there shall be attached to the top of the pole a 6" x 2" metal piece, capable of being located by a metal detector from the ground surface.

3.2 MANHOLE STRUCTURE

A. Connect to Existing Sanitary Sewer

1. When connection to an existing sanitary sewer is made at an existing or proposed manhole, the Contractor shall expose and verify the elevation of the existing sewer prior to laying any sanitary sewer to, or from, the connection point. If the elevation of the existing sewer does not match the elevation shown on the plans, the Contractor shall notify the City Engineer, at which time the City Engineer may adjust the proposed grades.

B. Outside Drop Manhole

1. All pipe materials used to construct the drop section and the incoming pipe shall be ductile iron.
2. Ductile iron pipe shall extend from the tee to 2 feet beyond the point where the elevation of the virgin soil becomes a uniform 6 inches below the invert elevation of the incoming pipe.

C. Raise / Lower Existing Manhole

1. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2" adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require: the removal of the manhole cone section or the concrete slab top; the addition, removal, or exchange of barrel sections; the replacement of the

cone section or the concrete slab top; the installation of the proper number of adjusting rings; and the replacement of the manhole casting and frame.

D. Manhole Base

1. Pre-cast bases shall be used for all manholes.
2. Integral cast base is required unless otherwise shown on the plans or approved by the City Engineer.

E. Miscellaneous Work

1. If concrete adjusting rings are used, they shall be set with bituminous mastic or cement mortar and shall be plastered inside and out, with a minimum thickness of 1/2-inch of mortar. A maximum of 3 individual adjusting rings shall be used. Taller 6" or 12" rings shall be used where adjustment requires more than three 2" rings.
2. If HDPE adjusting rings are permitted in Part 2 and used, the sealant material and method shall be in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

A. Deflection test

1. No exception to the referenced specification is made.

B. Sanitary sewer leakage testing

1. Leakage tests shall be conducted as described in the referenced specification. However, leakage testing will not be necessary where existing services are connected directly to the new sewer as it is being constructed.

C. Air Testing

1. No exception to the referenced specification is made.

D. Televising

1. Televising is required after the installation and backfill are complete.
2. Immediately prior to televising, the televisor shall discharge sufficient clear water into the pipe to assist in identifying sags and mis-alignment.
3. Televising shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by close circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may indicate improper installation
4. A video tape and suitable log shall be kept and later submitted to the City.

****END OF SECTION****

SECTION 02535 – FORCEMAINS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to force main construction as indicated on the drawings or as specified herein.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the force main items, as indicated. Such items of work include but are not limited to:
 - 1. Furnishing and installing all bends, pipe restraints, blocking and fittings, include in the price bid for force main.
 - 2. Furnishing and installing tracer wire and electrical connections, include in the price bid for force main.
 - 3. The furnishing and installing polyethylene encasement material, include in the price bid for force main.
 - 4. Concrete blocking or metal ties, include in the price bid for force main.
 - 5. Hydrostatic, leakage and continuity testing, include in the price bid for force main.
 - 6. Delays due to other utility conflicts, which result during the course of construction, include in the price bid for force main.
 - 7. Protecting existing improvements from damage, include in the price bid for force main.
 - 8. Connecting to existing structures, include in the price bid for force main.

1.2 SPECIFICATION REFERENCES

- A. Reference Section 02320 of these Specifications for trench excavation, bedding and backfill, except as modified herein.
- B. Reference CEAM Specification No. 2611 shall apply to the force main construction, except as modified herein.
- C. Reference CEAM Specification 2621.3G for pipe deflection.
- D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 – PRODUCTS

2.1 FORCE MAIN PIPE AND FITTING MATERIALS

- A. Pressure Polyvinyl Chloride (PVC) Pipe
 - 1. Force main pipe material shall be polyvinyl chloride (PVC) pipe having a cell classification of 12454.B as defined in ASTM Designation D-1784. The dimensions, physical requirements, test methods and extrusion quality shall meet the requirements of ASTM Designation D-2241 for dimension ratio (DR) of 26, pressure Class 160 and shall have IPS outside diameter. Gasketed integral bells shall conform to ASTM Designation D-3139 "Standard Specification for Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals." Gaskets shall conform to ASTM Designation F-477, "Standard Specification for Elastomeric Seals (Gaskets) for Joint Plastic Pipe."

B. Pressure Pipe Joint Restraint Clamps

1. The clamps (Series 6500 Ebaa Iron, Inc.) shall be ductile iron and supplied with a sufficient number of ductile iron bolts to restrain working and test pressures for this application.

C. Pipe Fitting Materials - The following pressure pipe fitting materials will be allowed for use on this project:

1. Mechanical Class 350 ductile iron, cement lined fittings shall be used. Adaptors, back-up rings, and oversize sleeves shall be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings shall be long mechanical joint.
2. All fittings, valves, hydrants and retaining rods shall be protected by using sacrificial zinc anode caps such as 175P190 Protecto Caps as manufactured by Ebaa Iron or an approved equal. Contractors shall supply 2 Protecto Caps per mechanical joint gland installed.
3. All fittings, valves, hydrants, etc. shall be secured utilizing COR-BLUE T-BOLTS as manufactured by NSS Industries or approved equal.
4. All fittings shall have been manufactured in the year of construction or prior calendar year.

2.2 AIR RELIEF MANHOLES

A. Precast Concrete Manholes

1. Air relief manholes shall conform to the Mn/DOT Standard for the design type shown on the plans including integral base sections and rubber gasketed tongue and groove joints. All pipe openings shall have integral cast watertight seal.

B. Castings

1. The type of casting assembly to be used shall be Mn/DOT 700-7 frame with Mn/DOT 712 with gasketed cover, concealed pick hole and no lug, unless otherwise specified on the plan.

2.3 AIR AND VACUUM RELEASE VALVES

- A. The air and vacuum release valve shall be equal to APCO Model 402 with a 2-inch inlet. The air and vacuum release valve shall be equipped with blow-off valves, quick disconnect couplings, 6-feet of hose and a 2-inch shut-off valve. A 2-inch saddle shall be used on the force main for connection of the air and vacuum release valve.

2.4 POLYETHYLENE ENCASEMENT

- A. No exception to the referenced specification is made.

2.5 PIPE TRACER WIRE

- A. The tracer wire shall be equal to 10 gauge bare solid copper wire, type THHN / THHW.

2.6 VALVE AND VALVE HOUSING

- A. All valves shall have been manufactured in the year of construction or prior calendar year.

B. Valve Housing

1. Cast-iron screw type valve boxes shall be installed where indicated on underground valves. The cast-iron valve boxes shall be of either the two piece or three piece style and shall be furnished with a stay-put cover with raised letters indicating "SEWER." The shaft shall be 5 1/4" inside diameter.

2. All valve box assemblies shall be furnished with a valve umbrella anchorage assembly. The valve umbrella anchorage assembly shall be manufactured by Adaptor, Inc., Oak Crest, WI, or equivalent.
 3. High Density Polyethylene valve housings will not be allowed on this project.
- C. Gate Valves
1. All valves up to and including 12 inch diameter shall be gate valves conforming to the referenced specification.

PART 3 – EXECUTION

3.1 INSTALLATION OF PIPE AND FITTINGS

A. Blocking and Anchoring of Pipe

1. A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Pre-cast concrete thrust blocks and other restraining devices such as adjustable rods or cables, shall be provided at all bends or wherever the force main changes direction.

B. Polystyrene Insulation

1. The Contractor shall install polystyrene insulation in those areas where the force main may be susceptible to frost or freezing, or as directed by the City Engineer.

C. Polyethylene Encasement and Tracer Wire Installation

1. The Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.
2. The Contractor shall install a pedestal between the force main and the surface to allow electrical access to the tracer wire. The pedestal shall be constructed of PVC pipe with a metallic lid and have a maximum spacing of 1000 feet. The precise locations shall be selected at the preconstruction conference and the Contractor shall document the final location on the record drawings.
3. If a non-conductive force main material is used, the Contractor shall install a continuous tracer wire adjacent to, and below the spring-line of the force main. Approximately 1% slack shall be maintained in the wire by installing 101 feet of wire for each 100 feet of pipe length. The wire shall be electrically tied to each valve by extending the wire to ground surface inside the valve box and attaching it to the valve box with stainless steel screws. The wire shall be extended to the surface in each valve box, air relief manhole, the receiving manhole, the pump station and pedestal.
4. At junctions of non-conductive forcemain materials with conductive forcemain materials, the Contractor shall electrically connect the conductive forcemain with the tracer wire adjacent to the non-conductive material.

3.2 FIELD QUALITY CONTROL

- A. No exception to the referenced Specification is made unless a non-conductive force main is installed, in which case the conductivity requirements, as specified are deleted and the conductivity requirement shall be to demonstrate the electrical continuity of the tracer wire.
- B. The City Engineer may require the Contractor to demonstrate that the forcemain meets the requirements of CEAM Specification 2621.3G for pipe deflection.
- C. The City Engineer may require the Contractor to perform a hydrostatic pressure test as specified in CEAM Specification 2611.3G to a pressure of 100 p.s.i.

****END OF SECTION****

SECTION 02610 - PIPE CULVERTS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary to construct pipe culverts as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Reference Section 02320 of these Specifications for trench excavation, bedding and backfill, except as modified herein.
- B. Mn/DOT Specification Section 2501 shall apply to the construction of pipe culvert and appurtenance items, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 CULVERT PIPE AND FITTINGS

- A. Reinforced Concrete Pipe (Mn/DOT 3236)
 - 1. No exception to the referenced specification is made.
- B. Corrugated Steel Pipe
 - 1. No exception to the referenced specification is made.
- C. Bituminous Coated Corrugated Steel Pipe
 - 1. No exception to the referenced specification is made.
- D. Corrugated Polyethylene Pipe
 - 1. No exception to the referenced specification is made.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall install a clay (or an approved impermeable equal) collar around all culverts at a point approximately 4 feet from each apron. The collar shall fill the breadth and height of the trench for a minimum length of 3 feet.

3.2 FIELD QUALITY CONTROL

- A. Deflection test - No exception to the referenced specification is made.
- B. Televising - No exception to the referenced specification is made.

****END OF SECTION****

SECTION 02620 - SUBSURFACE DRAINS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary to construct subsurface drains as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification No. 2502 shall apply to the subsurface drains, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 SUBSURFACE PIPE AND FITTINGS

- A. Perforated PVC drain pipe, SDR35 (ASTM D3034)
- B. Perforated PVC drain pipe, A-2000 (ASTM D2412)
- C. Perforated corrugated polyethylene drainage tubing, PE (ASTM D3350)
- D. Cleanout caps on inspection tees shall be cast iron screw in type.

2.2 GRANULAR MATERIALS

- A. The filter aggregate shall conform to the requirements of Mn/DOT 3149-H for coarse filter aggregate.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Geo-textile fabric sock shall not be installed
- B. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor shall be required to remove and restore, or protect the utility.
- C. The Contractor shall install and operate a dewatering system to maintain all trenches free of water wherever necessary. The Contractor shall be responsible for any damage to adjacent structures or buildings caused by the dewatering operations. The Contractor shall make his own subsurface investigations and determine what dewatering methods to utilize to prevent such damage.
- D. Existing inverts shall be protected during construction. If debris enters culverts or sewers, it shall be the responsibility of the Contractor to clean.
- E. Inspection tees shall be installed flush with the finished boulevard grade.
- F. Where subdrains are connected to catch basins or manholes, rodent protection shall be installed.

****END OF SECTION****

SECTION 02630 - PIPE SEWERS – STORM

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to storm sewer construction as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification No. 2506 shall apply to manholes, catch basins and castings, except as modified herein.
- B. Reference Section 02320 of these Specifications for trench excavation, bedding and backfill, except as modified herein.
- C. CEAM Specification No. 2621 shall apply to construction of pipe sewers, except as modified herein.
- D. Mn/DOT Specification No. 2503 shall apply to measurement and payment of pipe sewers, except as modified herein.
- E. Mn/DOT Standard Plates Manual with latest revisions.
- F. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 SEWER PIPE AND FITTINGS

- A. Reinforced Concrete Pipe (Mn/DOT 3236)
 - 1. No exception to the referenced specification is made.
- B. Solid Wall Polyvinyl Chloride (PVC) Pipe (Mn/DOT 3245)
 - 1. 4" through 15" Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D-3034 for the Standard Dimension Ratio (SDR) of 35.
 - 2. Over 15" Diameters:: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM F679 with a minimum wall thickness for a minimum pipe stiffness of 46.
 - 3. The connection shall be push-on with elastomeric gasketed joints, which are bonded to the inner walls of the gasket recess of the bell socket.
 - 4. The pipe grade used shall be resistant to aggressive soil and corrosive substances in accordance with the requirements of ASTM D-543.
- C. Profile Wall Polyvinyl Chloride (PVC) Pipe
 - 1. Large diameter (21-inches through 48-inches) closed profile polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM-F794. Pipe and fittings shall be made from polyvinyl chloride compounds which comply with the requirements for a minimum cell classification of 12364A as defined by ASTM D1784.

