

**Chaska Yards**  
212 North Walnut Street  
Chaska, Minnesota

**PROJECT MANUAL**



July 22, 2024

Prepared by

**MacDonald & Mack Architects, LTD.**  
3101 East Franklin Avenue  
Minneapolis, Minnesota 55406  
T: 612.341.4051

I hereby certify these specifications were prepared  
by me or under my direct supervision and  
that I am a Duly Registered Architect under the  
laws of the State of Minnesota.

---

Todd A. Grover / Reg. No. 43014

## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Contractor's use of site and premises.
4. Work restrictions.
5. Specification and Drawing conventions.

#### 1.2 PROJECT INFORMATION

##### A. Project Identification: Chaska Yards.

1. Project Location: 212 North Walnut Street, Chaska, MN 55318.

##### B. Owner: Carver County CDA, 705 Walnut Street, Chaska, MN 55318.

1. Owner's Representative: Allison Streich, allisons@carvercds.org.

##### C. Architect: MacDonald & Mack Architects, 3101 Franklin Avenue, Minneapolis, MN 55406.

1. Architect's Representative: Todd Grover, toddg@mm-architects.com.

##### D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. Civil Engineering: BKBM. Joel Maier, PE, jmaier@bkbm.com.
2. Landscape Architecture: Damon Farber, Andrew Montgomery, PLA, amontgomery@damonfarber.com.

#### 1.3 WORK COVERED BY CONTRACT DOCUMENTS

##### A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Rehabilitation of the Historic Ernst/Riedele House:
  - a. New roofing.
  - b. Porch rehabilitation.
  - c. Window rehabilitation.
  - d. Masonry repair.
  - e. Interior rehabilitation installing: new wall configurations, electrical, HVAC, plumbing, stairs, kitchen, bathrooms, and interior finishes.
2. Construction of 3 new housing units.

3. Construction of a 4-stall garage.
4. Site regrading.
5. New site walkways, driveways, and stone retaining walls.
6. New fencing, planting, and landscaping.
7. All new electrical, water service, and sewer service to the site.
8. Storm water connection to existing City service and piping through site
9. And other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.5 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets, work on public streets, rights of way, noise control, dust control, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Meet requirements of the City of Chaska for working hours.
- C. Smoking and Controlled Substance Restrictions: Use of tobacco products and other controlled substances on Project site is not permitted.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
  3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
  4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

## SECTION 013591 - HISTORIC TREATMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes general protection and treatment procedures for designated historic spaces, areas, rooms, and surfaces in Project.

#### 1.2 DEFINITIONS

- A. Consolidate: To strengthen loose or deteriorated materials in place.
- B. Dismantle: To disassemble or detach a historic item from a surface, or a nonhistoric item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- C. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- D. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- E. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.
- F. Remove: To take down or detach a nonhistoric item located within a historic space, area, or room, using methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.
- L. Retain: To keep an element or detail secure and intact.

- M. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.
- N. Salvage: To protect removed or dismantled items and deliver them to Owner[ ready for reuse].
- O. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.
- P. Strip: To remove existing finish down to base material unless otherwise indicated.

### 1.3 PROJECT MEETINGS FOR HISTORIC TREATMENT

- A. Preliminary Historic Treatment Conference: Before starting historic treatment work, conduct conference at Project site.
  - 1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, historic treatment specialists, chemical-cleaner manufacturer(s), and installers whose work interfaces with or affects historic treatment shall be represented at the meeting.
  - 2. Agenda: Discuss items of significance that could affect progress of historic treatment work, including review of the following:
    - a. Fire-prevention plan.
    - b. Governing regulations.
    - c. Areas where existing construction is to remain and the required protection.
    - d. Sequence of historic treatment work operations.
    - e. Storage, protection, and accounting for salvaged and specially fabricated items.
    - f. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
  - 3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

### 1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Historic Treatment Program: Submit 10 days before work begins.
- B. Fire-Prevention Plan: Submit 10 days before work begins.

## 1.6 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: An experienced firm regularly engaged in historic treatments similar in nature, materials, design, and extent to the work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
- B. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.
- C. Historic Treatment Program: Prepare a written plan for historic treatment for whole Project, including each phase or process and protection of surrounding materials during operations. Describe in detail the materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project historic treatment program with specific requirements of programs required in other historic treatment Sections.
  - 1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
  - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- D. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- E. Safety and Health Standard: ANSI/ASSP A10.6.

## 1.7 STORAGE AND HANDLING OF HISTORIC MATERIALS

- A. Historic Materials for Reinstallation:
  - 1. Repair and clean historic items for reuse as indicated.
  - 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
  - 3. Protect items from damage during transport and storage.
  - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- B. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

- C. Storage: Store historic items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

## PART 2 - PRODUCTS - (Not Used)

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.
  - 1. Use only proven protection methods, appropriate to each area and surface being protected.
  - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where historic treatment work is being performed.
  - 3. Erect temporary barriers to form and maintain fire-egress routes.
  - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during historic treatment work.
  - 5. Contain dust and debris generated by historic treatment work, and prevent it from reaching the public or adjacent surfaces.
  - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
  - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
- B. Temporary Protection of Historic Materials:
  - 1. Protect existing historic materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
  - 2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
  - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by historic treatment work before commencing operations.
  - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for historic treatment work.
  - 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.



- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
  - 1. Prevent solids such as stone or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
  - 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

### 3.2 PROTECTION FROM FIRE

- A. Follow fire-prevention plan and the following:
  - 1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
  - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
    - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
  - 3. Prohibit smoking by all persons within Project work and staging areas.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
  - 1. Use of open-flame equipment is not permitted.
  - 2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
  - 3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that area is safe.
  - 4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
  - 5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
  - 6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
    - a. Train each fire watch in proper operation of fire-control equipment and alarms.
    - b. Prohibit fire-watch personnel from other work that would distract from fire-watch duties.
    - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.

- d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for type of fire risk in each work area. Ensure that nearby personnel and fire-watch personnel are trained in fire-extinguisher and blanket use.

### 3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

### 3.4 GENERAL HISTORIC TREATMENT

- A. Have historic treatment work performed only by qualified historic treatment specialists.
- B. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work.
- D. Perform regular inspections of Project site as the Work progresses to detect hazards resulting from historic treatment procedures.
- E. Follow the procedures in subparagraphs below and procedures approved in historic treatment program unless otherwise indicated:
  - 1. Retain as much existing material as possible; repair and consolidate rather than replace.
  - 2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.

3. Use reversible processes wherever possible.
  4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
- F. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
1. Do not proceed with the work in question until directed by Architect.
- G. Where missing features are indicated to be repaired or replaced, provide work with appearance based on accurate duplications rather than on conjecture, subject to approval of Architect.
- H. Where work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.
- I. Identify new and replacement materials and features with permanent marks hidden in the completed Work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

END OF SECTION 013591

SECTION 01 5713  
EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Provide protection of the environment during the construction of this project to reduce soil erosion and siltation to meet all local, state, and federal standards.
- C. Erosion and sediment control; as indicated on the Drawings, specified herein; including, but not limited to:
  - 1. Erosion Control Blankets
  - 2. Inlet Sediment Prevention Devices
  - 3. Temporary Seed
  - 4. Rock Construction Entrance
  - 5. Straw Mulch
- D. Prevention of erosion due to construction activities.
- E. Prevention of sedimentation of waterways, open drainage ways, and storm sewers due to construction activities.
- F. Restoration of areas eroded due to insufficient preventive measures.
- G. Maintain, replace, and remove all erosion control devices once vegetation has been established and all areas have been paved.
- H. Compensation to Owner/Governing agencies for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.2 RELATED SECTIONS

- A. Section 02 4113 - Selective Site Demolition.
- B. Section 31 0000 - Earthwork.
- C. Section 31 1000 - Site Clearing.
- D. Section 31 2333 - Trenching and Backfilling.

- E. Section 33 4000 - Storm Drainage Utilities.

### 1.3 REFERENCES

- A. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction; 2012 (Reapproved 2022).
- B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 2022.
- C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015.
- D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a (Reapproved 2023).
- E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.
- F. ASTM D4884/D4884M - Standard Test Method for Strength of Sewn or Bonded Seams of Geotextiles; 2014A.
- G. ASTM D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile- Related Products Using a 50-mm Probe; 2014.
- H. Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction". Only applicable portions of construction methods and materials apply. References to methods of measurement or payment are not applicable.
  - 1. MN/DOT 3733 - Geotextiles
  - 2. MN/DOT 3876 - Seed
- I. Minnesota Department of Labor and Industry - Minnesota State Building Code.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Comply with all requirements of the City of Chaska for erosion and sedimentation control.
- B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- C. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- D. Erosion On-site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.

1. Control movement of sediment and soil from temporary stockpiles of soil.
  2. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- E. Erosion Off-site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
1. Prevent windblown soil from leaving the project site.
  2. Prevent tracking of mud onto public roads outside site.
  3. Prevent mud and sediment from flowing onto sidewalks and pavements.
  4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- F. Sedimentation of Waterways Off-site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways and storm sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- G. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

#### 1.5 GENERAL

- A. Exercise every precaution, throughout the life of the project, to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground or roadway surfaces, or other property. Erosion control practices to be used for this project are as indicated on the Drawings and directed by the local governing agency.
- B. The Contractor is solely responsible for the cleanup of any rivers, streams, lakes, reservoirs, other water impoundments, ground or roadway surfaces or other property damaged by construction activity related to this project.
- C. Coordinate the placement of temporary turf establishment provisions with the placement of permanent turf establishment.