2. All joints shall be of the bell and spigot type with elastomeric seals and conform to the requirements of ASTM-D3212. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe
 3. Alternate PVC pipe conforming to Contech A-2000 (ASTM F949) will be accepted.
- D. Corrugated Polyethylene Pipe and Fittings (Mn/DOT 3247)
1. Smooth interior and corrugated exterior polyethylene pipe and fittings (diameters through 36-inches) shall conform to the requirements of AASHTO M294 and Mn/DOT Specification 3247. All joints shall be installed using an approved watertight sleeve with gaskets meeting the requirements of ASTM-F477.
- E. Flexible Pipe Jointing
1. Pipe joints for solid wall and profile wall polyvinyl chloride (PVC) pipe shall be in accordance with ASTM 3212 - 89. This includes the flexible elastomeric seals being rated at sustaining an internal pressure of 10.8 psi for 10 minutes.
 2. Pipe joints for high density polyethylene (HDPE) pipe shall be in accordance with ASTM 3261-90.
- F. Aluminized Steel (AS) Type 2 - Smooth Interior Corrugated Exterior Pipe and Fittings
1. 72" diameter (between outlet control structure and existing 72-inch C.M.P): Pipe shall be formed from Aluminized Steel Type 2 coil (12 ga.) and conform to the current AASHTO M-274 and ASTM A 819 material specification. Pipe shall be manufactured to conform to the current ASTM A 760 Type 1R. Each pipe shall be fabricated with a minimum of two (2) annular corrugations to join the pipe with band connectors. Pipe shall be joined together with hugger band connectors made from the same material as the pipe. All joints shall be constructed with the hugger band drawn together by two (2) diameter bolts through the use of a bar and strap connector, or an angle type connector. All joints shall have two O-ring gaskets that conform to the requirements of ASTM C 361 (Section 5.9).
- G. Corrugated Steel Pipe (Mn/DOT 3226)
1. No exception to the referenced specification is made.
- 2.2 MANHOLES & CATCH BASINS
- A. Precast Concrete Manholes and Catch Basin Section
1. Storm sewer manholes shall conform to the Mn/DOT Standard for the design type shown on the plans.
 2. Reinforced polypropylene plastic steps shall be furnished for all storm sewer manholes eight feet or more in depth.
- B. Castings
1. All casting assemblies shall meet the certification requirements of the Minnesota Department of Transportation and be manufactured by a Mn/DOT approved source.
 2. The type of casting assembly to be used shall be Mn/DOT 700-7 frame with Mn/DOT 712, unless otherwise specified on the plan.
 3. The type of curb and gutter catch basin casting assembly to be used shall be Neenah R-3067-V, unless otherwise specified on the plan.
- C. Adjusting Rings
1. Only concrete adjusting rings shall be permitted.

D. Chimney Seal

1. Chimney seals accepted for use, when specified as shown in the plans, shall be one of the following listed as standard of quality:
 - (a) InfriShield (exterior only)
 - (b) Cretex (exterior or interior)

2.3 GEOTEXTILE FABRIC

- A. Mn/DOT 3733, Type II, non-woven for use in wrapping joints in storm sewer.

PART 3 -- EXECUTION

3.1 MANHOLE STRUCTURE

A. Raise / Lower Existing Manhole

1. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2" adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require: the removal of the manhole cone section or the concrete slab top; the addition, removal, or exchange of barrel sections; the replacement of the cone section or the concrete slab top; the installation of the proper number of adjusting rings; and the replacement of the manhole casting and frame.

B. Miscellaneous Work

1. If concrete adjusting rings are used, plaster all manhole adjusting rings installed inside and out, with a minimum thickness of 1/2-inch of concrete. A maximum of 3 individual adjusting rings shall be used. Taller 6" or 12" rings shall be used where adjustment requires more than three 2" rings.
2. If HDPE adjusting rings are used, the sealant material and method shall be in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

1. Deflection test - No exception to the referenced specification is made.

****END OF SECTION****

SECTION 02660 - DETENTION POND EXCAVATION & EMBANKMENT

PART 1 -- GENERAL

1.1 GENERAL

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of storm water detention ponds as indicated on the drawings or as specified herein.

1. The Contractor shall review and comply with the recommendations contained in the soils report found in the Appendix hereto, unless otherwise directed by the City Engineer.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2105.1 through 2105.3 shall apply to all excavation and embankment, except as modified in these Special Provisions.
- B. Reference to "roadway" and "roadbed" in the MN/DOT Specifications shall be used interchangeably with "dike" and/or "embankment."
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. EXCAVATION/EMBANKMENT CONSTRUCTION

1. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.
2. Design contours representing the finished surface are shown on the grading plan at this site. The Contractor shall excavate, haul, place and compact the material as needed to be within +/- 0.5' of the finished subgrade of the site.
3. Embankments shall be constructed in eight-inch (loose thickness) lifts.
4. All embankments and subcuts shall be compacted using the Specified Density Method. Testing shall be by the Contractor. Compacted density shall be at least 95% of ASTM:D698-78, Standard Proctor Density. Certified copies of all density test reports shall be provided to the City Engineer.
5. Topsoil unsuitable for protection layer construction can be used as embankment material beyond the four to one pond slopes.
6. All rock six-inches and larger encountered during any embankment construction shall be removed and disposed of as directed by City Engineer.
7. All embankment shall be compacted using the Specified Density Method:
8. Under areas with proposed paved or structural improvements:
 - (a) 100% Standard Proctor from the proposed pavement subgrade elevation down 3 feet.
 - (b) 95% Standard Proctor from the bottom of excavation up to 3 feet below the subgrade elevation
9. Under areas with no proposed paved or structural improvements:

(a) 95% Standard Proctor

3.2 SOURCE QUALITY CONTROL

- A. The Contractor shall arrange for having the following testing performed:
 - 1. One (1) gradation test per each 500 tons or 275 cubic yards (CV) of granular borrow.
 - 2. One (1) Standard Proctor test per each 500 cubic yards of clay borrow.
- B. All testing shall be performed by an independent testing laboratory approved by the City Engineer.
- C. Samples for testing shall be taken from material at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.

3.3 FIELD QUALITY CONTROL

- A. The Contractor shall arrange for the following testing performed:
 - 1. At least two Standard Proctor Density tests shall be conducted in accordance with ASTM D-698 on each type of soil used in the construction of the pond to establish the moisture density relationship.
 - 2. Field density tests shall be conducted at the rate of one test per 1500 cubic yards of placed material (compacted volume).
- B. All testing shall be performed by an independent testing laboratory approved by the City Engineer.
- C. The Contractor shall cooperate fully with the individuals performing the tests.
- D. Samples for testing shall be taken from material in place at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.
- E. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the City Engineer that the specified density requirements have been met.
- F. Copies of all test results with maps of testing locations shall be submitted as determined at the pre-construction meeting.
- G. All required soils tests and pond bottom surveys must be approved by the City Engineer prior to pond prefill.

**** END OF SECTION ****

SECTION 02662 - POND LINER AND PREFILL

PART 1 -- GENERAL

1.1 GENERAL

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary to construct the pond liner system as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification No. 2105 for pond liner subgrade excavation, except as modified in these Special Provisions.
- B. Mn/DOT Specification No. 2112 for subgrade preparation, except as modified in these Special Provisions.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. There are two alternates for synthetic pond liners and also an optional clay liner for the Detention Pond B liner system. The synthetic liner alternates include PVC, HDPE/bentonite composite geosynthetic liner. The Contractor may use either of the synthetic liner alternates (or the clay liner option only if the City so chooses).
- B. The Contractor shall furnish and install one of the geosynthetic liners or construct the optional compacted clay liner in detention basin "B" as shown on the contract drawings. The geosynthetic liner material to be supplied under these specifications shall be designed and manufactured specifically for this type of use. The suitability of the material for this type of use must be satisfactorily demonstrated by prior applications on similar projects. The fabricator of the geosynthetic material shall, upon request, supply the City Engineer with the names of the CITY or projects for which the fabricator supplied this type of material.
- C. The Contractor shall note the groundwater elevations found in the soils investigation. The potential, therefore, exists for liner floating. It shall be the Contractor's responsibility to install the liner at a time that groundwater will not affect the geosynthetic pond liner material.
- D. The manufacturer of the roll goods from which the liner is fabricated shall demonstrate the ability to produce the required geosynthetic material for similar applications. The manufacturer, fabricator, and installer shall provide experience statements to the City Engineer upon request.

2.2 GEOSYNTHETIC POND LINER MATERIALS

- A. Polyvinyl Chloride (PVC) Pond Liner Material
 - 1. The PVC membrane shall be domestic virgin material of single-ply construction having polyvinyl chloride as its principal polymer and shall be compounded to meet the requirements of these specifications. The membrane shall be so produced as to be free of holes, undispersed raw materials, or blisters. Any such defect shall be repaired using compatible sheeting and solvents or adhesives approved by the manufacturer.

2. The PVC material shall have the following physical characteristics:

Property	Test Method	Requirements
Specific Gravity	ASTM D792	1.24-1.30
Thickness-30 mil PVC	ASTM D1593	.030 in. ± 5%
Tensile Strength	ASTM D882	2400 psi, Min
Elongation at Break	ASTM D882	350%, Min.
100% Modulus	ASTM D882	1000-1600 psi
Graves Tear	ASTM D1004	325 lb/in., Min
Water Extraction	ASTM D1239	0.30%, Max.
Volatility-30 mil PVC	ASTM D1203	0.70%, Max
Cold Crack	ASTM D1790	-20°F
Dim. Stability (212° F/15 Min.)	ASTM D1204	5%, Max.
Resistance to Soil Burial	ASTM D3083 (USBR ¶4c (1))	Pass
Peel Strength	ASTM D413	10 lb./in. width
Shear Strength	ASTM D3083	1920 psi, Min

Material certifications showing that the PVC material meets or exceeds these specification requirements shall be supplied by the material manufacturer upon request.

3. Factory Fabrication

- (a) All factory seams shall be made using a solvent weld or heat fusion. The factory seams shall have a minimum width of 1-inch. The strength of the seam shall be 80% of the specified sheet strength.
- (b) The roll goods from which the liner is fabricated shall be at least 61-inches wide. The factory fabricated panels shall be a size that can be easily handled on the job site with conventional construction equipment. The panels should be as large and as square as possible to minimize the amount of field seaming required.

4. Packaging and Shipment

- (a) The fabricated panels shall be accordion folded in both directions, placed on pallets and boxed. The boxes shall be substantial enough to protect the lining material during transport.
- (b) The boxes and the panels shall be marked as to the size of the panel, the direction of unfolding, and both shall be marked with a letter or number which correlates to the Panel Layout Diagram.

5. Soil Sterilant

- (a) Any soil sterilant applied to the pond surface prior to installing the liner must be approved by the liner manufacturer.

- B. High Density Polyethylene (HDPE) / Bentonite Composite Pond Liner Material

1. The material shall be high density polyethylene / bentonite composite designed for exposed conditions containing carbon black UV stabilizer, anti-oxidants and heat stabilizers.
2. The liner material shall be so produced as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter. Any such defect shall be repaired using the extrusion fusion welding technique in accordance with the manufacturer's recommendations.
3. The lining material shall be manufactured a minimum of 22.5 feet (6.8 meters) seamless widths. Labels on the roll shall identify the thickness, length, and manufacturer's roll number. There shall be no factory seams.

4. Liner thickness tolerance shall be +/- 10 percent of nominal thickness.
5. The HDPE geosynthetic or clay liner material shall have the following physical properties:

Property	Test Method	Requirements
HDPE Component Thickness (mil.)		60
		1
Sheet Size (Width - Ft.)		17.5
Density (g/cc. - min.)	ASTM D1505	0.94
Melt Flow Index	ASTM D1238	0.3
		Condition E (190 deg. C, 2.16 kg.)
Tensile Properties	ASTM D638	
a) Strength at Break (lb/in)		160
b) Strength at Yield (lb/in)		95
c) Elongation at Break (%)		700
d) Elongation at Yield (%)		13
Tear Resistance (lbs)	ASTM D1004	30
Low Temperature Brittleness (deg F)	ASTM D746	-112
Dimensional Stability (% Change)	ASTM D1204	+/- 2
Environmental Stress Crack (Hrs, Min)	ASTM D1693	1500
Puncture Resistance (lbs)	FTMS 101	52
Coefficient of Linear Thermal Expansion ($\times 10^{-4}$ cm/cm degrees C)	ASTM D696	2.0
Thermal Stability (min)	ASTM D3895	2000
Bentonite Swell Index (ml/2g min.)	ASTM D5890	24
Bentonite Fluid Loss (ml max)	ASTM D5891	18
Bentonite Mass/Area (lb/ft ²)	ASTM D5261	0.95
GCL Grab Strength (lbs)	ASTM D4632	90
GCL Grab Elongation (%)	ASTM D4632	15
GCL Index Flux (m ³ /m ² /sec)	ASTM D4632	1×10^{-9}
GCL Hydrated Internal Shear Strength (psf)	ASTM D5321	500

6. Granular sodium bentonite shall be adhesively attached to the HDPE layer.
7. Soil Sterilant
 - (a) Any soil sterilant applied to the pond surface prior to installing the liner must be approved by the liner manufacturer.

2.3 CLAY BORROW MATERIALS FOR LINER

- A. Clay Borrow for the compacted clay liner option shall be an impervious clay suitable for pond lining. Permeability shall be a maximum of 1×10^{-7} cm/sec. The City may test the clay borrow material to confirm whether the material meets the permeability requirement.

2.4 GEOSYNTHETIC BASE AND PROTECTION LAYER MATERIAL

- A. The bedding material below the geosynthetic liner and the liner protection layer shall consist of sound durable particles of sand and gravel free of sharp and angular particles, meeting the following gradation requirements.

Sieve Size	Percent Passing
3/8"	100
# 200	0-15

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Excavation for Liner

1. Geosynthetic Liner Systems

- (a) The Contractor shall subcut 1.5 feet below the finished pond bottom elevation and 1.5 feet below finished top and the inside slope elevations (measured normal to face) as shown on the plans to provide for placement of the geosynthetic liner. Additional subgrade excavation below the grade of the pond liner shall be done only if the existing materials at the liner grade do not meet the gradation specification for liner base.
- (b) The Contractor shall place and compact salvaged granular borrow materials for the liner bedding only if the existing materials at the liner subgrade are unsuitable.

2. Compacted Clay Liner

- (a) The Contractor shall subcut 2.0 feet below the finished pond bottom elevation and 3.0 feet below finished top and the inside slope elevations (measured normal to face) as shown on the plans to provide for placement and compaction of the clay liner.

B. Subgrade Preparation

1. The Contractor shall scarify, shape, compact and maintain the top 6 inches of the subgrade to at least 95 percent of Standard Proctor Density before placing the geosynthetic or the optional clay liner material. The subgrade shall be in accordance with Mn/DOT Specification 2112.1-2112.3 and 2116.1-2116.3.
2. Any organic uncompactable material encountered in the subgrade preparation shall be removed. Excavation for correction of the subgrade materials, as may be required, shall be considered incidental to the earthwork excavation and replaced with salvaged suitable granular materials meeting the gradation for liner base material.
3. The Contractor shall replace the excavated unsuitable subgrade material with suitable, compactable material to bring the subgrade to the proper elevation. Subgrade correction materials shall be thoroughly blended with the existing subgrade material prior to compacting to the specified density. The moisture content of all soils shall be maintained within $\pm 2\%$ of optimum moisture during placement and compaction.

C. Geosynthetic Liner Construction

1. A representative of the liner fabricator must be present "at all times" during the installation of the liner.
2. Installation of the geosynthetic lining may only take place during dry weather when the ambient temperature is at, or above 55° F. The surface upon which the liner will be placed shall be dry and free of rocks, stones, and other debris which may damage the liner. The surface and all lines and slopes shall be approved by liner fabricator representative and examined for general compliance by the City Engineer prior to the placement of the liner.
3. Sterilize the completed subgrade in advance of liner installation. Verify sterilant compatibility with liner material before application.
4. The pallets of material shall be placed according to the Pallet Placement Diagram provided by the manufacturer. The installer shall spread only those panels which can be seamed together in one day. The liner shall be installed in a relaxed condition and shall be free of tension or stress. Stretching of the liner to fit will not be allowed. The liner shall be installed taking embankment settling into account.
5. Field Seams:
 - (a) PVC liner- The panel edges to be joined shall be overlapped 6-inches over a smooth surface (1" x 10" board or a conveyer belt). The surfaces to be seamed shall be free of moisture, sand, dust, and all other foreign matter. Either solvent or heat fusion may be used to seam the material. If solvent is used it shall be applied to one surface. The material shall be pressed together immediately with a steel or nylon roller to create a 3-inch seam. If adhesive is used, it shall be applied to both surfaces and they shall be allowed to dry to a tack before they are rolled together.
 - (b) (HDPE Composite) Make field seams in accordance with manufacturer's recommended procedures. Lap splices of the composite HDPE/bentonite liner shall overlap a minimum of 6" in all areas. Supplemental cap seams on side slopes and seams at pipe penetrations shall be by the extrusion weld process. Weld areas shall be cleaned and prepared in accordance with manufacturer's recommended procedures.
6. The geosynthetic liner shall be installed at the elevations shown on the plans.
7. The geosynthetic liner shall be connected to the pond outlet control structure and pipe inlets by using a stainless steel flat bar (2" x 1/4") over a neoprene sponge bolted into the concrete structure @6" o.c. w/ 3/8" diameter stainless steel kwik bolts.
8. All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to scuffing, penetration to foreign objects, or distress from rough subgrade shall, as directed by the City Engineer, be replaced or covered and sealed with an additional layer of the geosynthetic lining of the proper size. Any repairs to the geosynthetic lining shall be patched with lining material and liner to liner bonding adhesive meeting the specifications of the material being repaired. The patch material shall have rounded corners and shall extend a minimum of 4 inches in each direction from the damaged area.
9. After the geosynthetic liner has been installed, an 18-inch protection layer consisting of salvaged granular material shall be placed and compacted by method of Ordinary Compaction.

D. Compacted Clay Liner Construction

1. Inplace material at the subgrade shall be scarified to a depth of 1.5' and then re-compacted. The 2.0-foot thick clay liner (after compaction) shall be placed in four lifts of six inches of (compacted depth) each.
2. Scarified material, sub-cut material and liner material shall be compacted to a minimum of 98 percent of maximum density, based on the Standard Proctor of the material (ASTM:D698). The moisture content of the clay placed should be between 1-3% above optimum moisture. The

Contractor shall dry or add water in order to obtain the required density at no additional cost to the liner construction. After clay liner placement, Contractor shall keep the liner at the optimum moisture or greater until the pond is prefilled. Compaction testing shall be by the City

3. All rocks four inches in diameter and larger encountered during the liner placement shall be removed and disposed of as directed by City Engineer.
4. If unsuitable subgrade material is exposed during the excavation for the liner, this material shall be removed and replaced as specified for liner placement.

3.2 FIELD QUALITY CONTROL

A. Inspection and Testing

1. The City may conduct density tests whenever subgrade, embankment, clay liner, protection layer or structure and trench backfill compaction operations are being conducted.
2. Field density tests may be conducted at the rate of :
 - (a) One test per 1500 cubic yards of placed material (compacted volume) or as directed by City Engineer.
 - (b) At least two Standard Proctor Density tests shall be conducted in accordance with ASTM D-698 on each type of soil used in the construction of the pond to establish the moisture density relationship.
3. A water balance test shall be done by the City Engineer. The Contractor shall provide all necessary materials to complete the water balance test, including barrels, concrete pads and baffles. This test shall be done in accordance to the Requirements for Water Balance Test in Appendix C.
4. After completion of the liner placement and prior to the pond prefill, permeability tests of the finished in-place liner will be made. One test per acre of bottom surface area with a minimum of four tests per pond bottom will be conducted. All replacement of liner material will be completed at no expense to the City.
5. The Contractor shall provide, at his own expense, the entire cost of the required water balance testing. The Contractor shall be responsible for reworking of any inadequate portions of the seal until the material passes the specification requirements.
6. Copies of all test results shall be submitted by the Contractor as determined at the pre-construction meeting.
7. At conclusion of the pond construction and prior to pond prefill, the Contractor, the independent engineering firm providing the onsite inspections, and the soils testing laboratory involved with the liner testing shall provide the city, in writing, the acceptance that the subgrade, embankment and liner meet the requirements of the specifications.
8. The finished pond bottom shall be constructed to the elevations shown on the plans. The finished pond grades shall not deviate from the plans by more than plus or minus 0.5 feet. The Contractor shall take spot elevations of the finished pond bottom every 5,000 square feet of liner placed to verify the pond bottom elevations.
9. Geosynthetic Pond Liner - Seam Testing
 - (a) The Manufacturer shall employ on-site physical non-destructive testing using an air lance or other approved technique for all welds. In addition to field testing, the Contractor shall prepare specimen welds from on-site materials and demonstrate the integrity of welds. The Contractor shall be responsible for patching all sampling points.
 - (b) Upon completion of the liner installation and prior to placement of the earth cover, the installation supervisor and the City Engineer's field representative shall fully examine every lineal foot of field seam and all seals around penetrations. All field seams shall be tested by the installation Contractor with an air lance. The air lance test shall consist of directing 50 pounds

per square inch of air through a 3/16-inch diameter nozzle held no more than 4 inches from the seam. Each field seam that passes the air lance test shall be recorded by the City Engineer on the Panel Layout Diagram.

- (c) All requirements from the geosynthetic liner manufacturer must be met by the Contractor.

10. Prefill Pond and Water Balance

- (a) Detention Pond "B" shall be constructed prior to October 15 to allow for the water balance test to be completed.
- (b) Upon acceptance of the installed liner system, examination and completion of all structures, piping and appurtenances, the Contractor shall prefill the pond to one foot below the permanent pool depth as determined from the plan.
- (c) Water shall be pumped through portable piping to prefill the pond from an approved sources. Water from dewatering wells may be used.
- (d) The Contractor shall apply for and obtain a permit from the Minnesota Department of Natural Resources or Minnesota Department of Health for acquisition of water as required.
- (e) All required tests must be reviewed by the City Engineer prior to prefill. All pond prefill and testing procedures located in the Appendix must be completed by the Contractor for the new ponds. The Contractor shall be responsible for installing and removing water balance equipment for the new pond. The Contractor shall be responsible for payment to an independent testing firm or the City Engineer for taking water level measurements and writing the appropriate report required.
- (f) The allowable mean seepage rate shall be 500 gallons/acre/day with a confidence interval of \pm 1,000 gallons/acre/day defined by the water balance procedure outlined in the Appendix. If the water balance fails, the Contractor shall rework the seal at no additional cost to the City.

**** END OF SECTION ****

SECTION 02705 - MANHOLES & CATCH BASINS - ADJUST CASTING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to adjusting a casting assembly frame and ring or valve box as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2506 shall apply to adjusting frame and ring, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 ADJUSTING RINGS

1. Only concrete adjusting rings shall be permitted.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall bring manhole castings and valve boxes to grade. The manhole casting shall be placed on a full mortar bed or bituminous mastic upon final setting. The inside and outside of the adjusted area shall be plastered with a minimum thickness of 1/2-inch cement.
- B. All inverts of manholes and valves boxes shall be cleaned of debris and gravel which may have fallen into the structures as a result of construction.
- C. Finished grade of the casting or valve box in paved areas shall be according to the following, unless otherwise specified on the plans:

	Distance Below Adjacent Concrete Pavement	Distance Below Adjacent Bituminous Pavement	Distance Below Adjacent Gravel Pavement
City Streets	1/8" to 1/4"	1/4" to 3/8"	1"
County Highways	1/8" to 1/4"	1/4" to 3/8"	1"
State Highways	1/8" to 1/4"	1/4" to 3/8"	1"
Sidewalks	1/8" to 1/4"	1/8" to 1/4"	1"
Parking Areas	1/8" to 1/4"	1/4" to 3/8"	1"

- D. In no case shall the casting or valve box extend above the finished surface.
- E. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2" adjusting rings will not reach a minimum of 2 rings or exceed a

maximum of 6 rings. Typically, it will require the removal of the manhole cone section or concrete slab top; the addition, removal or exchange of barrel sections; replacement of the cone section or the flat slab top; installation of the proper number of adjusting rings; and replacement of the manhole frame and casting. In some cases, the existing structure may require saw cutting.

******END OF SECTION******

SECTION 02720 - AGGREGATE BASE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to construct the aggregate base course as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2211 shall apply to the construction of aggregate base, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. When no percent crushing is designated in the schedule of prices, the material to be used shall conform to the Specifications for Aggregate Base Class 5 modified so that the percent passing the No. 200 sieve shall be 5 to 10 percent.
- B. When the schedule of unit prices calls for 100% crushed aggregate base, the material to be used shall conform to the Specifications for Aggregate Base Class 5, modified so that the material consists of 100% crushed rock. The gradation shall also be modified so that the percent passing the No. 200 sieve shall be 5 to 10 percent.
- C. Materials included here consists of new aggregate surfacing, Class 5 aggregate base, aggregate bedding (rock), bedding and encasement material. If additional rock is used to provide a coarser Class 5 gradation, the added materials must pass the Los Angeles Rattler (L.A.R.) test. The percent crushed shall also be tested on the aggregate surfacing or aggregate base class 5 samples.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.
- B. The depth and class of aggregate base to be constructed shall be as shown on the plans. Aggregate base construction shall take place only after the street subgrade condition and grade has been examined by the City Engineer.
- C. All aggregate base shall be compacted using the Specified Density Method:
 - 1. Under areas with proposed paved or structural improvements:
 - (a) 100% Standard Proctor from the proposed pavement subgrade elevation down 3 feet.
 - (b) 95% Standard Proctor from the bottom of excavation up to 3 feet below the subgrade elevation
 - 2. Under areas with no proposed paved or structural improvements:
 - (a) 95% Standard Proctor

3.2 SOURCE QUALITY CONTROL

- A. The Contractor shall arrange for having the following testing performed:
 - 1. One (1) gradation test for each 500 tons or 275 cubic yards (CV) of each class of aggregate base.
 - 2. One (1) percent crushing test
 - 3. One (1) aggregate quality test
- B. Samples for testing shall be taken from material in stock at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.
- C. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the City Engineer that the requirements have been met.

3.3 FIELD QUALITY CONTROL

- A. "Blue top" stakes shall be provided by the Contractor at 100 foot intervals to confirm that the base is constructed to the required grades and elevations. Methods other than "blue top" staking may be allowed, if approved by the City Engineer.
- B. The Contractor shall arrange for having the following testing performed:
 - 1. One (1) compaction test (including Standard Proctor) for each 500 SY of each class of aggregate base.
- C. All testing shall be performed by an independent testing laboratory approved by the City Engineer.
- D. The Contractor shall cooperate fully with the individuals performing the tests.
- E. Samples for testing shall be taken from material in place, in the roadway at locations approved by the City Engineer. All sampling methods shall be approved by the City Engineer.
- F. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the City Engineer that the requirements have been met.

****END OF SECTION****

SECTION 02740 - PLANT-MIXED BITUMINOUS SURFACING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of plant-mixed bituminous surfacing as indicated on the plans or as specified herein.
 - 1. This is a Certified Plant Project. The supplier shall have sufficient testing facilities and qualified personnel including Certified Technicians. If requested by the City Engineer, the required tests shall be performed in a timely manner and with a good quality control program.

1.2 SPECIFICATION REFERENCE

- A. Mn/DOT Specification Section 2350, Plant Mixed Asphalt Pavement, shall apply to the construction of plant-mixed bituminous surfacing, except as modified herein. A copy of Standard Specification 2350 is available from the City Engineer upon request.
 - 1. Mn/DOT Section 02350.6B5 : The maximum payment factor for density is 100%.
 - 2. Mn/DOT Section 02350.7C (pavement smoothness) is hereby DELETED.
- B. Unless noted otherwise, the provisions in this Section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Bituminous material for the mixture shall be PG 58-28 asphaltic cement.
- B. No recycled materials will be allowed in the bituminous wearing course.
- C. The wear mix shall be produced with gradation 3 aggregate for lifts of 1-1/2" and more, and shall be produced with gradation 4 aggregate for lifts of less than 1-1/2".

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The bituminous wearing course shall be constructed in the construction season following the season in which the underground utilities, aggregate base and bituminous base course have been constructed.
- B. The Contractor is required to use the self-propelled pneumatic tire roller as an intermediate roller on the wearing courses.
- C. The bituminous surfacing shall be constructed with maximum deviation of plus or minus 1/4-inch from the planned compacted thickness.
- D. The contact surfaces of all fixed structures, the edge of the in-place mixture in all courses at transverse joints, and the wearing course at longitudinal joints shall be given a uniform coating of Liquid Asphalt or Emulsified Asphalt before placing the adjoining mixture. The bituminous material shall be applied by methods that will ensure uniform coating and in no case shall the application be excessive. Refer to Specification 02745 for compensation.

E. Compaction of all bituminous mixtures shall be by the Ordinary Compaction Method.

3.2 SOURCE QUALITY CONTROL

A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current Mn/DOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project, and is approved by the City Engineer. No bituminous mixture shall be placed without an approved mix design.