#### 1.6 QUALITY CONTROL

- A. Conform to all applicable code for materials and installation of the Work of this Section.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated.

## 1.7 REGULATORY AGENCIES

- A. Comply with requirements of state, regional, and local erosion and sediment control regulatory authorities.

## 1.8 SUBMITTALS

- A. Submit under provisions of Division One Specifications.
- B. Product Data: Submit manufacturer's product data for perimeter sediment control materials; including fabrics and posts.
- C. Shop Drawings: Indicate complete silt fence and erosion control layout, dimensions, and termination details prior to construction.

## PART 2 PRODUCTS

### 2.1 EROSION CONTROL BLANKETS

- A. Blankets are machine produced mats consisting of a uniform web of interlocking straw fibers with net backing. The blankets shall be a consistent thickness with the fiber evenly distributed over the entire area of the blanket. The top and bottom sides of each blanket are covered with a natural fiber mesh. The blanket is smolder-resistant without the use of chemical additives. The Blanket shall meet the requirements of MN/DOT 3885 Category 20. Provide erosion control blankets such as “Enviroscape ECM S2000BD, American Excelsior AEC Premier Straw Dbl. Net FiberNet, Erosion Control Blanket.com S32BD, EroGuard EG-2s NN” or approved equivalent by the Engineer.

- 1. Erosion blankets shall be used at slopes and berms, ditches, and other “hard to hold” problem areas.

### 2.2 INFRASAFE SEDIMENT CONTROL BARRIER

- A. InfrSAFE sediment barrier is manufactured by Royal Environmental Systems Inc. Stacy, MN.
- B. The InfrSAFE sediment control barrier device consists of a reusable polyethylene product. The barrier and frame set inside of the access opening or hole of the top slab or cone section of the catch basin structure. The polyethylene barrier is manufactured with perforations in its sidewalls and is wrapped in a geotextile fabric to allow storm water runoff to drain into the structure. A larger opening near the top of the barrier allows greater amounts of water into the system during large rainfall events.

### 2.3 WIMCO ROAD DRAIN PROTECTION DEVICES

- A. WIMCO Road Drain protection devices are manufactured by WIMCO Inc. Shakopee, MN.

B. Material:

1. Model # RD23, Road Drain.
2. Model # CG3067, Curb and Gutter Drain.
3. The WIMCO road drain protection device consists of a reusable, open topped receptacle that sets inside the storm sewer grate. An incorporated rear deflector plate is connected to the receptacle directing the water into the basin for filtration.
4. The filter media shall meet all local specifications for inlet protection.

2.4 SILTSACK

A. Material:

1. The SILTSACK or approved equal shall be manufactured from woven polypropylene fabric with all seams double stitched using nylon thread.
2. The seams shall have certified average wide width strength per ASTM D4884/D4884M as follows:
  - a. Regular flow seam strength:
    - 1) Maximum Load - 852 lbs
    - 2) Maximum strength - 1280 lbs/ft
  - b. Hi flow seam strength:
    - 1) Maximum load - 800 lbs
    - 2) Maximum strength - 1200 lbs./ft.

- B. Procurement of the devices shall be obtained from ACF Environmental, Inc., 1801-A Willis Road, Richmond, Virginia, 23237, phone number 1-800-644-9223.

2.5 TEMPORARY SEED

- A. For temporary spring/summer cover, a MN/DOT 21-111 (oats) seed mix shall be applied. For a fall cover, a MN/DOT 21-112 (winter wheat) seed mix applied. Apply seed mix at a rate of 100 pounds per acre.

2.6 ROCK FOR TEMPORARY CONSTRUCTION ENTRANCE

- A. One and one-half (1.5") inch to three (3") inch crushed rock meeting ASTM D448, Gradation Number two (2).

2.7 GEOTEXTILE FABRIC UNDER ROCK CONSTRUCTION ENTRANCE

- A. MN/DOT Spec 3733, Type III shall be used under rock construction entrance.
- B. Minimum grab tensile strength, ASTM D4632/D4632M, 100 pounds Class III.



- C. Minimum elongation, ASTM D4632/D4632M 50%.
- D. Minimum seam breaking strength, ASTM D4632/D4632M, 90 pounds Class III.
- E. Apparent opening size ASTM D4751, 50 US Std. Sieve size.
- F. Minimum permittivity falling head ASTM D4491, 0.5.

## 2.8 STRAW MULCH

- A. Straw: Dry, rot free small grain cuttings free of seed-bearing stalks of noxious grasses and weeds. The mulch shall be in an air-dried condition.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### 3.2 PREPARATION

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

### 3.3 GENERAL

- A. Construct and maintain all erosion control measures until the Substantial Completion of the project, or as directed by the Engineer.
- B. Install temporary erosion and sediment control items prior to site preparation.
- C. Install erosion control items as detailed and in locations shown on the Drawings and as required by permit.
- D. The Contractor shall schedule and conduct their operations to minimize the erosion of soils, to prevent siltation, and to minimize the turbidity of storm sewer runoff entering storm sewers, streams, ditches and lakes.
- E. No work shall be started in the affected area until the applicable erosion control schedules and methods have been accepted by the designated erosion control inspector.
- F. The Contractor shall install adequate safeguards to minimize water pollution from haul roads, work platforms, temporary earthen fills and any other temporary construction that he uses to facilitate construction. The Contractor shall obtain all necessary permits from the regulatory agencies for temporary work not shown on the Drawings.

### 3.4 EROSION CONTROL

- A. The Contractor shall install sediment traps at existing and proposed catch basins within the construction zone. Sediment traps shall remain in place until turf and pavement surfaces are established. Filter fabric between casting and frame will not be allowed. Contact Engineer prior to removal.
- B. Repair or replace any erosion control devices that have been disrupted during operations as required by local regulation. This work and material shall be considered part of the Base Bid Contract and no additional compensation shall be made therefore.
- C. Sediment control devices are to be installed and shall remain in place until turf has been established. Contact the Engineer prior to removal.
- D. The Contractor shall schedule and conduct their operations so as to minimize erosion of soils and to prevent silting and muddying of streams, irrigation systems, and impoundments (lakes, reservoirs, etc.). Construction of drainage facilities, turf establishment items, and other Contract Work that will contribute to the control of erosion and sedimentation shall be carried out concurrently with earthwork operations or as soon thereafter as practicable.
- E. While operations are in progress and prior to suspension of grading operations for longer than fourteen (14) days, areas of bare soil exposed to erosion possibility shall be shaped to permit storm runoff with minimum erosion. Temporary berms, dikes, slope drains or sedimentation basins will be required where possibilities for water pollution exist and the permanent erosion controls are not completely operative.
- F. Erosion control devices shall remain in place until other means of permanent control such as turf establishment and paving has taken place.
- G. Application of erosion control blanket: Where slopes are three (3') feet horizontal to one (1') foot vertical or greater and in the areas where indicated on the Drawings, erosion control blanket per MN/DOT Specification Section 3885.2 shall be applied.
- H. Restoration:
  - 1. Control of drainage and erosion shall include restoration work as the Engineer considers necessary in preventing siltation of public waters. Restoration shall include cleanup, shaping, and replacement of topsoil and establishment of vegetative cover on all disturbed areas where water pollution potentials have been increased due to the Contractor's operations.
- I. Compensation:
  - 1. All expenses incurred in complying with the provisions hereof and effectively preventing pollution of public waters or public infrastructure shall be borne by the Contractor with no direct compensation being made therefore.

### 3.5 WIMCO ROAD DRAIN PROTECTION DEVICES - INSTALLATION

- A. Remove the grate from the storm sewer casting.

- B. Clean all edges of the casting frame.
- C. Place filter media over the filter cartridge and install to unit.
- D. Insert the receptacle into the casting frame.
- E. Install casting grate on top of the model making sure the grate is secure for traffic.
- F. The maximum height change should be 1/8" of the casting cover to frame.
- G. Installation, Maintenance and Removal:
  - 1. The devices shall be sized to fit the catch basin opening and shall be fastened according to the manufacturer's instructions.
  - 2. The sediment control device shall be removed, emptied and replaced when the level of silt rises above the midpoint.
  - 3. The sediment control device shall be permanently removed only after permanent surfaces are established and all loose silt on the surface adjacent to the device has been removed. Removal shall be coordinated with the City Erosion Control Officer.
- H. The cost of installation, maintenance and removal shall be considered part of the Base Bid Contract with no additional compensation granted.

### 3.6 EROSION CONTROL BLANKET - INSTALLATION

- A. Properly prepare, fertilize and seed areas to be covered before blanket is applied. When the blanket is unrolled, netting should be on top and fibers in contact with the soil over the entire area.
- B. In ditches, apply blankets in the direction the water flows, butting them at the ends and sides and then stapling.
- C. On slopes, apply blankets vertically to the slope, parallel to the direction of flow, butting ends and sides and then staple.
- D. Use wire staples, ninety-one one-thousandths (0.091") inch in diameter or greater, "U" shaped with legs six (6") inches in length and a one (1") inch crown. Size and gauge of staples used will vary with soil conditions. Drive staples vertically into the ground. Use four (4) staples across at the start of each roll. For slope installation, continue to staple along the length of the roll at six (6') foot intervals. For ditch liner, staple along the length of the roll at four (4') foot intervals. Another row of staples in the center of each blanket should be alternately spaced between each side of either the slope or the ditch. Use a common row of staples on adjoining blankets.