3.3 FIELD QUALITY CONTROL

- A. A nuclear density meter and operator shall be provided by the Contractor at the beginning of each course for each typical section for each street, to establish the appropriate rolling patterns.
- B. Three (3) inch diameter core samples shall be taken by the Contractor to verify the thickness of the compacted finished bituminous structure. Sample locations shall be designated by the City Engineer and made with a drilling device that produces clean sharp, vertical edges.
- C. If any cores prove deficient, the Contractor may, at its own cost and expense, take additional core samples to further define the extent of the deficiency.
- D. The City Engineer shall calculate deficient pavement areas using the locations and thickness results of all core samples and prorating the thickness profile.
- E. A \$0.50 deduction per square yard-inch will be made for each 1/8-inch deficiency of thickness beyond the specified tolerances.
- F. Reduction in payment for bituminous courses constructed to more than the a maximum permissible thickness shall be in accordance with Mn/DOT Section 2350.7, except that the thickness tolerances specified herein apply.
- G. Testing:

Quantity Mixture Type	REQUIRED CONTRACTOR TESTING			CITY ARRANGED INDEPENDENT ASSURANCE TESTING			
	VMA & Air Voids	Gradation	Spot Check	VMA & Air Voids	Gradation	Spot Check	Extraction
0-500 Ton	2	1	1	1	1		1
500-1000 Ton	3	1	1	1	1		1
1000+ Ton	4 First Day 1/1000 Ton Thereafter with Min. 2/day	2/Day	2/Day	1	1	1	1

****END OF SECTION****

SECTION 02741 - BITUMINOUS PATCH

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of plant-mixed bituminous surfacing as indicated on the plans or as specified herein.

1.2 SPECIFICATION REFERENCE

- A. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- B. Subgrade Preparation
 - 1. Mn/DOT Specification Section 2112 shall apply to the subgrade preparation, except as modified herein.
- C. Aggregate Base Course
 - 1. Mn/DOT Specification Section 2211 shall apply to the construction of aggregate base, except as modified herein.
- D. Bituminous Tack Coat
 - 1. Mn/DOT Specification Section 2357 shall apply to the construction of bituminous tack coat, except as modified herein.
- E. Bituminous Paving Materials
 - 1. Mn/DOT Specification Section 2350, Bituminous Quality Assurance, shall apply to the construction of plant-mixed bituminous surfacing, except as modified herein.
 - (a) Mn/DOT Section 02350.6B5 : The maximum payment factor for density is 100%.
 - (b) Mn/DOT Section 02350.7C (pavement smoothness) is hereby DELETED.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Subgrade Preparation
 - 1. No exception to the referenced specification is made.
- B. Aggregate Base Course
 - 1. The material to be used shall conform to the Specifications for Aggregate Base, Class 5.
- C. Bituminous Tack Coat
 - 1. The bituminous material for tack coat shall be CRS-1 or CRS-2.
- D. Bituminous Paving Materials
 - 1. Bituminous material for the mixture shall be PG 58-28 asphaltic cement.
 - 2. No recycled materials will be allowed in the bituminous wearing course.

3. The wear mix shall be produced with gradation 3 aggregate for lifts of 1-1/2" and more, and shall be produced with gradation 4 aggregate for lifts of less than 1-1/2".

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The depth and class of aggregate base and bituminous surface to be constructed shall be:
 1. Bituminous Patch - 5 Ton
 - (a) 2" Type MV Bituminous Wearing Course
 - (b) 12" 2211 Aggregate Base, Class 5
 2. Bituminous Patch - 7 Ton
 - (a) 1" Type MV Bituminous Wearing Course
 - (b) 3" Type MV Bituminous Base Course
 - (c) 10" 2211 Aggregate Base, Class 5
 3. Bituminous Patch - 9 Ton
 - (a) 1" Type MV Bituminous Wearing Course
 - (b) 4" Type MV Bituminous Base Course
 - (c) 12" 2211 Aggregate Base, Class 5unless otherwise shown on the plans.
- B. The subgrade, aggregate and bituminous base courses of patches whose smallest dimension is less than the width of the compaction equipment shall be hand tamped.
- C. The subgrade shall be compacted using Quality Compaction Method.
- D. When the Contractor believes subgrade preparation is complete, he shall notify the City Engineer for a final examination. If the City Engineer requests it, the subgrade shall be test rolled with a fully loaded tandem truck to verify subgrade stability.
- E. Aggregate base construction shall take place only after the street subgrade condition and grade has been examined by the City Engineer.
- F. Cut the adjacent asphalt surface prior to the Construction of the bituminous surface course to obtain a clean, vertical, solid edge.
- G. Compaction of the aggregate base courses shall be by the Quality Compaction Method.
- H. The bituminous tack coat shall be applied at the rate of 0.10 gallons per square yard.
- I. The contact surfaces of all fixed structures, the edge of the in-place mixture in all courses at transverse joints, and the wearing course at longitudinal joints shall be given a uniform coating of Liquid Asphalt or Emulsified Asphalt before placing the adjoining mixture. The bituminous material shall be applied by methods that will ensure uniform coating and in no case shall the application be excessive.
- J. The bituminous surfacing shall be constructed with maximum deviation of plus or minus 1/4-inch from the planned compacted thickness.
- K. Compaction of all bituminous mixtures shall be by the Ordinary Method of Compaction. A nuclear density meter and operator shall be provided by the Contractor, if requested by the City Engineer.

3.2 FIELD QUALITY CONTROL

- A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current Mn/DOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project, and is approved by the City Engineer. No bituminous mixture shall be placed without an approved mix design.
- B. Final line and grade of the wearing surface shall not exceed the following tolerances from the adjacent pavement surfaces:

	Distance Below Adjacent Bituminous Pavement
City Streets	1/8"
County Highways	1/8"
State Highways	1/8"
Sidewalks	1/8"
Parking Areas	1/4"

****END OF SECTION****

2.2 EQUIPMENT

- A. Application equipment for latex and epoxy resins systems shall consist of a machine of the spray type capable of applying the material under pressure at a controlled temperature through nozzles equipped with remotely controlled cutoff mechanisms and suitable line guides that will produce clean cut lines and prevent excessive material drift.
- B. For highway and street applications, the marking material shall be applied with truck mounted traveling units properly equipped to apply the stripes as required. Where two or more lines are to be applied closely spaced, the machine shall be equipped to apply those stripes simultaneously. For application of broken lines, the applying unit shall include an automatic feed to control device capable of being set to produce the specified stripe gap ratio.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. At the time of applying the marking material, the application area shall be free of contamination. The contractor shall clean the surface prior to the line application in a manner and to the extent required by the City Engineer.
- B. Pavement markings shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface after cleaning and before the marking material can be applied.
- C. The filling of tanks, pouring of materials or cleaning of equipment shall not be performed on unprotected pavement surfaces unless adequate provisions are made to prevent spillage of the material.
- D. No striping operations will be permitted between sundown and sunrise without written permission from the City Engineer.
- E. All material shall be placed in a workmanlike manner, which shall result in a clearly defined line.
- F. All pavement striping shall be 4-inches wide, unless noted otherwise on the plans.
- G. Application for the marking material shall be such as to provide uniform film thickness throughout the coverage area. Stripe ends shall be clean cut and square, with a minimum of material beyond the cutoff.
- H. All pavement markings not conforming to the requirements of the Contract shall be removed and replaced or otherwise repaired to the satisfaction of the City Engineer. Removal of unacceptable work shall be accomplished with suitable blasting or grinding equipment unless other means are approved by the City Engineer.

3.2 CONVENTIONAL PAVEMENT MARKINGS

- A. Conventional pavement markings (fast dry alkyd and high solids latex) shall be applied in accordance with the referenced Mn/DOT Application Specification Conventional Pavement Marking Materials - Three (3) Minute Dry Alkyd And High Solids Latex.

3.3 EPOXY RESIN PAVEMENT MARKINGS

- A. Epoxy Resin Pavement Markings shall be applied in accordance with the referenced Mn/DOT Specification - Epoxy Resin Pavement Markings - (Free Of Toxic Heavy Metals).

3.4 PREFORMED PAVEMENT MARKINGS

1. Preformed Pavement Markings shall be applied in accordance with the appropriate referenced Mn/DOT Specification for High Durability Preformed Pavement Markings or Patterned Preformed Polymer Pavement Marking Tape.

******END OF SECTION******

SECTION 02770 - CONCRETE CURBING AND DRIVEWAY PAVEMENT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of concrete curbing and driveway paving as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2531 shall apply to the construction of concrete curbing and driveway placement, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- C. Mn/DOT Standard Plates

1.3 SUBMITTALS

- A. The mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor. A current mix design may be submitted and accepted, provided the aggregate source is the same as that being used for this project. Two copies of the certified mix design shall be submitted to the City Engineer for review prior to the construction of the project.

PART 2 -- PRODUCTS

2.1 MATERIAL

- A. The concrete mix to be used shall conform to Mn/DOT Mix No. 3A32 for manually placed concrete or Mix No. 3A22 for machine placed concrete.
- B. 50% of the coarse aggregate shall be Class A material as specified in Mn/DOT Specification 3137.
- C. Joint sealer shall be a silicone based product.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Excavate to the elevation shown on the design detail plate. Salvage material suitable for backfill.
- B. The width of all driveways shall be established in the field by the project City Engineer or City.
- C. The joints in the driveway pavement shall match with the sidewalk and curb control joints. The Contractor shall be fully responsible for proper jointing patterns. Mismatched jointing will require removal and replacement of components in order to achieve the desired results. All removal and replacement of rejected construction shall be at the Contractor's expense.
- D. The tooling tolerances as outlined in specification 2531 for surface uniformity, alignment and jointing shall be reviewed by the Contractor prior to the construction. Defects found during examinations will require the Contractor to remove and replace those areas. No deduction in unit price will be acceptable to satisfy defective areas found.

- E. Backfill along exposed edges of slabs and/or behind the curb with selected salvage material from the excavation to the elevation shown on the design detail plate.
- F. The Contractor shall imprint the concrete curb at the locations of the utility service locations in accordance with City standards.
- G. When the pavement is placed directly on natural subgrade, earth check dams shall be constructed immediately after passage of the slip forms or removal of the forms to prevent water from flowing along the edge of the pavement and undermining the concrete. They shall not be spaced or be of a width to provide an approach over which a vehicle may be driven onto the pavement.
- H. High early strength concrete shall be used for all driveway pavement.
- I. No warranty is expressed or implied that all concrete work will be accessible for machine construction.

3.2 FIELD QUALITY CONTROL

A. Testing

- 1. The City may conduct various material tests throughout the construction to determine conformance with these specifications, including but not limited to:
 - (a) Air and slump cone tests.
 - (b) Beam and cylinder testing.
- 2. The Contractor's shall cooperate with the individuals conducting the testing operations..

B. Warranty Period

- 1. During the two-year warranty period, necessary repairs shall include but not be limited to defects in concrete and workmanship such as cracking, pop-outs, spalling, improper joint placement and settlement.

****END OF SECTION****

SECTION 02775 - WALKS - CONCRETE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of concrete walks as indicated on the drawings or as specified herein.

1.2 SPECIFICATIONS REFERENCES

- A. Mn/DOT Specification Section 2521 shall apply to the construction of concrete walks, except as modified herein.
- B. Mn/DOT Technical Memorandum No. 03-19-TS-02 shall apply to the construction of pedestrian curb ramps.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- D. Mn/DOT Standard Plates, including modifications from the Technical Memorandum listed above.

1.3 SUBMITTALS

- A. Two copies of the certified mix design shall be submitted to the City Engineer for review prior to the construction of the project. The mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor. A current Mn/DOT Design Mix may be accepted provided the aggregate sources are the same as that being used for this project.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. CONCRETE

- 1. The concrete mix to be used shall conform to Mn/DOT Mix No. 3A32 for manually placed concrete or Mix No. 3A22 for machine placed concrete.
- 2. Fifty percent (50%) of the coarse aggregate shall be Class A material as specified in Mn/DOT Specification 3137.

- B. The foundation materials shall be Class 5, Aggregate Base.

C. TRUNCATED DOME SYSTEMS for pedestrian curb ramps.

- 1. The approved products are those listed on the Mn/DOT web site <http://www.mrr.dot.state.mn.us/materials/apprprod.asp>.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Excavate the walk alignment to 3-inches below finished walk sub-grade or the bottom of the topsoil layer, whichever is deeper. If excavation beyond the 3 inch layer is required, the Contractor shall fill the excess excavation with suitable compacted material.. Salvage all topsoil for re-use.

- B. A minimum depth of 3-inches of Class 5 aggregate shall be furnished, placed and compacted by the "Ordinary Compaction Method" upon the prepared subgrade.
- C. Backfill along the walk with salvaged topsoil, to an elevation so the sod will match the walk surface and adjacent undisturbed lawn.
- D. When the pavement is placed directly on natural subgrade, earth check dams shall be constructed immediately after passage of the slip forms or removal of the forms to prevent water from flowing along the edge of the pavement and undermining the concrete. They shall not be constructed to provide an approach over which a vehicle may be driven onto the pavement.

3.2 FIELD QUALITY CONTROL

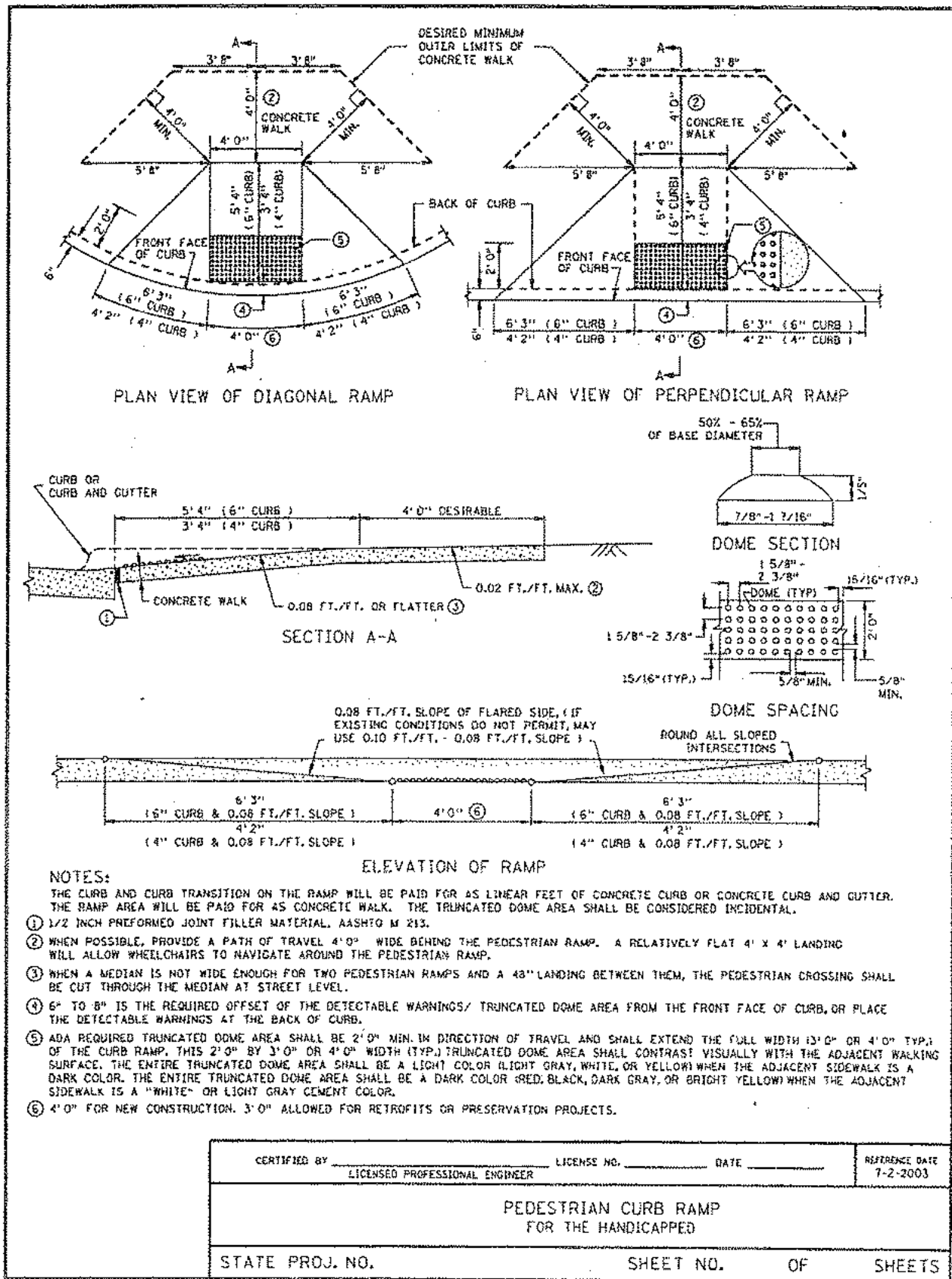
A. Testing

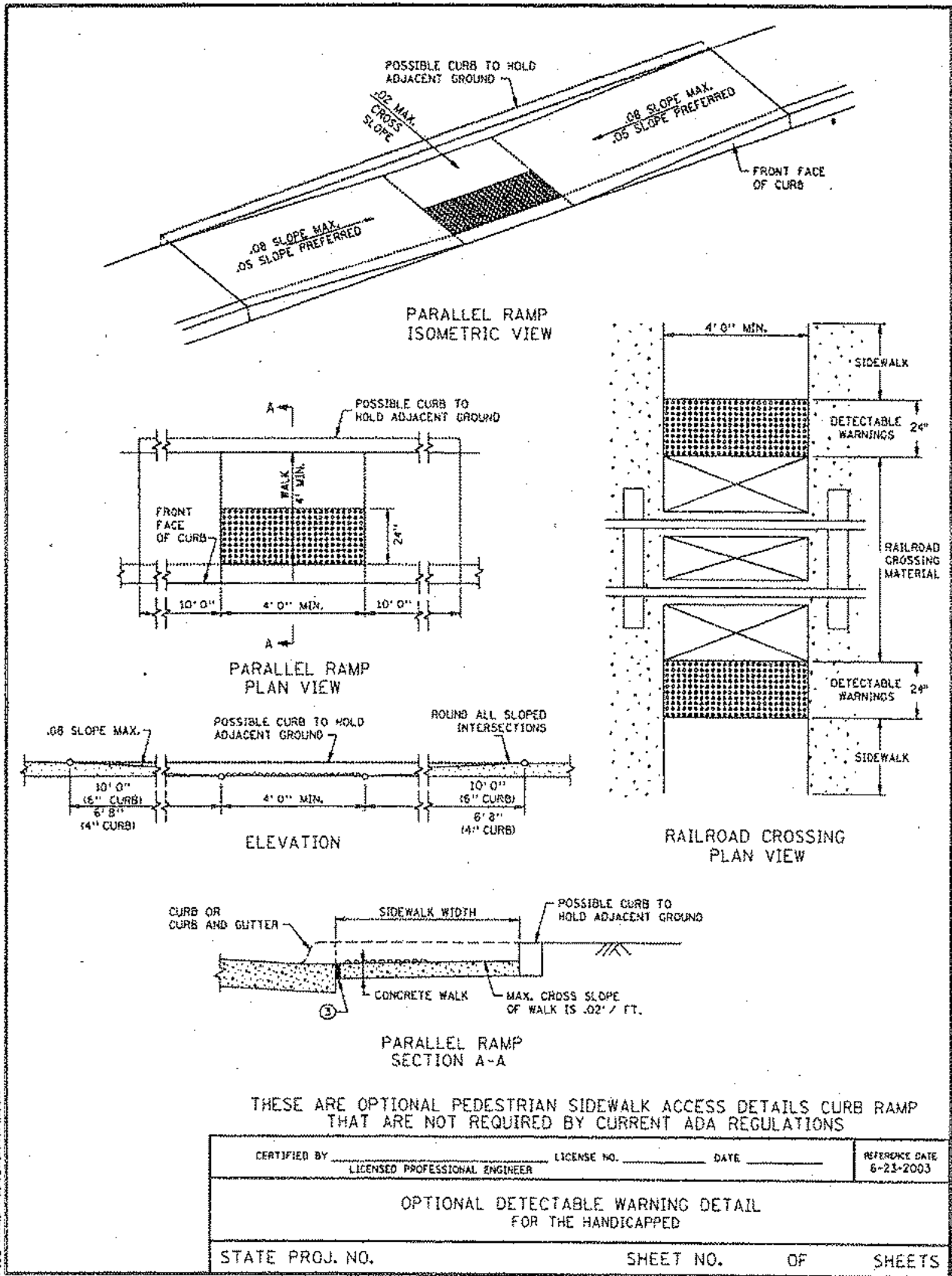
- 1. The City may conduct various material tests throughout the construction to determine conformance with these specifications, including but not limited to:
 - (a) Air and slump cone tests.
 - (b) Beam and cylinder testing.
- 2. The Contractor's shall cooperate with the individuals conducting the testing operations..

B. Warranty Period

- 1. During the two-year warranty period, necessary repairs shall include but not be limited to defects in concrete and workmanship such as cracking, pop-outs, spalling, improper joint placement and settlement.

****END OF SECTION****





SECTION 02780 - BRICK PAVERS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to installation of all brick pavers, as shown on the drawings, as specified herein.

1.2 SPECIFICATION REFERENCES

- A. All masonry work shall be done according to practices set forth in the Concrete Masonry Handbook.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.3 SUBMITTALS

- A. The Contractor shall submit 6 sample pavers to the City Engineer for approval prior to actually placing the order together with the name of the manufacturer, the model or style of the particular paver, and the technical specification for the paver.
- B. Once the order is placed, the Contractor shall submit to the City the lot number(s) of the pavers to be shipped so the City can order a quantity for repair and replacement.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. New brick pavers in concrete walks shall comply with the following:
 - 1. Modular size, exterior grade brick pavers nominal 8" x 4" x 1-1/4" thick to match streetscape pavers.
 - 2. Approved manufacturer/product: Pacific Clay, color "Desert Brown" as distributed by Mankato Brick or equal as approved by City Engineer and City.
 - 3. The pavers shall be an "open stock" item as produced by the manufacturer.
- B. Grout materials shall comply with the following:
 - 1. Grout shall be Hydroment as manufactured by Upco or equal. The grout shall be a gray color conforming to the color of the concrete mix.
- C. Mortar shall comply with the following:
 - 1. Material:
 - (a) Mortar for brick pavers shall be Latex-Portland Cement - ASTM C-150
 - (b) Sand: clean washed ASTM C-144
 - (c) Hydrated ASTM C-207, Type S
 - (d) Latex Additive: Tec-crete, as manufactured by H.B. Fuller or equal
 - 2. Proportioning: . Portland Cement, silica sand mortar shall be mixed with the latex additive. All preparation shall be in strict accordance with latex manufacturer's directions. No dilution of latex additive will be permitted.

3. Mixing: All ingredients shall be mixed for a minimum of five minutes in a batch mixer. Water shall be limited to the amount required to produce working consistency. Mortar shall be used within 2-1/2 hours after mixing. Mortar that has stiffened within this time may be retempered with the minimum amount of water necessary to obtain desired workability.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The paver installer shall examine areas and conditions under which brick pavers are to be installed. The Contractor shall notify the City Engineer and City, in writing, of conditions detrimental to proper and timely completion of the work. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in manner acceptable to paver installer, unless otherwise directed by the City Engineer.
- B. The Contractor shall protect masonry materials during storage and construction against wetting by rain, snow or ground water and against spoilage or intermixture with earth or other types of materials.
- C. Installation shall be accomplished as follows;
 1. Apply a troweled bed of latex portland cement mortar on the concrete slab. Place paver on freshly laid and still plastic setting bed and beat same into plastic mortar until it matches the required level or slope, as fixed by straight edges accurately placed at regular intervals.
 2. Joints shall be uniform, not less than 1/4 inch nor more than 3/8 inch wide.
 3. Lay out all pavers in patterns shown on drawings.
 4. Grout all joints solidly, fill all joints flush and tool smooth. Flush grout installation shall be strictly adhered to. Clean pavers using ten percent (10%) Muriatic Acid solution.
 5. The top surface of the bricks may be field coated with protective wax coating approved by the supplier prior to placement.
 6. Cut masonry units with motor-driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible.
- D. The Contractor shall protect all brick paved areas from damage until work is turned over to City. Remove and replace pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- E. In the event cold weather delays brick installation or if the walk must be opened to pedestrian traffic prior to completion of the installation of the brick pavers, the depressed area in the sidewalk shall be filled with a non-slip surface plywood or other approved method through the winter.

****END OF SECTION****

SECTION 02745 - BITUMINOUS TACK COAT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of the bituminous tack coat as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2357 shall apply to the construction of bituminous tack coat, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. The bituminous material for tack coat shall be CRS-1 or CRS-2.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The material shall be applied at the rate of 0.05 gallons per square yard.
- B. The contact surfaces of all fixed structures, the edge of the in-place mixture in all courses at transverse joints, and the wearing course at longitudinal joints shall be given a uniform coating of Liquid Asphalt or Emulsified Asphalt before placing the adjoining mixture. The bituminous material shall be applied by methods that will ensure uniform coating and in no case shall the application be excessive.

******END OF SECTION******

SECTION 02750 - CONCRETE PAVEMENT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of concrete paving as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2301 shall apply to the construction of concrete pavement including any additional requirements listed in the *Technical Memorandum (2301) Concrete Pavement* contained in the Appendix, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.
- C. Mn/DOT Standard Plan Sheets.

1.3 SUBMITTALS

- A. The mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor. A current mix design may be submitted and accepted, provided the aggregate source is the same as that being used for this project. Two copies of the certified mix design shall be submitted to the City Engineer for review prior to the construction of the project.
- B. Test reports and certification by an approved testing laboratory that the following meet all of the requirements of these Specifications.
 - 1. Fine Aggregate for Portland Cement Concrete (Mn/DOT 3126)
 - 2. Coarse Aggregate for Portland Cement Concrete (Mn/DOT 3137)
 - 3. Fine aggregate and cementitious material (ASTM C-1260).
- C. In the event ready-mix concrete is used, the Contractor shall furnish the City Engineer with numbered delivery tickets showing the date, time, place of delivery, number of cubic yards, the weight of cement, fine aggregate and coarse aggregates, and amount of mixing water in each load. At the end of each paving day, the Contractor shall obtain from the supplier a summary showing the average component amounts that day.

PART 2 -- PRODUCTS

2.1 MATERIAL

- A. The concrete mix to be used shall conform to Mn/DOT Mix. No. 3A26 for vibratory machine placement, Mix. No. 3A36 for non-vibratory machine placed concrete and Mix No. 3A46 for manual placed concrete.
- B. 50% of the coarse aggregate shall be Class A material as specified in Mn/DOT Specification 3137.
- C. High early strength concrete, when used and/or specified, shall be accomplished by increasing normal cement content by approximately 30 percent without use of calcium chloride, except as directed by the City.

- D. The source of fine and coarse aggregates shall be one currently approved by the Minnesota Department of Transportation.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The concrete pavement with integral curb shall be constructed using the slip form method of construction. The Contractor's equipment must be mechanically and physically capable of placing the concrete and integral curb in accordance with the Specifications and to the plan widths, cross-sections, grades and thicknesses, including all irregularities and/or special sections affecting project geometry.
- B. The provisions of Section 2301.3L for transverse metal tine finish shall be deleted.
- C. Control contraction joints shall be sawed at 60 to 75 foot intervals within 24 hours of placing the concrete. Contraction joints shall be sawed at approximately 15 foot intervals in accordance with the Plans.
- D. Longitudinal, contraction and expansion joints shall be constructed as specified in Mn/DOT 2301 and as shown on the attached Mn/DOT Standard Plan Sheet 5-297.221 (2 sheets).
- E. All joint walls shall be lightly sand blasted and then cleaned with a jet of compressed air under a pressure not less than 85 pounds per square inch immediately prior to sealing. Any joints filled above the permissible level (1/8 inch below the concrete surface) shall be corrected by removing and replacing the sealer at the Contractor's expense.
- F. Concrete paving equipment shall be operated so that smooth, continuous movement in the direction of the paving operation is maintained. Starting and stopping the paver for other than safety reasons or for lack of fresh concrete will not be permitted. The City Engineer may require paving operations to be halted if the paver is not being operated to produce pavement conforming to plan elevation, grade or cross-section; if the concrete is not being supplied at an acceptable rate; or if the mechanical operation of the paving equipment is causing unacceptable surface variations not correctable by finishing operations.