### 3.7 CONSTRUCTION ENTRANCE

- A. Construct a gravel area or pad at points where vehicles enter and leave the construction site. The rock entrance shall be a minimum of 50 feet long and 12 feet wide.
- B. Clear the entrance and exit area of all vegetation, roots and other objectionable material and properly grade and place gravel to the grade and dimensions shown on the Plans.
- C. Construct drainage channels to carry water to a sediment trap or other suitable outlet.
- D. Install geotextile fabric under rock to improve the stability of the foundation.
- E. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site by periodic top dressing with two (2") inch stone.
- F. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary.
- G. Immediately remove sediment spilled, washed or tracked onto public roadways.

### 3.8 TEMPORARY SEEDING

- A. Seeding:
  - 1. Apply seed per the rate indicated under Products - Temporary Seed of this Section.
  - 2. The seedbed should be prepared to a depth of approximately 3 inches. In compacted or hard soils, use a disc or ripper to prepare the seedbed by loosening a minimum of the top three inches of soil. The seedbed preparation should not be prepared under excessively wet conditions.
  - 3. Seed should be evenly applied with a cyclone seeder, drill or cultipacker seeder at a seeding depth of ½ inch, ensuring good seed to soil contact.
  - 4. The grass area shall be mulched with a MN/DOT 3882 Type 1 mulch at the rate of 2 tons per acre. Once the area is mulched, the mulch shall be disc-anchored into the soil.
  - 5. Erosion control blankets shall be installed as specified for the following areas:
    - a. Slopes that are 3:1 or steeper.
    - b. Hard to hold problem areas.
- B. Provide a temporary cover for erosion control on disturbed areas that will remain unstabilized for a period of more than thirty (30) days. This practice applies to cleared areas, diversions, dams, temporary sediment basins, temporary road banks and topsoil stockpiles where vegetation is needed for less than one (1) year.
- C. Provide grass on slopes 5 percent or greater within fourteen (14) days of disturbance.
- D. Provide water if necessary to aid the establishment of the turf.
- E. After turf grasses reach a height of 6 inches, initially mow the area to a height of 2 to 3 inches.

### 3.9 INLET PROTECTION

- A. Install WIMCO, InfrSAFE or other approved sediment barrier devices around the storm drain inlets per manufacturer's specification and as detailed within the Drawings.
- B. InfrSAFE sediment barriers shall be surrounded with 3/4-inch minus washed rock to filter the storm water runoff prior to it draining through the weep holes in the barrier device.
- C. Construct temporary sediment barriers around the storm drain curb inlets using block and gravel silt fence or interior sacks per City and State standards and specifications. Installation shall be as detailed on drawings.
- D. Inspect the structure after each rainfall and repair, clean or replace as required.
- E. Remove sediment when trap reaches one-third (1/3) capacity.
- F. Remove structure when protected areas have been stabilized.

### 3.10 TEMPORARY SEDIMENT TRAPS

- A. Utilize temporary sediment traps at the bottom of all disturbed slopes where run-off is parallel to the utility trench and draining into an existing ditch or stream, and where slopes are 5 percent or greater along the trench.
- B. Provide at intervals of seventy-five (75') feet.

### 3.11 REMOVAL AND CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

## SECTION 017300 - EXECUTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering.
  - 3. Installation.
  - 4. Cutting and patching.
  - 5. Coordination of Owner's portion of the Work.
  - 6. Progress cleaning.
  - 7. Starting and adjusting.
  - 8. Protection of installed construction.
  - 9. Correction of the Work.

#### 1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

#### 1.3 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect through RFIs.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a surveyor or engineer experienced in laying out the Work, using the following accepted surveying practices:
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and



duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

### 3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb, and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches (2300 mm) in unoccupied spaces, unless otherwise indicated on Drawings.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

### 3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
  - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.7 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, in accordance with regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in [Section 015000 "Temporary Facilities and Controls."] [Section 017419 "Construction Waste Management and Disposal."]

Three paragraphs below reduce or eliminate the need for similar provisions in other Sections. Insert other provisions needed because of unusual Project conditions. Specify unusual provisions for specific work in the individual Section.

- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

### 3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

### 3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.

- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 02 4113  
SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Selective site demolition of designated items; including removal of materials from site, legal disposal off-site and salvage of items which are identified on the plan documents for Owner.
  - 1. Selective demolition of existing structures including below grade foundations.
    - a. Miscellaneous foundations in the entirety.
  - 2. Asphalt paved areas, including saw cutting.
  - 3. Concrete walks, slabs, and curb and gutter; including saw cutting.
  - 4. Tree and landscape removal, including roots.
  - 5. Site signage, posts, bollards, fencing and associated foundations.
  - 6. Designated work in City right-of-way.
- C. Abandonment and removal of identified existing utilities and utility structures.
  - 1. Storm sewer piping, structures, and appurtenances.

1.2 RELATED SECTIONS

- A. Section 01 5713 - Erosion and Sediment Controls.
- B. Section 31 0000 - Earthwork.
- C. Section 31 1000 - Site Clearing.

1.3 REFERENCES

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).
- C. Minnesota Department of Labor and Industry - Minnesota State Building Code.

#### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. Demolition Firm: Company specializing in the type of work required.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Division One Specifications.
- B. Schedule: Indicate demolition and removal sequence and location of salvageable items, location and construction of barricades, fences and temporary work.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities, subsurface construction and any other items relocated.

#### 1.6 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.
- B. Protection of Persons: The Owner's activities will continue about the site during construction. Install barricade fencing (snow fence), as necessary, to provide a safe environment between construction work and pedestrian circulation.
- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, buildings/structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  - 2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.



3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
4. Locate, excavate, and expose all existing underground lines in advance of trenching operations.
5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.

E. Traffic Control:

1. Maintain vehicular and pedestrian traffic as required for construction activities.
2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.
3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to the State Building Code and all applicable codes for demolition of site structures, safety of adjacent structures, dust control, run-off control and disposal.
- B. Notify affected utility companies before starting work and comply with their requirements, as outlined under the provisions of Division One Specifications.
- C. Do not close or obstruct roadways, sidewalks, or hydrants without permits.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Fill Material: As specified in Section 31 0000 - Earthwork.

### 2.2 EROSION CONTROL AND SILT FENCES

- A. Reference to Section 01 5713 - Erosion and Sediment Control.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Provide, erect and maintain temporary barriers, traffic control and security devices at locations as directed by the Engineer, City and Owner.
- B. Protect existing landscape materials, appurtenances, and structures that are not to be demolished.
- C. Prevent movement or settlement of adjacent structures. Provide bracing or shoring.
- D. Mark location of utilities.
- E. Once installed, all erosion control measures are to be approved by the City prior to the start of construction.

### 3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Comply with applicable requirements of NFPA 241.
  - 3. Use of explosives is not permitted.
  - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 5. Provide, erect, and maintain temporary barriers and security devices.
  - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
    - a. Cease operations immediately if adjacent structures appear to be in danger. Notify the Engineer and do not resume operations until directed.
  - 8. Do not close or obstruct roadways or sidewalks without permit.
  - 9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
  11. Sprinkle work with water to minimize dust. Provide hoses and water connections for this purpose.
- B. Do not begin removal until receipt of notification to proceed from Owner.
  - C. Do not begin removal until built elements to be salvaged or relocated have been removed.
  - D. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.
  - E. Protect existing structures and other elements that are not to be removed.
    1. Provide bracing and shoring.
    2. Prevent movement or settlement of adjacent structures.
    3. Stop work immediately if adjacent structures appear to be in danger.
  - F. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
  - G. Perform demolition in a manner that maximizes salvage and recycling of materials.
    1. Dismantle existing construction and separate materials.
    2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
  - H. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.
  - I. Underground Storage Tanks: Remove and dispose of as specified in Section 02 6500.

### 3.3 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without a permit from the authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

- E. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- F. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

### 3.4 CLEARING AND REMOVAL

- A. General: Remove structures and facilities indicated on the Drawings. Remove and dispose of all structures, except for that which is permitted to remain upon determination being made by the Engineer that their existence does not interfere with, endanger or detract from the new construction in any way.
- B. Removal Operations: Perform removal operations that may endanger new construction prior to construction of affected Work.
- C. Compliance with Instructions, Ordinances and State Laws: Comply with all instructions and ordinances of the State of Minnesota, and all counties and municipalities regarding disposal, signs, advertising, traffic corners, danger signals, barricades, fire protection and all safety laws, ordinances and rulings.
- D. Disposal of Materials and Debris: Dispose of debris resulting from the removal and demolition operations in accordance with specific regulations imposed by laws, ordinances, orders and decrees.
- E. Removal of Existing Structures: Remove and dispose of all structures, except for those that are specified to be removed by others or which are permitted to remain upon determination being made by the Engineer that their existence does not interfere with, endanger or detract from the new construction in any way. Catch basins and manholes designated for removal shall be removed entirely and the pipe leads closed per City standards. Manholes designated to remain shall be clearly marked in the field and protected at all times.
- F. Removal of Existing Pavements: Where a portion of an existing pavement is to be retained for use, that portion shall not be damaged during removal operations and/or construction activities. In removing concrete and bituminous pavements, sidewalks and similar structures, where the cut will be exposed in the finished Work, the structure shall, unless the removal is made to an existing joint and unless determined otherwise by the Engineer, be sawed along the removal lines with a concrete saw to a depth of not less than one-half (1/2) the thickness of the concrete or bituminous before breaking off the concrete or bituminous. In such cases, the use of wedges, driven into the saw cut to break off the portion to be removed, will not be permitted. Elsewhere, the structure shall be cut and chipped to true lines and vertical faces.
- G. Removal of Trees, Stumps, Brush and Vegetation: The clearing operations shall consist of the cutting and removal of trees, shrubs, bushes, windfalls and other vegetation in the designated areas. Grubbing operations shall consist of removing and disposing of the stumps, roots and other remains in their entirety.
- H. Disconnect, remove and/or cap designated utilities within demolition areas.

- I. All materials removed under this section shall be removed from the site. The cost of legal disposal of the existing materials shall be included in the Bid Price, and no additional compensation will be allowed.

### 3.5 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on information provided on the topographic survey. The Contractor shall call Gopher State One Call for a field locate and field locate actual utility locations.
  1. Verify that construction and utility arrangements are as shown.
  2. Report discrepancies to Engineer before disturbing existing installation.
  3. The beginning of demolition work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
  1. Remove items indicated on drawings.
- C. Services (Including but not limited to Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
  1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
  2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  3. Verify that abandoned services serve only abandoned facilities before removal.
  4. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- D. Protect existing work to remain.
  1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
  4. Patch as specified for patching new work.

### 3.6 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, trash and unused materials from site.

- B. Burning of debris is not permitted on the Owner's property.
- C. Remove all waste materials and unsuitable or excess topsoil from the Owner's property.
- D. The cost of disposal of waste materials is considered part of the Base Bid Contract.
- E. Remove from site all materials not to be reused on site.
- F. Leave site in clean condition, ready for subsequent work.
- G. Clean up spills and wind-blown debris from public and private lands.
- H. Keep all public roadways free of mud, soil and debris to the satisfaction of regulatory agencies.

END OF SECTION

## SECTION 040322 - HISTORIC BRICK UNIT MASONRY REPAIR

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes historic treatment work consisting of repairing historic clay brick masonry.

#### 1.2 DEFINITIONS

- A. Low-Pressure Spray:
  - 1. Pressure: [100 to 400 (690 to 2750)] psi (kPa).
  - 2. Flow Rate: [4 to 6 (0.25 to 0.4)] gpm (L/s).

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to masonry historic treatment and repair.
  - 2. Review methods and procedures related to repairing historic brick masonry.

#### 1.4 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic brick masonry repair specialist. Experience installing standard unit masonry is insufficient experience for masonry historic treatment work.
- B. Mockups: Prepare mockups of historic treatment to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
  - 1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches (1200 mm) in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
    - a. Replacement: Four brick units replaced.

## PART 2 - PRODUCTS

### 2.1 MASONRY MATERIALS

- A. Face Brick: Units, including molded, ground, cut, or sawed shapes as required to complete masonry repair work.
  - 1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork.

### 2.2 MORTAR MATERIALS

- A. See Specification section 040323 SF - Historic Brick Unit Masonry Repointing.

### 2.3 ACCESSORY MATERIALS

- A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.

### 2.4 MORTAR MIXES

- A. See Specification section 040323 SF - Historic Brick Unit Masonry Repointing.

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.
- B. Remove downspouts and associated hardware adjacent to immediate work area, and store during masonry repair work. Reinstall when repairs are complete.
  - 1. Provide temporary rain drainage during work to direct water away from building.

### 3.2 MASONRY REPAIR, GENERAL

- A. Have repair work performed only by qualified historic treatment specialist.

### 3.3 BRICK REMOVAL AND REPLACEMENT

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.



- B. Support and protect remaining masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units in existing backup, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible. Remove mortar and sealant from surfaces of removed units.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with other removed brick in good condition, where possible, matching existing brick. Do not use broken units unless they can be cut to usable size.
- H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
  - 1. Maintain joint width for replacement units to match existing joints.
  - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. (30 g/194 sq. cm per min.). Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
  - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
  - 2. Rake out mortar used for laying brick before mortar sets according to Section 040323 "Historic Brick Unit Masonry Repointing." Point at same time as repointing of surrounding area.
  - 3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.
- J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
  - 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

### 3.4 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, applied by low-pressure spray.
  - 1. Do not use metal scrapers or brushes.

2. Do not use acidic or alkaline cleaners.

END OF SECTION 040322

## SECTION 040323 - HISTORIC BRICK UNIT MASONRY REPOINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes historic treatment work consisting of repointing brick masonry joints.

#### 1.2 DEFINITIONS

- A. Low-Pressure Spray:
  - 1. Pressure: 100 to 400 (690 to 2750) psi (kPa).
  - 2. Flow Rate: 4 to 6 (0.25 to 0.4) gpm (L/s).

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to masonry historic treatment and repointing.
  - 2. Review methods and procedures related to repointing historic brick masonry.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

#### 1.5 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic masonry repointing specialist. Experience in pointing or repointing only new or nonhistoric masonry is insufficient experience for masonry historic treatment work.
- B. Mockups: Prepare mockups of historic treatment on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.
  - 1. Repointing: Rake out joints in two separate areas, each approximately 36 inches (900 mm) high by 48 inches (1200 mm) wide.

## PART 2 - PRODUCTS

### 2.1 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II; white or gray or both where required for color matching of mortar.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Sand: ASTM C144 unless otherwise indicated.
  - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
  - 2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
  - 3. Provide sand with rounded edges.
- D. Water: ASTM C270, potable.

### 2.2 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
  - 1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.
- B. Do not use admixtures in mortar unless otherwise indicated.
- C. Mixes: Mix mortar materials in the following proportions:
  - 1. Pointing Mortar by Property: ASTM C270, Property Specification, Type O unless otherwise indicated; with cementitious material limited to portland cement and lime.

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.
- B. Remove downspouts and associated hardware adjacent to immediate work area and store during masonry repointing work. Reinstall when repointing is complete.

1. Provide temporary rain drainage during work to direct water away from building.

### 3.2 MASONRY REPOINTING, GENERAL

- A. Have repointing work performed only by qualified historic treatment specialist.

### 3.3 REPOINTING

- A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated.
2. Joints at locations of the following defects:
  - a. Holes and missing mortar.
  - b. Cracks that can be penetrated 1/4 inch (6 mm) or more by a knife blade 0.027 inch (0.7 mm) thick.
  - c. Cracks [1/16 (1.6)] [1/8 (3)] inch(es) (mm) or more in width and of any depth.
  - d. Deterioration to point that mortar can be easily removed by hand, without tools.
  - e. Joints filled with substances other than mortar.

- B. Do not rake out and repoint joints where not required.

- C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of 2-1/2 times joint width and not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 (50) inches (mm) deep; consult Architect for direction.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of bricks or widen joints. Replace or patch damaged bricks as directed by Architect.
  - a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
  - b. ONLY AFTER APPROVAL - Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar in bed joints and mortar in head joints by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.

- D. Notify Architect of unforeseen detrimental conditions, including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

- E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.

2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 (9) inch(es) (mm) until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 (9) inch(es) (mm). Fully compact each layer and allow it to become thumbprint hard before applying next layer. Where existing brick have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
  - a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
  - b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Remove mortar and repoint.

#### 3.4 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, applied by low-pressure spray.
  1. Do not use metal scrapers or brushes.
  2. Do not use acidic or alkaline cleaners.

END OF SECTION 040323

## SECTION 080352 - HISTORIC TREATMENT OF WOOD WINDOWS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes historic treatment of wood windows in the form of the following:
  - 1. Repairing wood windows and trim.
  - 2. Replacing wood window frames and sash units.
  - 3. Reglazing.
  - 4. Repairing and replacing hardware.
  - 5. Replacing storm-window units.
  - 6. Providing new storm-window units.

#### 1.2 DEFINITIONS

- A. Window: Includes window frame, sash, hardware, trim, storm window, and exterior and interior shutters unless otherwise indicated by context.
- B. Exterior Trim: Exterior casing, brick mold, and cornice or drip cap.
- C. Interior Trim: Casing, stool, and apron.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of wood windows and fire protection.
  - 2. Review methods and procedures related to historic treatment of wood windows.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, and sections showing locations and details of each new unit and its corresponding window locations in the building on annotated plans and elevations.
- C. Samples: For each exposed product and for each color and texture specified.

## 1.5 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic wood window specialist, experienced in repairing, refinishing, and replacing wood windows in whole and in part. Experience only in fabricating and installing new wood windows is insufficient experience for wood-window historic treatment work.
- B. Wood-Repair-Material Manufacturer Qualifications: A firm regularly engaged in producing wood consolidant and wood-patching compound that have been used for similar historic wood-treatment applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.
- C. Mockups: Prepare mockups of historic treatment repair processes to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Prepare mockups so they are as inconspicuous as practicable.
  - 1. Wood Window Repair: Prepare one entire window unit to serve as mockup to demonstrate samples of each type of repair of wood window members including frame, sash, glazing, and hardware.

## PART 2 - PRODUCTS

### 2.1 HISTORIC TREATMENT OF WOOD WINDOWS, GENERAL

- A. Quality Standard: Comply with applicable requirements in Section 12, "Historic Restoration Work," and related requirements in AWI/AWMAC/WI's "Architectural Woodwork Standards" for construction, finishes, grades of wood windows, and other requirements unless otherwise indicated.
  - 1. Exception: Industry practices cited in Section 12, Article 1.5, Industry Practices, of the Architectural Woodwork Standards do not apply to the work of this Section.

### 2.2 REPLICATED WOOD WINDOW UNITS

- A. Replicated Wood Window Frames and Sash: Custom-fabricated replacement wood units and trim, with operating and latching hardware.
  - 1. Wood Species: Match wood species of exterior window trim and sash parts.
  - 2. Wood Window Members and Trim: Match profiles and detail of existing window members and trim.
  - 3. Glazing Stops: Provide replacement glazing stops coordinated with glazing system indicated.
  - 4. Exposed Hardware: Reuse or where missing, match]existing exposed window hardware.
  - 5. Weather Stripping: Full-perimeter and meeting rail weather stripping for each operable sash.