3.2 FIELD QUALITY CONTROL

- A. The City may conduct various material tests throughout the construction to determine conformance with these specifications, including but not limited to:
 - 1. Air and slump cone tests.
 - 2. Beam and cylinder testing.
- B. The Contractor's shall cooperate with the individuals conducting the testing operations.
- C. A 10-foot straight edge with the capability of checking the deviation in any direction over the entire width of the fresh concrete shall be supplied by the Contractor during all concrete pavement installation. The Contractor shall verify the compliance of the concrete surface with deviation requirements during the concrete finishing operation and make corrections as required.
- D. If any random or uncontrolled crack occurs in undoweled or doweled jointed pavement, the pavement shall be repaired in a manner consistent with dowel load-transfer techniques using the latest Mn/DOT's Rehabilitation Standards/Details in use at the time of the construction. The City Engineer may require replacement of the pavement or portions, thereof, or allow repairs. The City Engineer will review specific repair techniques and also determine if a reduced payment is appropriate. The replacement or repair work shall be performed at the Contractor's expense. Failed repairs shall be replaced at the Contractor's expense. Acceptance of the repairs will be consistent with the acceptance of the pavement portion of the Project.

E. PAVEMENT THICKNESS & CORE SAMPLES

1. It is intended that the finished pavement thickness conform substantially to the thickness shown in the Plans or as modified and staked by the City Engineer. Any modifications will be considered as being the planned thickness.
2. Prior to final acceptance of the work, the City Engineer will take cores from the pavement for use as test specimens.
3. Coring will not begin until the new pavement has attained an age of 7 days or until control beams have attained a flexural strength of 500 pounds per square inch. The Contractor will be responsible for filling the core holes with 3U18 concrete or another concrete mix approved by the City Engineer. The Contractor will be responsible for all traffic control related to coring. All unacceptable cores and cores taken to delineate deficient pavement as outlined in 2301.3P2 or 2301.3P3 will be at the Contractor's expense.
4. Wherever any core shows a deficiency of more than 0.50 inch from the planned thickness, additional exploratory cores will be taken. The first exploratory cores at any location will be taken 10-feet on each side of the deficient core location and at the same distance from the pavement centerline, and one will be taken in the adjacent traffic lane if it was placed in the same operation. If the length of each one of the first exploratory cores is equal to or greater than the plan thickness of the pavement minus 0.50 inch, no additional cores will be taken in that location. If any or all of these cores are not within such limitations, additional exploratory cores will be taken at intervals of 10 to 25 feet, as directed by the City Engineer, at the same distance from the pavement centerline in the same lane as the original core. The coring will proceed in the direction of the deficiency until cores of satisfactory length are obtained. Any exploratory cores are also the responsibility of the Contractor.
5. Wherever the cores show a thickness deficiency greater than 0.50 inch, the pavement will be considered to be defective and shall be removed and replaced. The defective pavement area will be considered as the entire area surrounding the deficient core (or cores) within a traffic lane and between acceptable cores. The remaining areas in an increment where the cores show a thickness deficiency no greater than 0.50 inch will be considered as acceptable pavement.
6. Where the cores are deficient in length by less than 0.50 inch, or less, and the concrete also has an air content less than 4.0 percent, the Contractor shall remove and replace the defective pavement.

****END OF SECTION****

SECTION 02760 - PAVEMENT MARKINGS

PART 1 -- GENERAL

1.1 SUMMARY

1. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to the application of pavement markings as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. The following Mn/DOT Specifications, attached hereto, shall apply to the pavement markings, except as modified herein:
 1. Specification - High Solids Water Based Traffic Paints
 2. Specification - Three Minute Dry Alkyd Traffic Paints
 3. Specification - Application Specification Conventional Pavement Marking Materials - Three (3) Minute Dry Alkyd And High Solids Latex.
 4. Specification - Epoxy Resin Pavement Markings - (Free Of Toxic Heavy Metals).
 5. Specification - High Durability Preformed Pavement Markings - (including stop lines and crosswalks)
 6. Specifications - No. 1 Patterned Preformed Polymer Pavement Marking Tape with improved retention of reflectivity for lines and selected symbols and legends
 7. Specification - Drop-On Glass Beads
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Interim Pavement Markings for application on bituminous base course prior to the construction of the bituminous wearing course shall be :
 1. High Solids Water Based Traffic Paints, in accordance with the referenced specification.
 2. Three Minute Dry Alkyd Traffic Paints, in accordance with the referenced specification.
 3. Drop-On Glass Beads, in accordance with the referenced specification.
- B. Permanent Pavement Markings for application on the final bituminous wearing course shall be:
 1. High Solids Water Based Traffic Paints, in accordance with the referenced specification.
 2. Three Minute Dry Alkyd Traffic Paints, in accordance with the referenced specification.
 3. Epoxy Resin Pavement Markings, in accordance with the referenced specification.
 4. Drop-On Glass Beads, in accordance with the referenced specification.
 5. High Durability Preformed Pavement Markings, in accordance with the referenced specification.
 6. Patterned Preformed Polymer Pavement Marking Tape, in accordance with the referenced specification

SECTION 02785 - BITUMINOUS SEAL COAT

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of bituminous seal coating as indicated on the plans or as specified herein.

1.2 SPECIFICATION REFERENCE

- A. Mn/DOT Specification Section 2356 shall apply to the construction of bituminous seal coat, except as modified herein.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Seal Coat Aggregate:

- 1. Seal coat aggregate shall be FA-2 with a modified gradation of 69 to 100 percent passing the No. 4 sieve.

B. Bituminous Material

- 1. Bituminous material shall be MC-800 conforming to the requirements of Mn/DOT Specification 3151. The bituminous material shall be treated with an approved anti-stripping additive in accordance with Mn/DOT Specification 2356.2C.

2.2 SOURCE QUALITY CONTROL

A. The City may arrange for and pay all costs associated with having the following testing performed:

- 1. One (1) gradation test for each 300 tons of each class of aggregate.
- 2. One (1) percent shale test (if required by the City Engineer).

B. The Contractor shall cooperate fully with the individuals performing the tests.

- C. A Certificate of Compliance from the refinery shall be provided with each transport load of bituminous material delivered to the job site. The Contractor shall also provide two clean, dry, one gallon containers with tight covers for sampling each load. The Contractor shall assist the City in obtaining two samples from each load. If, in the opinion of the City, the seal coating surface appears defective, the City may order that some or all of the samples be laboratory tested in accordance with ASTM Specification. D9777, at the Contractor's cost and expense.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The City shall complete all necessary street patching prior to the bituminous seal coat application.
- B. No seal coating operations will be permitted until all necessary and required equipment is on site and functioning.

- C. Prior to any seal coating, the Contractor shall coordinate any necessary parking restrictions and provide barricades as needed to permit seal coating to proceed.
- D. The Contractor shall perform one complete sweeping of the areas to be seal coated immediately prior to beginning work, and will remove all objectionable foreign matter, including weed growth, on the road surface.
- E. The Contractor shall protect all manhole covers, valve box covers and catch basin castings by covering them with building paper or other suitable methods to prevent such items from being sprayed with bituminous material. Simply piling aggregate over these structures is not acceptable.
- F. The Contractor shall exercise care to avoid over spraying on adjacent concrete walk, curb and gutter, and other structures. A minor overlap on the outside edge of the concrete gutter will be permitted. However, over spray on the remainder of the gutter, on the curb, on the walk or on other structures shall be removed at the Contractor's expense.
- G. The Contractor shall also take the necessary precautions to prevent the seal coat aggregate from entering any manholes, catch basins or water valve boxes.
- H. Any aggregate spill and/or tracking shall be cleaned by the Contractor from the surface prior to the application of the bituminous seal coat material.
- I. The aggregate spreader shall be a self-propelled type mounted on pneumatic tired wheels located to operate on the freshly applied aggregate. Truck mounted spreaders are not acceptable.
- J. The Contractor shall comply with the requirements of Mn/DOT Specification 2356.3F for rolling operations, including time limitations, required equipment type and number of rollers on site.
- K. Upon completion of the bituminous seal coat application, the Contractor shall remove all coverings and excess seal coat materials from manhole covers, catch basins, and water valve boxes and restore them to their original condition.
- L. The Contractor will sweep the excess seal coat aggregate from the streets approximately 30 to 45 days following the application.
- M. Application Rates:

	Basis of Estimated Quantity
	per Square Yard
Aggregate	30 lbs.
Bituminous Material	0.30 gallons

- N. The Contractor shall maintain barricades and traffic control measures until the seal coat has cured adequately so that vehicles are not "tracking" the cover aggregate.
- O. In the event a second seal coat application is required, the second application shall not be made until the first has had adequate time to cure.

****END OF SECTION****

SECTION 02820 - CHAIN LINK FENCE AND GATES

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of chain link fence and gate as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification No. 2557 shall apply to fencing except as modified herein.

PART 2 -- PRODUCTS

2.1 GENERAL

- A. All fencing shall have a fabric height of six feet unless noted otherwise in the drawings, with steel posts set in concrete-filled holes and spaced not to exceed 10'-0" center to center. All chain link fence shall be Century Palisade or equal and shall conform to the requirements stipulated herein.

2.2 MATERIALS

A. FABRIC

- 1. Fabric shall be of No. 9 gage copper bearing open hearth steel wire, woven in a two-inch mesh, with knuckled salvage and heavily galvanized (1.2 oz./sq. ft.) by the hot-dip process after weaving.

B. POSTS

- 1. All posts shall be galvanized by the hot-dip process after fabrication.
- 2. All posts shall be of such length that they may be embedded in concrete foundations to a depth of not less than 36 inches.
- 3. All intermediate posts shall be 2-inch OD pipe section posts weighing not less than 2.72 pounds per linear foot.
- 4. End, corner, angle and pull posts shall be of 2-1/2-inch O.D. steel pipe weighing not less than 3.65 pounds per linear foot.
- 5. Swing gate posts shall be of 4-inch O.D. steel pipe weighing not less than 9.11 pounds per linear foot for 14-feet and larger gates and 3-inch O.D. steel pipe weighing not less than 9.11 pounds per linear foot for 12-feet and smaller gates.

C. TOP RAIL, BOTTOM RAIL

- 1. All fencing shall be provided with top rails which shall be of 1-5/8-inch O.D. steel pipe weighing not less than 2.27 pounds per linear foot, and shall be heavily galvanized by the hot-dip process.
- 2. Top rails shall pass through the bases of extension arms, which shall be provided on the top of each post, and shall form a continuous brace from end to end of each stretch of fence.
- 3. Top rails shall be provided with expansion rail couplings and shall be securely fastened to gate and terminal posts by means of suitable hot-dip galvanized connections.

D. BRACING

1. End, gate and corner posts shall be suitably braced by means of 1-5/8-inch O.D. steel pipe weighing not less than 2.27 pounds per linear foot, set in horizontal position, with adjustable truss braces between terminal and first intermediate posts, complete with all fittings hot-dip galvanized.
2. Terminal posts shall be laterally braced.
3. Swing gates shall be provided with auxiliary side braces where necessary.

E. TENSION BARS

1. Fabric shall be attached to, and supported by, terminal and gate posts by means of 3/4" x 1/4" hot-dip galvanized tension bars, secured to the posts by means of heavy galvanized fittings.

F. TENSION WIRE

G. FABRIC BANDS

1. Fence fabric shall be fastened to intermediate posts by means of aluminum bands, spaced approximately 14 inches apart, and to the top rail by means of suitable wire ties spaced approximately 24 inches apart.

H. GATES

1. Gates shall be fabricated by the manufacturer of the fence in which they are installed.
2. The gate frames shall be made of 2-inch steel pipe weighing not less than 2.28 pounds per linear foot, with necessary intermediate braces of 1-5/8-inch steel pipe weighing not less than 2.27 pound per linear foot, with all pipe, fittings, stretcher bars, hook bolts, hinges, latches, truss-rods and other accessories heavily galvanized by the hot-dip process.
3. The gates shall be filled with fabric to match the line fence fabric. Fabric shall be built into each gate frame by means of stretcher bars and adjustable bolt hooks.
4. Hinges shall be of heavy malleable iron, hot-dip galvanized. A hot-dip galvanized latch of the drop bar type, arranged for padlocking, shall be provided for each gate.
5. A heavy duty Schlage, Yale, Masterlock or equal padlock with not less than two keys shall be provided for each gate.

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. All earth, brush or other obstructions which interfere with the proper alignment of construction of fences shall be removed and disposed of.
- B. All posts shall be spaced in the line of fence not to exceed ten foot centers and set 36 inches in concrete foundations. Concrete foundations shall be circular in horizontal section, not less than ten inches in diameter for intermediate posts, and with a diameter not less than the outside of the post plus nine inches for all other posts. Post foundations shall extend above the ground surface and shall be crowned not less than one inch to provide adequate drainage away from the post.
- C. The fence shall be so erected that the bottom of the fencing will follow the contour of the grade surface with 1" maximum clearance. The gate shall align with the top of the fence and shall have a 3" maximum clearance at the bottom.

- D. Bracing shall be provided at all end, gate and corner posts, the latter in both directions. Horizontal brace rails shall be set midway between top rail and ground running from the corner, end or gate post to first line post. Diagonal tension members shall connect tautly between posts below horizontal braces.
- E. The chain-link fabric shall be fastened on the side of the posts as shown or as designated by the CITY ENGINEER. The fabric shall be stretched and securely fastened to the posts, and, between the posts, the top and bottom edges of the fabric shall be fastened to the top rail and tension wire, respectively. The tension wires shall be stretched tight with turnbuckles at the end and corner posts. The bottom tension wire shall be installed on a straight grade between posts.
- F. The fabric shall be fastened to the end, corner and gate posts with stretcher bars and stretcher bar bands spaced approximately 14 inches on line posts and at approximately 18 inches on tension wires.
- G. Encasement concrete for footings shall be placed immediately after mixing in a manner such that there will be no concentration of the large aggregates. The concrete shall be consolidated by tamping or vibrating in an approved manner. Concrete for footings may be placed without forms, providing the ground is firm enough to permit excavation to neat line dimensions. Prior to placing the concrete, the earth around the hole shall be thoroughly moistened. The concrete shall completely fill the hole and top surfaces of the concrete encasement shall be sloped outward to shed water and shall have a neat appearance. Not less than 7 days shall elapse after placing the concrete footings before the fence fabric or barbed wire is fastened to the posts.
- H. Any galvanized coating damaged during construction of the fencing shall be repaired by application of molten Galvo-Weld, Galvinox or equal.