## 2.3 STORM WINDOWS

- A. General: Custom fabricated, tight fitting, and with operating and latching hardware.
  - 1. Fabricate storm windows for installation on outside of primary window.
  - 2. Make storm windows removable for cleaning and storage.
- B. Wood Storm Windows:
  - 1. Basis of Design: Hayes Wood Storm Windows.

## 2.4 INSECT SCREENS

- A. Wood Insect-Screen Frames: Custom fabricated; tight fitting and removable and with a minimum of exposed fasteners and latches.
- B. Aluminum Wire Fabric: 18-by-16 count per sq. in. (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire; charcoal gray finish.

## 2.5 WOOD-REPLACEMENT MATERIALS

- A. Wood, General: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) deep by 2 inches (51 mm) wide.

## 2.6 WOOD-REPAIR MATERIALS

- A. Wood Consolidant: Ready-to-use product designed to penetrate, consolidate, and strengthen soft fibers of wood materials that have deteriorated due to weathering and decay and designed specifically to enhance the bond of wood-patching compound to existing wood.
- B. Wood-Patching Compound: Two-part epoxy-resin wood-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of wood repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials that have deteriorated due to weathering and decay. Compound shall be capable of filling deep holes and spreading to feather edge.

## 2.7 HARDWARE

- A. Window Hardware: Provide complete sets of window hardware consisting of sash balances, hinges, pulls, latches, and accessories indicated for each window or required for proper operation. Sets shall include replacement hardware to complement repaired and refinished, existing hardware. Window hardware shall smoothly operate, tightly close, and securely lock wood windows and be sized to accommodate sash or ventilator weight and dimensions.
- B. Replacement Hardware: Replace existing damaged or missing hardware with new hardware.
- C. Material and Design:

1. Material: Match existing.
  2. Design: Match type and appearance of existing hardware.
  3. Weight and Pulley Sash-Balance: Concealed weight and pulley balance system including steel or cast iron weights, cast-bronze pulleys, synthetic sash cord or sash chain; size and capacity to hold sash stationary at any open position.
- D. Hardware Finishes: Comply with BHMA A156.18 for base material and finish requirements indicated.

## 2.8 WEATHER STRIPPING

- A. Metal Weather Stripping: Bronze weather stripping; designed either as one piece to seal by sliding into a groove in the sash or as two pieces that interlock; and completely concealed when window is closed.

## 2.9 MISCELLANEOUS MATERIALS

- A. Borate Preservative Treatment: Inorganic, borate-based solution, with disodium octaborate tetrahydrate as the primary ingredient; manufactured for preserving weathered and decayed wood from further damage by decay fungi and wood-boring insects; complying with AWWA P5; containing no boric acid.
- B. Cleaning Materials:
1. Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent that contains no ammonia, 5 quarts (5 L) of 5 percent sodium hypochlorite bleach, and 15 quarts (15 L) of warm water for each 5 gal. (20 L) of solution required.
  2. Mildewcide: Commercial, proprietary mildewcide or a solution prepared by mixing 1/3 cup (80 mL) of household detergent that contains no ammonia, 1 quart (1 L) of 5 percent sodium hypochlorite bleach, and 3 quarts (3 L) of warm water.
- C. Adhesives: Wood adhesives for exterior exposure, with minimum 15- to 45-minute cure at 70 deg F (21 deg C), in gunnable and liquid formulations as recommended in writing by adhesive manufacturer for each type of repair.
- D. Fasteners: Use fastener metals that are noncorrosive and compatible with each material joined.
1. Match existing fasteners in material and type of fastener unless otherwise indicated.
  2. Use concealed fasteners for interconnecting wood components.
  3. Use concealed fasteners for attaching items to other work unless exposed fasteners are unavoidable or the existing fastening method].
  4. For fastening metals, use fasteners of same basic metal as fastened metal unless otherwise indicated.
  5. For exposed fasteners, use Phillips-type machine screws of head profile flush with metal surface unless otherwise indicated.
  6. Finish exposed fasteners to match finish of metal fastened unless otherwise indicated.

- E. Anchors, Clips, and Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel complying with requirements in ASTM B633 for SC 3 (Severe) service condition.

## 2.10 WOOD WINDOW FINISHES

- A. Factory-Primed Replacement Units: Manufacturer's standard factory-prime coat on exposed exterior and interior wood surfaces; compatible with indicated finish coating.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean wood windows of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. After cleaning, rinse thoroughly with fresh water. Allow to dry before repairing or painting.
- B. Condition replacement wood members and replacement units to prevailing conditions at installation areas before installing.

### 3.2 HISTORIC TREATMENT OF WOOD WINDOWS, GENERAL

- A. General: In treating historic items, disturb them as minimally as possible and as follows:
  1. Stabilize and repair wood windows to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
  2. Remove coatings and apply borate preservative treatment before repair. Remove coatings according to Section 090391 "Historic Treatment of Plain Painting" unless otherwise indicated.
  3. Repair items in place where possible.
  4. Install temporary protective measures to protect wood window work that is indicated to be completed later.
  5. Refinish historic wood windows according to Section 090391 "Historic Treatment of Plain Painting" unless otherwise indicated.
- B. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use only the gentlest mechanical methods, such as scraping and natural-fiber bristle brushing, that will not abrade wood substrate, reducing clarity of detail. Do not use abrasive methods such as sanding, wire brushing, or power tools except as approved by Architect.
- C. Repair and Refinish Existing Hardware: Dismantle window hardware; strip paint, repair, and refinish it to match finish samples; and lubricate moving parts just enough to function smoothly.
- D. Repair Wood Windows: Match existing materials and features, retaining as much original material as possible to perform repairs.

1. Unless otherwise indicated, repair wood windows by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.
  2. Where indicated, repair wood windows by limited replacement matching existing material.
  3. Sash Balance: Repair sash balances to function according to type as specified in "Hardware" Article" above. Provide missing sash balances.
- E. Replace Wood Units: Where indicated, duplicate and replace units with units made from salvaged, sound, original wood or with new wood matching existing wood. Use surviving prototypes to create patterns for duplicate replacements.
- F. Protection of Openings: Where sash or windows are indicated for removal, cover resultant openings with temporary enclosures so that openings are weathertight during repair period.
- G. Identify removed windows, frames, sash, and members with numbering system corresponding to window locations to ensure reinstallation in same location.

### 3.3 WOOD WINDOW PATCH-TYPE REPAIR

- A. General: Patch wood members that exhibit depressions, holes, or similar voids, and that have limited amounts of rotted or decayed wood.
1. Treat wood members with wood consolidant before applying patching compound. Coat wood surfaces by brushing, applying multiple coats until wood is saturated and unable to absorb more. Allow treatment to harden before filling void with patching compound.
  2. Remove rotted or decayed wood down to sound wood.
- B. Apply borate preservative treatment to accessible surfaces either before applying wood consolidant or after removing rotted or decayed wood.
- C. Apply wood-patching compound to fill depressions, nicks, cracks, and other voids created by removed or missing wood.
1. Prime patch area with application of wood consolidant or manufacturer's recommended primer.
  2. Apply patching compound in layers as recommended in writing by manufacturer until the void is completely filled.
  3. Sand patch surface smooth and flush with adjacent wood, without voids in patch material, and matching contour of wood member.

### 3.4 WOOD WINDOW MEMBER-REPLACEMENT REPAIR

- A. General: Replace parts of or entire wood window members where deteriorated.
1. Remove broken, rotted, and decayed wood down to sound wood.
  2. Custom fabricate new wood to replace missing wood; either replace entire wood member or splice new wood part into existing member.

3. Secure new wood using finger joints, multiple dowels, or splines with adhesive and nailing to ensure maximum structural integrity at each splice. Use only concealed fasteners. Fill nail holes and patch surface to match surrounding sound wood.
- B. Apply borate preservative treatment to accessible surfaces after replacements are made. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.
  - C. Repair remaining depressions, holes, or similar voids with patch-type repairs.
  - D. Glazing: Reglaze units before reinstallation.
    1. Mill new and rout existing glazed members to accommodate new glass thickness.
    2. Provide replacement glazing stops coordinated with glazing system indicated.
    3. Provide glazing stops to match contour of sash frames.
  - E. Reinstall units removed for repair into original openings.
  - F. Weather Stripping: Replace nonfunctioning and install missing weather stripping to ensure full-perimeter and meeting rail weather stripping for each operable sash.

### 3.5 GLAZING

- A. Comply with combined written instructions of manufacturers of glass, glazing systems, and glazing materials, unless more stringent requirements are indicated.
- B. Remove cracked and damaged glass and glazing materials from openings and prepare surfaces for reglazing.
- C. Remove existing glass and glazing where broken, and prepare surfaces for reglazing.
- D. Remove glass and glazing from openings and prepare surfaces for reglazing.
- E. Size glass as required by Project conditions to provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances.
- F. Apply primers to joint surfaces where required for adhesion of glazing system, as determined by preconstruction testing.
- G. Install setting bead, side beads, and back bead against stop in glazing rabbets before setting glass.
- H. Install glass with proper orientation so that coatings, if any, face exterior or interior as required.
- I. Disposal of Removed Glass: Remove from Owner's property and legally dispose of it unless otherwise indicated.

### 3.6 WOOD WINDOW UNIT REPLACEMENT

- A. General: Replace existing wood window frame and sash units with new custom-fabricated units to match existing at locations scheduled and where damage is too extensive to repair.

- B. Apply borate preservative treatment to accessible surfaces before finishing. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.
- C. Mill glazed members to accommodate glass thickness. Glaze units before installation.
- D. Install units level, plumb, square, true to line, without distortion or impeding movement; anchored securely in place to structural support; and in proper relation to wall flashing, trim, and other adjacent construction.
- E. Set sill members in bed of sealant for weathertight construction unless otherwise indicated.
- F. Install window units with new anchors into existing openings.
- G. Weather Stripping: Install full-perimeter and meeting rail weather stripping for each operable sash.
- H. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- I. Disposal of Removed Units: Remove from Owner's property and legally dispose of them unless otherwise indicated.

### 3.7 STORM WINDOW INSTALLATION

- A. Install wood storm windows at each window.

### 3.8 INSECT-SCREEN INSTALLATION

- A. Install insect screening to be smooth, flat, and uniformly taut.

### 3.9 WEATHER STRIPPING INSTALLATION

- A. Install weather stripping for tight seal of joints as determined by preconstruction testing and demonstrated in mockup.

END OF SECTION 080352

# MacDonald & Mack

## ARCHITECTS

3101 East Franklin Avenue Minneapolis MN 55406  
P 612.341.4051 • F 612.337.5843 • www.mmarchltd.com

### Memorandum

Date July 22, 2024  
To Bidding Contractors  
From MacDonald & Mack Architects  
Project Chaska Yards  
Regarding Finish Assumptions

The following are finish assumptions for the three new units (Unit 01, 02, 03), the existing Ernst House (Unit 04), and the Garage on the Chaska Yards site.

Where specified materials are specified below, substitute materials/manufactures can be considered but must be approved by Architect.

Where specific material manufacturers are not specified below, contractor must submit samples for Architect approval.

### EXTERIOR

**Exterior construction** must meet current energy code requirements. See Section R402.

#### *Windows*

Units 01-03 (new): Marvin Elevate, white finish

Unit 04 (new): Marvin Elevate, white finish

Unit 04 (existing): Assume repair and refinishing to match existing finish.

Garage: no windows

#### *Storm Windows*

Unit 01-03: No storm windows

Unit 04 Basement: No storm windows

Unit 04 1<sup>st</sup> & 2<sup>nd</sup> Floor : Hayes Storm Windows <https://hayeswindows.com/services/#storm-windows>

#### *Doors*

Units 01-04 (new): Marvin Elevate

Unit 04 (existing): Repair and paint

Garage Personell Door: Marvin Elevate

Garage Overhead Door: Steel Panel Insulated Garage Doors without Windows

### ***Exterior Cladding***

Siding: Hardie Plank Lap Siding, Smooth, note colors on elevations

Trim: Hardie Trim, Smooth, note colors on elevations

Unit 04 Porch Floor: Cedar T&G finished

Unit 04 Porch: Reuse existing columns and details, replicate historic with new wood elements, paint.

### ***Roofing***

Units 01-03: Owens Corning, True Definition, Duration Shingles – Williamsburg Gray

Unit 04: Owens Corning, True Definition, Duration Shingles - Brownwood

## **INTERIOR**

### ***Flooring***

Units 01-03 Second floors (bedrooms, hallways, stairs) excluding baths: carpeting

Units 01-03 First floors: LVP

Units 01-03 Basement floors excluding baths and storage/mechanical: LVP

Units 01-04 Baths: Porcelain tile

Units 01-04 Storage/mechanical rooms: epoxy finish concrete

Unit 04 All flooring (excluding baths): assume repair and refinishing of existing wood floors and stairs. Where new wood flooring is needed for patch or repair, match existing.

### ***Walls/Ceilings***

Units 01-03: Painted GWB

Units 01-04 Baths: Porcelain tile on wet walls.

Unit 04 (new GWB): Painted GWB

Unit 04 (existing Plaster): Assume repair and refinishing to match existing finish, paint.

Garage: Painted GWB

### ***Doors***

Units 01-03 (new, excluding sliding closet doors): solid wood 2-panel, paint

Units 04 (new, excluding sliding closet doors): solid wood 4-panel, paint

Unit 04 (existing): Assume repair and refinishing to match existing finish

Units 01-04 closets: Sliding solid 2-panel doors, paint

### ***Door Hardware***

Finish: Satin Nickle (interior and exterior)

### ***Cabinetry***

Units 01-04: Shaker style, soft closures, white

### ***Finish Trim***

Units 01-03: Solid wood, painted

Unit 04 (first floor): Solid wood to match existing, painted



Unit 04 (basement, second floor): Solid wood to match existing, painted

***Countertops***

Units 01-04 (kitchen): Quartz with quartz backsplash.

Units 01-04 (baths, misc. storage): Solid Surface with integrated bowls.

***Bathroom Fixtures***

Shower and Tub Inserts: American Standard

Toilets: American Standard

Faucets and Shower Fixtures: American Standard

***Appliances***

Units 01-04: Stainless steel GE appliances (gas range, dishwasher, microwave over stove, refrigerator), LG Washer and Dryer

SECTION 31 0000  
EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Site preparation, protection and special precautions.
- C. Site clearing and grubbing.
- D. Earthwork operations and construction for:
  - 1. Buildings including:
    - a. Building pads.
    - b. Building foundations.
    - c. Building foundation wall backfill.
    - d. Granular layer below building floor slabs.
  - 2. Pavement areas including:
    - a. Exterior sidewalks.
    - b. Pavement areas (parking lots, roadways, aprons, etc.).
  - 3. Landscape areas.
- E. Acquisition of materials and material balancing, including:
  - 1. Stripping operations and stockpiling of soils to be re-used.
  - 2. Relocation of existing soils on-site for specific uses including:
    - a. Topsoil.
    - b. Structural fill under building areas.
    - c. Parking Lots and Roads.
  - 3. Removal (off-site) of soils not to be re-used.
  - 4. Importing approved soils for fill.
- F. Excavations.
- G. Filling, backfilling, and compaction procedures.
- H. Grading.

## 1.2 RELATED SECTIONS

- A. Section 01 5713 - Erosion and Sediment Controls.
- B. Section 02 4113 - Selective Site Demolition.
- C. Section 31 2333 - Trenching and Backfilling
- D. Section 32 1122 - Aggregate Bases.
- E. Section 32 1216 - Asphalt Concrete Paving.
- F. Section 32 1313 - Exterior Concrete Paving.
- G. Section 33 3000 - Sanitary Sewerage Utilities.
- H. Section 33 4000 - Storm Drainage Utilities.

## 1.3 REFERENCES

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.
- C. ASTM D75/D75M - Standard Practice for Sampling Aggregates; 2014(2014).
- D. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- E. ASTM D1586 - Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils; 2011.
- F. ASTM D2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure); 2009.
- G. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils; 1963 (Reapproved 2007).
- H. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction; 2012 (Reapproved 2022).
- I. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2023.
- J. Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction". Only applicable portions of construction methods and materials apply. References to methods of measurement or payment are not applicable.
  - 1. MN/DOT 3149 Granular Material

- K. Minnesota Department of Labor and Industry - Minnesota State Building Code.

#### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. Codes and Standards: Perform excavation work and disposal of debris in accordance with applicable requirements of governing authorities having jurisdiction.
- E. All excavations and trenches shall comply with the requirements of 29 CFR 1926, Sub-Part P, "Excavations."

#### 1.5 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.
- B. Protection of Persons: City activities will continue about the site during construction. Install barricade fencing as necessary, to provide a safe environment between construction work and pedestrian circulation.
- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  - 2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
  - 3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
  - 4. Locate, excavate, and expose all existing underground lines in advance of trenching operations.

5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.

E. Traffic Control:

1. Maintain vehicular and pedestrian traffic as required for construction activities.
2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.
3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.

F. Cold Weather Protection: See Special Precautions of this section.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Building Pads (Engineered Fill):

B. Building Pads (Engineered Fill):

1. Backfill shall be debris free, non-organic, mineral soil and free of gravel larger than three (3") inches. The on-site soils, except the topsoil, and soils containing organics and debris are judged to be suitable for reuse as engineered fill. However, some of the on-site soils could be wet or dry, depending on the weather conditions and the time of year that construction takes place. The soils will likely require moisture conditioning before they can be used.

C. Building Foundation Wall Backfill:

1. Basement foundation backfill material and backfill in or near water shall be coarse granular material. The granular material shall have less than 50 percent passing the No. 40 sieve and less than 5 percent passing the No. 200 sieve.

D. Granular Layer Below Building Floor Slab:

1. A six (6") inch granular layer shall be placed beneath the building floor slabs. The material shall be clean sand (SP) containing less than 5 percent passing the No. 200 sieve.

E. Under exterior sidewalks:

1. Refer to Specification Section 32 1122 Aggregate Bases for aggregate base material.
2. Subgrade material shall be debris free, non-organic, mineral soil and free of gravel larger than three (3") inches. The on-site soils, except the topsoil and soils containing organics

and debris, are judged to be suitable for reuse as engineered fill. Some of the on-site soils could be wet or dry, depending on the weather conditions and the time of year that construction takes place. The soils may require moisture conditioning before they can be used.

F. Pavement Areas:

1. Subgrade material shall be debris free, non-organic, mineral soil and free of gravel larger than three (3") inches. The on-site soils, except the topsoil and soils containing organics and debris, are judged to be suitable for reuse as engineered fill. Some of the on-site soils could be wet or dry, depending on the weather conditions and the time of year that construction takes place. The soils may require moisture conditioning before they can be used.