**** END OF SECTION ****

SECTION 02830 - MODULAR BLOCK RETAINING WALL

PART 1 -- GENERAL

1.1 SUMMARY

- A. The work under this section of these specifications includes, or is incidental to, the design, furnishing, and constructing a modular block retaining wall as indicated on the drawings or as specified herein. The work shall include the footings, drainage, the modular block, anchoring devices, railings, specified accessories and related items of construction.
- B. The retaining wall shall be constructed in the location and configuration as shown on the plans; however, the City Engineer reserves the right to alter this alignment to improve constructibility and/or aesthetics.
 - 1. Geosynthetic wall reinforcement shall be designed as part of the modular block retaining wall system and shall be certified by the designer of the retaining wall system that it meets the necessary strength and durability criteria for the application.

1.2 SPECIFICATION REFERENCE

- A. The design shall be per AASHTO and the Mn/DOT Road Design Manual.
- B. The materials, design, fabrication and erection of the retaining wall, foundation, geosynthetic wall reinforcement and associated items shall conform to the current Mn/DOT Specification Section 2411 - Minor Concrete Structures and Mn/DOT Technical Memorandum No. 03-07-MRR-03 or updates thereto, except as modified herein.
- C. The material, excavation and backfill for the retaining wall and associated items shall conform to the current Mn/DOT Specification Section 2451 - Structure Excavations and Backfill, except as modified herein.
- D. Unless otherwise noted, the provisions in this Section are in addition to the referenced specifications.
- E. In addition, all work and equipment shall conform to the most current applicable OSHA standards.

1.3 SUBMITTAL

- A. See Section 01300.
- B. The Contractor shall submit detailed design drawings and computations for the construction of the modular block retaining wall. The drawings and computations shall include, but not be limited to, footing / foundation drawings, wall details, anchoring requirements, compaction requirements, subdrainage details, railing details, re-bar schedules and other drawings and details that are appropriate for the successful completion of the project.
- C. Each manufacturing facility shall provide the State Materials Engineer with a copy of its quality control plan and procedures, including testing rates and material sources. Each manufacturing facility shall also supply test reports and documentation to verify compliance with this Specification.
- D. Included shall be a typical section detailing excavation limits, geotextile locations, block embedments, leveling pad dimensions, backfill, etc. Include as many sections and other views necessary for the construction and inspection of the wall. The information on embedment, geotextile locations, and geotextile lengths as they relate to wall heights may be shown in tabular form. Also included shall be pertinent information on the individual blocks, the geotextile material and compaction requirements.

- E. All drawings submitted by the Contractor shall be certified and signed by a Professional Engineer registered in the State of Minnesota. Each plan sheet shall clearly identify the name of the responsible engineering firm and the name of the person certifying the plan.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. The modular block units shall be as manufactured by one of the following firms or an approved equal:

1. Keystone Retaining Wall Systems
2. Rockwood Wall Systems
3. Genesis Wall System
4. Anchor Wall System
5. Risi Stone Wall System
6. Versa-lok
7. Allan Block
8. Interlock Concrete Products
9. Mesa Retaining Wall Systems

B. SURFACE SEALER

1. Surface sealers shall meet the requirements on file in the Mn/DOT Concrete Engineering Unit (651/779-5572). The list may also be viewed on the Mn/DOT website at:
www.mnrr.dot.state.mn.us/pavement/concrete/products.asp

C. GEOSYNTHETIC WALL REINFORCEMENT

1. No exception to the referenced specification is made.

D. SUB-SURFACE DRAINS

1. Perforated PVC drain pipe, SDR35 (ASTM D3034)
2. Perforated PVC drain pipe, A-2000 (ASTM D2412)
3. Perforated corrugated polyethylene drainage tubing, PE (ASTM D3350)
4. Cleanout caps on inspection tees shall be cast iron screw in type.

E. GEOTEXTILE SOCK:

1. The geotextile sock shall conform to the requirements of Mn/DOT 3733, Type I.

F. GRANULAR MATERIALS

1. The filter aggregate shall conform to the requirements of Mn/DOT 3149-H for coarse filter aggregate.

2.2 SOURCE QUALITY CONTROL

- A. The minimum required sampling rate for laboratory testing is one sample set per 10,000 units or fraction thereof, with a minimum of one sample per product type per contract. Sample size = 5 whole units per block type. Wall units and cap units are considered separate block types.

B. The units shall conform to ASTM C1372, except that:

1. The minimum compressive strength requirements shall be 38 Mpa (5500 psi) for any individual unit and 40 Mpa (5800 psi) for the average of 3 units.
2. The freeze/thaw durability of wall units tested in accordance with ASTM C 1262 in a 3% saline solution shall be the minimum of the following:
 - (a) The weight loss of each of five test specimens at the conclusion of 90 cycles shall not exceed 1% of its initial weight; or
 - (b) The weight loss of 4 out of 5 test specimens at the conclusion of 100 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5 th specimen to not exceed 10%.
3. The freeze/thaw durability of cap units test tested in accordance with ASTM C 1262 in a 3% saline solution shall be the minimum of the following:
 - (a) The weight loss of each of five test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight; or
 - (b) The weight loss of 4 out of 5 test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5 th specimen not to exceed 10%.
4. Cap units must meet the requirements of (a) and (c) and have a top surface sloped at minimum of 1 mm fall per 10 mm run (1 inch fall per 10 inches run) front to back or be crowned at the center.
5. ASTM C 1262 test results shall be recorded and reported in 10 cycle intervals
6. Note: It is the intention of this testing that 100% of the wall units and cap units meet the weight loss requirements for (b1) and (c1) respectively, or that a minimum of 80% of the wall units and cap units tested meet the weight loss requirements for (b2) and (c2) respectively. If a manufacturer chooses to increase the sample size tested beyond the 5 units required for each block type, these percentages will still apply to the sample size chosen (i.e. if a sample size of 7 blocks is tested a minimum of 6 must meet the weight loss requirement of (b2) or (c2), if a sample size of 10 blocks is tested a minimum of 8 must meet the weight loss requirement).

C. SAMPLING AND TESTING

1. Shall conform to ASTM C 140, except that: Section 6.2.4 shall be deleted and replaced with:
 - (a) "The specimens shall be coupons cut from a finished side or back shell of each unit and sawn to remove any face shell projections. The coupon size shall have a height to thickness ratio of 2 to 1 before capping and a length to thickness ratio of 4 to 1. The coupon shall be cut from the unit such that the coupon height dimension is in the same direction as the unit height dimension. Compressive testing of full size units will not be permitted. The compressive strength of the coupon shall be assumed to represent the net area compressive strength of the whole unit."
2. Cap units and wall units shall be sampled and tested as separate block types.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. All work shall be done in accordance with the approved drawings.

B. Sealer

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

2. Due to the potentially hazardous ingredients contained in sealer formulations extreme care must be exercised in their handling and use, and the manufacturer's recommendations shall be closely followed.
3. The Contractor shall comply with the manufacturer's written instructions for preparing, handling and applying the surface sealer.
4. The surface to be treated shall receive a light water-blast to the extent that the surface is clean and free of oils.
5. Before the surface sealer is applied the surface to be sealed shall be dry and free of all dust, debris, and frost.
6. Surface sealers shall be applied at the heaviest application rate specified by the manufacturer.

****END OF SECTION****

SECTION 02890 - TRAFFIC SIGNS

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools equipment and performances of all work and services necessary or incidental to project signing as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2564 shall apply to the construction of project signing, except as modified herein.
- B. The "1991 Minnesota Manual for Uniform Traffic Control Devices" (1991 MN MUTCD) shall apply unless modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. All signing materials shall conform to the requirements of Mn/DOT Specification 3352 and all Supplemental Specifications thereto.
- B. All posts shall be structural steel tubing, 3" x 3", minimum wall thickness .125". The posts shall be primed for painting.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The lower portion of the post shall be air-driven into the ground. Where posts must be placed in concrete or bituminous, the Contractor shall core the area without damaging the remainder of the surface. At core location, a PVC tube at least four inches in diameter shall be inserted and the post air driven from that point. The area shall then be patched.
- B. The Contractor shall construct the posts and signs at the locations indicated on the drawings and shall verify all sign locations with the City Engineer prior to installation.

******END OF SECTION******

SECTION 02920 - TURF RESTORATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to turf restoration as indicated on the drawings or as specified herein.
- B. A variety of different seeding mixtures may be utilized on this project. The Contractor shall refer to the plan for the locations of the different turf establishment areas.
- C. Temporary seeding may be necessary during construction in erosion sensitive areas. The Contractor shall do temporary seeding work as specified herein or as directed by the City Engineer.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Sections 2575 and 3876, Turf Establishment, shall apply to the establishment of grass and sod, except as modified herein.
- B. Mn/DOT Technical Memorandum No. 02-23-ENV-05 shall apply to additional seed mixtures.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Seeding Items

- 1. The seed mixtures to be used are shown on the plans.
- 2. Seeding with the various seed mixture designations shall utilize the following combinations of seed, fertilizer and mulch:

SEED			FERTILIZER		MULCH	
Designation	Name	Application Rate ²	Type	Application Rate	Type	Application Rate
240SR	Sandy Roadside	115 lb/AC	6-*-24	200 lb/AC	1	2 ton/AC
250GR	General Roadside	105 lb/AC	6-*-24	200 lb/AC	1	2 ton/AC
260CT	Commercial Turf	150 lb/AC	6-*-24	200 lb/AC	1	2 ton/AC
270RT	Residential Turf	180 lb/AC	6-*-24	200 lb/AC	1	2 ton/AC
280AG	Agricultural Areas	100 lb/AC	6-*-24	200 lb/AC	1	2 ton/AC
310NWT	Native Wet Tall	123lb/AC	6-*-24	200 lb/AC	1	2 ton/AC
110B	Oats	100 lb/AC	6-*-24	200 lb/AC	1	2 ton/AC
* Phosphorous content at the time of turf establishment shall be: ³ <ul style="list-style-type: none">▶ 0% in metropolitan counties.▶ 3% in non-metropolitan counties unless the local jurisdiction enacted legislation prior to August 1, 2002 that provided more stringent limits.						

² All application rates for mixes, except oats, are 150% the rate in Mn/DOT Technical Memorandum No. 02-23-ENV-05.
³ Minnesota Statutes 2003, Section: 18C.110, *Fertilizer, Soil Amendment, And Plant Amendment Law*

3. Type 1 mulch shall consist of clean straw with no pasture hay.
4. Temporary seeding, if required, shall use Seed Mixture – 110B Oats.

B. Seed Mixtures:

240SR (Sandy Roadside)		
Common Name	lb/AC	% of mix
Brome grass, smooth	15.0	13.0
Bluegrass, Kentucky "Certified Park"	31.0	27.0
Bluegrass, Canada	15.0	13.0
Switch grass	2.9	2.5
Wheat-grass, slender	4.6	4.0
Fescue, Hard "Reliant II"	8.0	7.0
Rye-grass, perennial	23.0	20.0
Dropseed, sand	2.9	2.5
Bluestem, little *	4.0 *	3.5
Red clover	8.0	7.0
Prairie clover, purple	0.6	0.5
GRAND TOTAL	115	
<ul style="list-style-type: none"> Bulk with 50% PLS minimum. Sandy Roadside Mix 		
Typical Usage – Sand, loamy sand, sandy loam, sandy clay loam.		

250GR (General Roadside)		
Common Name	lb/AC	% of mix
Brome grass, smooth	14.7	14.0
Bluegrass, Kentucky "Certified Park"	30.4	29.0
Bluegrass, Canada	14.7	14.0
Switch grass	3.2	3.0
Wheat-grass, slender	4.2	4.0
Rye-grass, perennial	21.9	21.0
Timothy	3.2	3.0
Redtop	3.2	3.0
Alfalfa, creeping	6.3	6.0
White clover	3.2	3.0
GRAND TOTAL	105	
General Roadside Mix		
Typical Usage – All.		

260CT (Commercial Turf)		
Common Name	lb/AC	% of mix
Bluegrass, Kentucky "Certified Park"	48	32.0
Bluegrass, Canada	15	10.0
Bluegrass, Kentucky – low maintenance *	45	30.0
Fescue, hard	12	8.0
Rye-grass, perennial	30	20.0
GRAND TOTAL	150	
Commercial Turf Mix * Any accepted low maintenance Kentucky Bluegrass EXCEPT "Park"		
Typical Usage – Good topsoils, loams.		

270RT (Residential Turf)		
Common Name	lb/AC	% of mix
Bluegrass, Kentucky – Elite	45	25.0
Bluegrass, Kentucky – Improved	45	25.0
Bluegrass, Kentucky – low maintenance *	45	25.0
Red fescue, creeping	14.4	8.0
Rye-grass, perennial	30.6	17.0
GRAND TOTAL	180	
Residential Turf Mix		
Typical Usage – Good topsoils, loams		

280AG (Agricultural Areas)		
Common Name	lb/AC	% of mix
Alfalfa, creeping	22.5	30
Brome grass, smooth	15	20
Redtop	4.5	6.0
Rye-grass perennial	22.5	30
Switch grass	3	4.0

310NWT (Native Wet Tall)		
Common Name	lb/AC	% of mix
Bluestem, big	3.75	25.0
Indian grass	3.75	25.0
Wild-rye, Virginia	3.00	20.0
Switch grass	0.75	5.0
Blue-joint grass	0.37	2.5

280AG (Agricultural Areas)		
Common Name	lb/AC	% of mix
Timothy	3	4.0
Wheat-grass, slender	4.5	6.0
GRAND TOTAL	75	100.0
Typical Usage – Clay, clay loam, loam, silty clay, silty clay loam.		

310NWT (Native Wet Tall)		
Common Name	lb/AC	% of mix
Green bulrush	0.38	2.5
Wool grass	0.37	2.5
Giant bur reed	0.38	2.5
Cordgrass, prairie	2.25	15.0
Grass totals	15	100.0
Winter wheat *	84.0	80.0
Rye-grass, annual	16.8	16.0
Wheatgrass, slender	4.2	4.0
Cover Crop Totals	105	100.0
Wet Forbs Mixture	3.0	100.0
GRAND TOTAL	123	
* Oats to be substituted for spring planting. Native mix for wetter areas. Tall height.		
Typical Usage – Clay, clay loam, loam, silty clay, silty clay loam, silty loam, silt.		