G. Fill under Landscaped Areas:

1. Fill under landscaped areas shall consist of existing or imported material, free of gravel larger than three (3") inches in size, free of debris and organic materials.

H. Topsoil: Refer to Landscape Specifications.

## 2.2 ACQUISITION OF MATERIALS

- A. Insufficient Materials: Provide necessary material from off the site, as approved by the Architect/Engineer and Geotechnical Engineer to complete the Work. The cost of these materials shall be considered part of the Base Bid Contract.
- B. Exterior Backfill: Clean, on-site materials obtained from the required stripping, contour cutting and excavation may be used for backfilling and grading.
- C. Subsoil for Site Grading: Clean, on-site materials obtained from the earthwork operations.
- D. Under-slab Fill: Obtain from on or off the site as approved by the Laboratory Inspector.
- E. Fill: Obtain from on or off the site as approved by the Laboratory Inspector.
- F. Borrow pits: Borrow pits will not be permitted on this project.
- G. Disposition of Materials
  1. Surplus Earth: Deposit excess soils on the site and grade as directed by the Architect/Engineer.

## 2.3 MATERIAL BALANCE

- A. The Contractor is responsible for determining the quantities of material necessary for completing the Work under this Section. This includes the cost of importing approved fill or exporting excess or unsuitable materials.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum locations. Verify that survey benchmarks and intended elevations for the Work are as indicated on the Drawings.
- B. Identify known underground, above ground and aerial utilities. Stake and flag utility locations. Protect above and below-grade utilities which are to remain.
- C. Verify that erosion control devices are in place.
- D. Verify limits of construction and accurately locate:
  - 1. Building perimeter.
  - 2. Paved areas.

### 3.2 PROTECTION

- A. Protect utilities that remain from damage.
- B. Protect trees, plant growth, and features designated to remain as final landscaping.
- C. Protect benchmarks, existing structures, fences, signs, sidewalks, paving, curbs, and other items indicated on the Drawings to remain.
  - 1. Contractor shall provide shoring, bracing, or other means of support as needed to protect the existing items indicated on the Drawings to remain throughout construction. The cost of shoring, bracing, or other means of support shall be included as part of the base bid contract.
- D. Protect proposed building(s), including footings and foundation walls. Contractor shall provide shoring, bracing, or other means of support as needed to protect the proposed building(s) during construction. The cost of shoring, bracing, or other means of support shall be included as part of the base bid contract.

### 3.3 SPECIAL PRECAUTIONS

- A. Dewatering:
  - 1. Prevent surface water and subsurface (ground) water from flowing into excavations and from flooding the site and surrounding area.
  - 2. Do not allow water to accumulate in excavations. Remove water to prevent soil changes detrimental to stability of subgrades. Provide and maintain pumps, well points, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

3. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
4. Do not place fill or compacted fill in standing water or over softened soils.
5. The cost of dewatering shall be considered part of the Base Bid Contract.

B. Stability of Excavations:

1. Sidewalls of all excavations shall comply with the most current OSHA regulations and applicable local building codes and ordinances. Shore and brace where adequate sloping is not feasible because of space restrictions or stability of material being excavated.
2. Maintain slopes of excavations in safe condition until completion of backfilling.
3. Soils on site may be sensitive to moisture and may be easily disturbed by construction traffic. Measures to protect subgrade from becoming unstable and maintaining stability of subgrade soils shall be provided. Subgrade stabilization will be incidental to the Contractor. Subgrade stabilization shall be the responsibility of the Contractor.

C. Site Disturbance:

1. The on-site soils are susceptible to disturbance due to repeated construction traffic. Disturbance of these soils may cause areas that were previously prepared, or that were suitable for pavement support or structure support, to become unstable and require moisture conditioning and compaction. The Contractor shall use means and methods to limit disturbance of the soils. No additional compensation will be allowed for reworking previously completed areas.

D. Cold Weather Protection:

1. Protect excavation bottoms and bearing surfaces against freezing when atmospheric temperature is less than 35 degrees Fahrenheit (2 degrees C).
2. Do not allow frost and snow to occur within materials beneath footings and slabs. Protect the soils to prevent freezing until after footings have been poured and until fill has been placed and compacted. Completely remove frost and snow, if present, before the footings are poured and the under-slab fill is placed.
3. Onsite moisture conditioning of wet soils will not be an acceptable practice between November 1 and April 1. If earthwork operations are to be performed during these months, the contractor shall assume unsuitable soils will need to be exported and new suitable soils will need to be imported for the necessary work. .

### 3.4 REMOVALS, CLEARING, AND GRUBBING

- A. Refer to Specification Section 02 4113 - Selective Site Demolition.



### 3.5 EXCAVATIONS

- A. The Contractor shall be solely responsible for determining quantities of fill and waste materials to be handled and for the amount of grading to be done in order to completely perform all work indicated on the Drawings. The costs of importing fill and/or exporting excess materials from the site shall be considered part of the Base Bid Contract.
- B. Excavate to the lines, grades and slopes as indicated on the Drawings.
  - 1. The Contractor shall thoroughly review the Geotechnical Report, Grading Plans, Structural Plans, and Specifications to determine depth of excavation and any soils correction required. No additional compensation will be given for work that could have been anticipated by reviewing the above documents.
- C. Provide temporary drainage where construction interferes with existing drainage.
- D. Stabilizing Sides of Excavation: Slope the sides of excavations to a safe angle of repose for materials being excavated. Shore and brace where sloping is not possible because of space restrictions or the stability of the materials being excavated. Maintain the sides of the excavations in a safe condition until the completion of backfilling.
- E. Excavation for proposed paving areas:
  - 1. In cut areas subcut to a point equal to the proposed pavement cross section, including base material, below finished grade elevations.

### 3.6 FILLING, BACKFILLING, AND COMPACTION PROCEDURES

- A. Coordination: The General and Mechanical Contractors shall cooperate in the digging, backfilling and compacting operations.
- B. The Contractor shall be solely responsible for determining quantities of fill and waste materials to be handled and for the amount of grading to be done in order to completely perform all work indicated on the Drawings. The costs of importing fill and/or exporting excess materials from the site shall be considered part of the Base Bid Contract.
- C. Prior to the placement of fill, the Geotechnical Engineer must inspect and approve the bottom or bearing surface of each excavation.
- D. Fill shall not be placed on frozen ground, nor shall filling operations continue when the temperature is such as to permit the layer under placement to freeze.
- E. Before placing fill on a slope greater than five (5) horizontally to one (1) vertically (5:1), the Contractor shall, at their option: (a) flatten the existing slope to the extent that it will not be steeper than 5:1; or (b) construct steps in the slope, with the back surface being as nearly vertical as practicable and with the horizontal cuts being made as close together as the slope permits, but with no step being less than ten (10') feet in width.

F. General:

1. Deposit approved fill in uniform layers not exceeding eight (8") inches (loose) thickness. Compact each layer with approved methods and equipment to the minimum specified density.
  - a. The fill material, when being compacted, shall contain the moisture content necessary for the required compaction as designated by the Geotechnical Engineer. The soil shall be moisture conditioned to within 2 percent of optimum moisture content. The moisture shall be uniform throughout each layer.
2. Scarify, remove, recompact or otherwise rectify all soft or yielding areas resulting from construction operations, rain or other sources at no additional cost to the Owner.

G. Filling, backfilling and compaction for buildings:

1. Employ a placement method that does not disturb or damage foundation perimeter drainage, foundation dampproofing and protective cover.
2. The compacted building pad area shall be brought to true even plane to the base of the sand cushion elevation.

H. Filling, backfilling and compaction for proposed paving areas:

1. Prior to placing fill materials, proof roll subgrade using a loaded truck or similar equipment to detect soft or loose zones where additional excavation depths may be required.
2. In fill areas, bring grade up to underside of granular subbase for pavements.
3. Compact and shape the subgrade for its entirety as may be necessary to produce, at the time base is placed, the specified density and stability in the top twelve (12") inches of the subgrade and the grades indicated on the Drawings.
4. Pre-compact entire area to be paved to the specified density just prior to placing stabilized aggregate base for pavements.
5. If test rolling shows any area to be unstable, the Contractor shall, at their expense, scarify the area and aerate or add moisture to the soil as necessary, and recompact the soil to the extent it will be stable when retested by rolling.
6. For roadways and parking areas, refer to Section 32 1122 for stabilized aggregate base.

I. Filling, backfilling and compaction for landscape areas:

1. Place a minimum of six (6") inches of topsoil at the surface of all landscape areas unless noted otherwise.
2. Compact topsoil as necessary to prevent settlement without inhibiting vertical drainage and subsequent turf establishment. If over-compaction occurs, the Contractor may be required to scarify soil and re-blade. The depth of the topsoil shall be measured after compaction.

### 3.7 GRADING

#### A. General:

1. The grades shown on the Drawings are proposed finish grades.
2. Provide surfaces free of debris and building materials. Complete rough grading by blading to reasonably smooth contours with neat, uniform transitions and slopes. Remove stones over one and one half (1-1/2 ") inches in diameter, branches and other vegetation. Ease new grades into surrounding existing grades without awkward or abrupt transitions.

#### B. Buildings Areas:

1. The Contractor shall grade to the prescribed subgrade elevations.
2. All surfaces shall be finished to such contour that they will not impound surface water.
  - a. Rough grade tolerances are as follows:
    - 1) Surfaces shall not vary by more than five one-hundredths (0.05') foot above or one-tenth (0.10') foot below the subgrade elevations referenced to herein.