C. Sodding Items

1. The sod to be used shall be Type A - Lawn Sod.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. GENERAL

1. The subgrade shall be shaped to approximate the contour of the finished surface. All construction debris shall be removed from the area prior to the placement of the topsoil. The subgrade shall be loosened with a disc or harrow to a depth of six-inches prior to application of the topsoil.
2. The topsoil shall be shaped to the approximate the contour of the finished surface, with a minimum depth of 4-inches, unless otherwise shown on the plan.. All construction debris shall be removed from the area prior to seeding or sodding. The topsoil shall be loosened with a disc or harrow to its full depth prior to seeding .
3. If, in the opinion of the City and/or City Engineer, that such maintenance is required, the City Engineer will notify the Contractor of the situation
4. The Contractor shall remove all rocks and debris from the surface prior to seeding and mulching.

B. SEEDING REQUIREMENTS

1. Turf establishment by seeding shall be done utilizing the various combinations of seed mixtures (including aquatic plants), fertilizing and mulching at disturbed areas as shown on the plans.
2. Areas prepared for seeding shall be free of rocks, debris and clumps of soil. The areas shall be graded uniformly and lawned areas shall be raked free of chunks exceeding ¾ inches diameter. Seed shall be applied with a drill seeder, unless otherwise approved in writing by the City Engineer.
3. Dormant seeding may be utilized in accordance with the referenced specification and technical memorandum, provided the final acceptance standards are met.

4. SEASON OF PLANTING

Seed Mix Designation	Seed Mix Name	Spring	Fall	Dormant Seeding	Dormant Seeding Temperature ⁴
240SR	Sandy Roadside	April 1 – June 1	July 20 – September 20	October 20 – November 15	40
250GR	General Roadside				
260CT	Commercial Turf				
270RT	Residential Turf				
280AG	Agricultural uses	April 1 – Sept. 1		Oct. 20 – Nov. 15.	40
310NWT	Native Wet Tall	April 15 – July 20	September 20 – October 20	October 20 – November 15	50
110B	Oats	May 1 – August 1	-	-	-

C. SODDING REQUIREMENTS

1. Sod shall be placed by the Contractor in the disturbed boulevard areas as directed by the City Engineer.
2. When placing sod in irregularly shaped locations, the Contractor shall produce sharp, straight joints between sod rolls.
3. Sod shall be placed to create a firm, smooth, uniform surface without ruts, knobs or wrinkles.
4. The Contractor shall be responsible for providing water and maintenance for a period of 30 growing days to firmly establish the sod. The term maintenance shall include mowing and weed control, as necessary, and shall be considered incidental.
5. All re-work necessary to repair imperfections in sod placement shall be performed at the Contractor's expense.

****END OF SECTION****

⁴ Maximum soil temperature.

SECTION 02930 - PLANT INSTALLATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to plant installation as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2571 shall apply to plant installation, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Nursery Stock
 - 1. Plant materials shall conform to the requirements of Mn/DOT Specification 3861.
 - 2. No substitutions will be accepted without written approval from the City or City Engineer.
 - 3. Treated burlap will be allowed on soil balls, as an exception to Mn/DOT Specification 2571.3F, and 3861.2G, if vertical slits are cut through the burlap. The vertical slits shall be made at six (6) inch intervals horizontally around the circumference of the root ball and shall be made from the top of the root ball extending downward and shall be done in a manner which does not damage the root system.
- B. Root guard shall be Typar Bio Barrier, or approved equal.
- C. Landscaping rock shall be 1 -1/2" washed river gravel, or other rock approved by the City.
- D. Weed control landscape fabric shall be non-biodegradable, non-woven, chemically inert and resistant to fertilizers and soil chemicals. Fabric shall be a rot-proof synthetic material and shall contain inhibitors to make the fabric resistant to heat and ultraviolet exposure. It shall be dimensionally stable so that fibers maintain their positions with respect to each other. It shall be water permeable and shall be free from any chemical treatment or coating that might significantly affect its physical properties. Suitable fabrics include Mirascape, Weed-check or Supac 5NP.
- E. Shredded hardwood mulch shall be provided free of dirt, ashes, sawdust, rocks, leaves, roots, black bark mold or any other debris.
- F. Poly Edging shall be 5" in width and similar to Valley View Black Diamond Brand with interconnects which will allow edging to be installed in a continuous line.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Planting operations shall not be started, nor shall any planting stock be delivered to the Project site, until all other work has been completed in the area of the proposed planting site as determined by the City Engineer.

- B. The Contractor shall notify the City Engineer orally or in writing, as designated by the City Engineer, at least twenty four (24) hours prior to the start of any planting operations during this Contract, including layout staking, clearing, weed spraying, soil preparation, watering, mulching, plant protection, weeding and clean-up.
- C. All planting operations shall be performed during normal working hours and under conditions suitable for such work, as determined by the City Engineer, unless otherwise authorized by the City Engineer.
- D. Prior to cultivating seedling and shrub beds, the Contractor may kill all vegetation (top growth and roots) using a non-selective, non-residual post emergence herbicide containing (41.0%) glyphosate as an active ingredient. Labels of all herbicides to be used shall be submitted to the City Engineer for review at least three (3) days prior to the contemplated date of application. The application shall be performed, in accordance with manufacturer's recommendations, by crews experienced and licensed by the State in the use of chemical pesticides.
- E. Select salvaged topsoil shall be used for preparation of planting soil. Grade 2 compost conforming to Mn/DOT Specification 2890.2B shall be mixed with the topsoil at a rate of three (3) parts topsoil to one (1) part compost.
- F. In all landscape planting beds, two (2) inches of Grade 2 compost conforming to Mn/DOT Specification 3890.2B shall be applied over the soil surface and shall be roto-tilled uniformly into the top twelve (12) inches of in place soil.
- G. The Plant Establishment Period will be one (1) calendar year from the date of final acceptance of the project. Replacement of dead, defective or missing plants or incidental materials shall be required immediately or as soon as is practicable within an appropriate period of time as ordered by the City or City Engineer. It is anticipated that the plant establishment will be included in the specified warrantee period and that no retainage will be held throughout the plant establishment period unless the City or City Engineer determine that the materials or procedures warrant such a retainage.
- H. Watering during the Plant Establishment Period shall consist of maintaining adequate (but not excessive) soil moisture at all times. It is recommended that after the initial thorough "watering in", every plant should receive a thorough watering, as necessary, at weekly intervals, on the average, throughout the growing season (approximately May 1 thru October 1). General water guidelines for the average condition are as follows:

<u>Plant Type</u>	<u>Average Amount of Water Per Application</u>
Machine Transplanted	50 to 100 Gallons
Trees (3" caliper plus)	
Balled & Burlapped Trees	20 Gallons ±
Bare Root Trees	15 Gallons ±
Balled & Burlapped Shrubs	10 Gallons ±
Bare Root or Container Shrubs	7 Gallons ±

- I. The Contractor is expected to carry insurance to cover responsibility for plants lost to acts of vandalism, theft and rodent damage. In the case of repeated and excessive vandalism, theft, and rodent damage, the City will make a determination as to whether the plants will be deleted or replaced again subsequent to initial replacement with additional compensation in accordance with the Contract prices.
- J. The Contractor shall install root guards as specified at all tree grate locations as shown on the plans. The Contractor shall protect tree grate castings from breakage due to vehicular traffic prior to the planting of the trees. If the tree grates are not protected, and breakage occurs due to traffic loading during the construction period, the Contractor will replace the tree grate casting at their expense.

****END OF SECTION****

SECTION 02932 - TRANSPLANT TREE

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to transplanting trees as indicated on the drawings or as specified herein.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall use a tree spade or other approved equipment to transplant live trees as shown on the drawings or as directed by the City Engineer.
- B. The tree spade shall be of suitable size such that it leaves the root system essentially intact during excavation and planting.
- C. The City will be responsible for maintaining the tree after it has been transplanted.

******END OF SECTION******

SECTION 2955 - DRAIN TILE REPAIR

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to drain tile repair, as indicated on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification No. 2502 shall apply to drain tile repair, except as modified herein.
- B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 DRAIN TILE REPAIR PIPE AND FITTINGS

- A. Solid Wall Polyvinyl Chloride (PVC) Pipe
 - 1. 4" through 15" Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D-3034 for the Standard Dimension Ratio (SDR) of 35.
 - 2. The connection shall be push-on with elastomeric gasketed joints, which are bonded to the inner walls of the gasket recess of the bell socket.
 - 3. The pipe grade used shall be resistant to aggressive soil and corrosive substances in accordance with the requirements of ASTM D-543.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. Drain Tile Repair
 - 1. The Contractor shall immediately notify the City Engineer whenever drain tile lines are discovered.
 - 2. If the existing drain tile is determined to be in service, the Contractor shall repair these lines with the same size or larger, solid wall PVC pipe as specified.
 - 3. The pipe connection with the existing joint shall be field connected so that the inverts match to form a smooth transition. The connection transition joint shall be given a full circumferential wrap of geotextile fabric meeting the requirements of Mn/DOT Section 3733 for Type II material. The geotextile shall be not less than 2-1/2 feet wide and shall be centered on the joint. The circumferential wrap shall overlap itself by not less than one foot.
 - 4. The connection shall be sealed with an approved concrete grout collar having a minimum thickness of 6-inches over the entire length of the geotextile wrap.

3.2 INSTALLATION OF PIPE AND FITTINGS

- A. Connection and Assembly of Joints
 - 1. All joints shall be water tight.

B. Bulkheading Open Pipe Ends

1. The Contractor shall furnish, install and maintain a temporary, water-tight plug adequately blocked in place to prevent flooding of the existing downstream sewer system. The plug shall be placed at the beginning of the project or at the end of each working day at the end of the day's operation.
2. When flows are diverted from an existing sewer to be abandoned in place, the Contractor shall construct a water-tight plug on the open end of the abandoned sewer.

3.3 FIELD QUALITY CONTROL

A. None

****END OF SECTION****

SECTION 02960 - PAVEMENT MILLING

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the milling of concrete or bituminous pavement as shown on the drawings or as specified herein.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 2232 shall apply to the milling of all pavements, except as modified herein.
- B. Mn/DOT Specification Section 2211 shall apply to the installation of milled materials as an aggregate base, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. All milled materials shall remain the property of the City and shall be stockpiled by the Contractor for later reuse by the City.

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. No exception to the referenced specifications is made.

******END OF SECTION******

SECTION 02975 -BITUMINOUS SURFACE CRACK AND JOINT REPAIR

PART 1 -- GENERAL

1.1 SUMMARY

- A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the repairing of the existing bituminous surface improvements shall including routing, cleaning and sealing the existing surface prior to placement of the overlay.

1.2 SPECIFICATION REFERENCES

- A. Mn/DOT Specification Section 3723 shall apply to the sealing of all cracks for airports, except as modified herein.
- B. Mn/DOT Specification Section 3719 shall apply to the sealing of all cracks for roadways, except as modified herein.
- C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Crack Sealant
 - 1. The crack sealant compound shall be packaged in sealed containers. Each container shall be clearly marked with the name of the manufacturer, the trade name of the sealant, the manufacturer's batch and lot number, the pouring temperature, and the safe heating temperature.
 - 2. Mixing of different manufacturer's brands or different types of sealant shall be prohibited

PART 3 -- EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. A copy of the manufacturer's recommendations pertaining to the heating and application of the joint sealant material shall be submitted to the City Engineer prior to the commencement of work. These recommendations shall be adhered to and followed by the contractor. The temperature of the sealer in the field application equipment shall never exceed the safe heating temperature recommended by the manufacturer. Any given quantity of material shall not be heated at the pouring temperature for more than six hours and shall never be reheated. Sealing shall not proceed if the temperature of the material has not reached or has fallen below the manufacturer's recommended minimum application temperature.
- B. Sealant materials may be placed during a period of rising temperature after the air temperature in the shade and away from artificial heat has reach 40 degrees F and indications are for a continued rise in temperature. During a period of falling temperature, the placement of sealant material shall be suspended when the air temperature, in the shade and away from artificial heat, reaches 40 degrees F. Sealant shall not be placed when in the opinion of the City Engineer, the weather or roadbed conditions are unfavorable.
- C. Routing and sealing will be permitted only during daylight hours between May 1 and October 15..

- D. The City Engineer shall determine the actual areas that will be repaired by marking the existing cracks to be routed, cleaned and sealed. The routing, cleaning and sealing shall extend the full width of the surface on transverse cracks.
- E. The Contractor shall conduct the bituminous crack sealing operations so that routing, cleaning and sealing is a continuous operation. Traffic shall not be allowed to kneed together or damage the reservoir once it has been created. Routed cracks not sealed before traffic is allowed on the surface shall be re-routed at no additional cost to the City.
1. ROUTING. The routing equipment shall be mechanical and power driven and shall be capable of following the existing cracks. All cracks shall be routed 1 inch wide x 1 inch deep. The cracks shall be routed with sharp router blades to the specified dimensions without deviation from the existing crack or creating excessive spalling. Equipment designed to "plow" the cracks to dimension will not be permitted. Wet sawing will not be allowed.
 2. CLEANING. Immediately prior to cleaning and sealing the cracks, the entire bituminous surface shall be cleaned to remove all loosened bituminous particles and foreign material and the cracks shall be blown clean with oil-free compressed air. Compressed air shall be 100 psi and 75 cfm minimum at the nozzle. The crack and surface area six (6) inches on both sides will then be cleaned and dried with a hot compressed air heat lance. The heat lance shall meet the following requirements: temperature of heated air at exit or orifice minimum of 2,800 degrees F. Velocity of exiting heated air minimum of 2,800 fps. The application time and final results of the cleaning are subject to the City Engineer's approval.
 3. SEALING. After the cracks have been properly cleaned, the Contractor shall install a foam backer rod in those cracks wider than 1/4 inch which extend below the bottom to the routed joint. The backer rod shall be compressed to fill the entire width of the crack and shall not protrude up above the bottom of the routed reservoir. The Contractor shall install a bond breaker tape at the bottom of the routed reservoir for those cracks less than 1/4 inch in width which extended below the bottom of the routed joint.
- F. The sealant shall be placed evenly in two separate applications. The first application shall fill the reservoir to approximately three-fourths the depth of the routed joint. After the first application has sufficiently cooled, the second application shall be placed to provide an "over bond" seal with the bituminous pavement. The over band shall be of the width and thickness to assure a tight seal with the pavement surface. The sealant shall be pressure applied with a wand type applicator; pour pots or similar devices shall not be used to apply the crack sealant. The applicator wand shall be returned to the machine and the crack sealant materials reticulated immediately upon completion of each crack.

****END OF SECTION****