#### C. Paved Areas:

1. The Contractor shall grade to the prescribed subgrade elevations.
2. All surfaces shall be finished to such contour that they will not impound surface water.
  - a. Rough grade tolerances are as follows:
    - 1) Surfaces shall not vary by more than five one-hundredths (0.05') foot above or one-tenth (0.10') foot below the subgrade elevations referenced to herein.

#### D. Landscape Areas:

1. Rough Grading: Grade subsoil to a minimum elevation six (6") inches below finish grade. Soil most suitable for lawns shall be spread as top layer. Rough grading shall include spreading the material on the site smoothly and evenly with a dozer or equal equipment, leaving it similar to back dragging with a dozer.
  - a. Rough grade tolerances are as follows:
    - 1) Not more than two-tenths (0.20') feet above or below finish grade elevations shown on the drawings.
2. Finish Grading: Spread topsoil to a minimum depth of six (6") inches and stabilize as indicated on the plans.
3. Backfill in landscape areas placed against curbing shall be graded flush with the top of curb. Backfill in landscape areas placed against walks or pavements shall be graded flush with the walk or pavement surface on the up gradient side and held down one inch below the walk or pavement on the down gradient side.

END OF SECTION

SECTION 31 2333  
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Trench Excavation, Backfilling and Compaction as indicated on the Drawings, specified herein; and as needed for installation of underground utilities associated with the Work.

1.2 RELATED SECTIONS

- A. Section 01 5713 - Erosion and Sediment Controls.
- B. Section 02 4113 - Selective Site Demolition.
- C. Section 31 0000 - Earthwork.
- D. Section 32 1122 - Aggregate Bases.
- E. Section 32 1216 - Asphalt Concrete Paving.
- F. Section 32 1313 - Exterior Concrete Paving.
- G. Section 33 1000 - Water Distribution.
- H. Section 33 3000 - Sanitary Sewerage Utilities.
- I. Section 33 4000 - Storm Drainage Utilities.

1.3 REFERENCES

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2019.
- C. ASTM D75/D75M - Standard Practice for Sampling Aggregates; 2014(2014).
- D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.

- F. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2020.
- G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).
- H. ASTM D2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure); 2009.
- I. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2017, with Editorial Revision (2018).
- J. ASTM D6913/D6913M - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis; 2017.
- K. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2023.
- L. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- M. Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction". Only applicable portions of construction methods and materials apply. References to methods of measurement or payment are not applicable.
  - 1. MN/DOT 2575 - Establishing Turf and Controlling Erosion
- N. Minnesota Department of Labor and Industry - Minnesota State Building Code.

#### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. The Contractor is responsible for coordinating construction schedule and required testing with testing agency prior to start of construction.
- E. Codes and Standards: Perform excavation work and disposal of debris in accordance with applicable requirements of governing authorities having jurisdiction.
- F. All excavations and trenches shall comply with the requirements of 29 CFR 1926, Sub-Part P, "Excavations and Trenches."

- G. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this section.
- H. Use equipment adequate in size, capacity and number to accomplish the Work in a timely manner.

#### 1.5 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding.
- B. The Contractor shall carefully review plans and identify utilities that are to be verified prior to construction.
- C. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  - 2. The approximate location of certain underground lines and structures are shown on the Plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
  - 3. Locate these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
  - 4. Locate, excavate, and expose all existing underground lines in advance of trenching operations.
  - 5. The Contractor shall carefully review the plans and identify utilities that are to be verified prior to construction.
  - 6. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.
  - 7. The Contractor shall become familiarized with the existing conditions and be prepared to adequately care for and safeguard themselves and the Owner from damage.
- D. Protection of Persons: The Owner's activities will continue in and about the site during construction. Install barricade fencing, as necessary, to provide a safe environment between construction work and owner's activities.
- E. Benchmarks and Monuments: Maintain and protect benchmarks and monuments that exist on the site.

- F. Protection of Existing Property to Remain: Protect existing equipment and structures which are in the area where the Work will be performed and which are to remain. Repair or replace existing property which is to remain that is damaged by the Work, to the Engineer's or jurisdictional authority's satisfaction and at no cost to the Owner and the Owner's Representatives.
- G. Protecting Trees, Shrubbery and Lawns:
1. Trees, plants and shrubbery in developed areas and along the trench line shall not be disturbed unless absolutely necessary, and subject to the approval of the Engineer.
    - a. Any such trees, plants and shrubbery necessary to be removed shall be heeled in and replanted.
  2. Where trenches cross private property through established lawns, sod shall be cut, removed, stacked and maintained in a suitable condition until the Engineer approves replacement.
    - a. Topsoil underlying lawn areas shall be removed and kept separate from general excavated materials.
- H. Clearing:
1. Perform all clearing necessary for installation of the complete Work.
  2. Clearing shall consist of removing all trees, stumps, roots, brush and debris in the right-of-way obtained for the Work.
  3. The Owner has the option to keep all timber of merchantable size. The timber shall be trimmed, cut and stacked where directed.
  4. All other material, including trimmings from above, shall be completely disposed of off the site in a satisfactory manner.
- I. Removing and Re-Setting Fences:
1. Where existing fences must be removed to permit construction of utilities:
    - a. Remove such fences, and as the Work progresses, reset the fences in their original location and condition. If fence cannot be reset to its original quality, the Contractor is to replace the fence with new material. This is considered part of the Base Bid Contract.
- J. Restoration of Disturbed Areas:
1. The Contractor shall restore to a condition equal to or better than existing, all other structures not specifically mentioned above which are disturbed because of this construction including fences, clothesline posts, mailboxes, yard lights, entrance markers, etc. There will be no additional compensation for this miscellaneous restoration.
  2. All work in public right-of-way is to meet City standards. The Contractor is to contact the City to fully understand the scope of work. No additional compensation will be given for unanticipated work in City or County right-of-way.

3. All surplus waste materials remaining after completion of the backfilling operations shall be disposed of in an acceptable manner within 24 hours after completing the backfill work on each particular pipeline section. Disposal at any location within the project limits shall be as specified, or as approved by the Engineer; otherwise, disposal shall be accomplished outside the project limits at the Contractor's discretion. The backfilling and surplus or waste disposal operations shall be a part of the Work required under the pipeline installation items, not as work that may be delayed until final cleanup.
4. Surface improvements such as pavement, curbing, pedestrian walks, fencing or turf disturbed by this Contractor outside of the general demolition area shall be repaired or replaced to the satisfaction of the responsible party, i.e., the Owner, Engineer, or City. The improvement shall be restored to the pre-existing condition. Each item of restoration work shall be done as soon as practicable after the completion of installation and backfilling operations on each section of pipeline.
5. The restoration work shall be compensated as part of the Work required under those contract items which necessitated the destruction and/or replacement and repair, and there will be no separate payment for restoration. Any improvements removed or damaged unnecessarily or undermined shall be replaced or repaired at the Contractor's expense.
6. Turf restoration shall be accomplished by sod placement except where seeding is specifically allowed or required.
  - a. Topsoil shall be placed to a minimum depth of six (6") inches under all sod and in all areas to be seeded. Topsoil shall be salvaged from the demolition areas and shall be light, friable loam, free of heavy clay, coarse sand, stones, sticks and other foreign matter.
  - b. All turf establishment work shall be done in substantial compliance with MN/DOT 2575.
7. Pavement Restoration (except in City right-of-way).
  - a. The in-place pavement structure (including base aggregates) shall be restored in kind and depth as previously existed, with new materials being provided for reconstruction of the concrete or bituminous surface courses, including base aggregates.
  - b. Reconstruction of aggregate base courses and concrete or bituminous surface courses shall be in substantial compliance with all applicable MN/DOT Specifications pertaining to the item being restored. The material used shall be comparable to those used in the in-place structure and the workmanship and finished quality shall be equal to that of new construction to the fullest extent obtainable in consideration of operational restrictions.
  - c. Existing concrete and bituminous surfaces at the trench wall shall be sawed or cut with a cutting wheel to form a neat edge in a straight line before surfaces are to be restored. Sawing or cutting may be accomplished as a part of the removal or prior to restoration at the option of the Contractor. However, all surface edges will be inspected prior to restoration.

K. Minimizing Silting and Bank Erosion During Construction:

1. During construction, protective measures shall be taken and maintained to minimize silting and bank erosion of creeks and rivers adjacent to the Work being performed during construction.



2. Sack breakers, silt fence, biologs or slope stabilizer mats are to be used on steep slopes along creek banks and fill slopes to prevent washing of ditch. The above-mentioned items are to be used at the direction of the Engineer, local government body. All costs are part of the Base Bid Contract.
  3. The Contractor is to refer to Section 01 5713 - Erosion and Sediment Controls.
  4. The Contractor shall, at their own expense, control all erosion at the outfall and downstream of the dewatering pipe.
- L. Blasting will not be permitted on this job.
- M. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.

## PART 2 PRODUCTS

### 2.1 EXCAVATED MATERIALS

- A. Perform all excavations of every description and of whatever substances encountered to depths indicated on the Drawings or as specified.
- B. Pile materials for backfilling in an orderly manner at a safe distance from banks or trenches to avoid overloading and to prevent slides or cave-ins.
- C. Remove and deposit unsuitable or excess materials in a legal manner off-site. This is considered part of the Base Bid Contract.

### 2.2 GRANULAR MATERIALS

- A. Granular materials furnished for foundation, bedding, encasement, backfill, or other purposes as may be specified shall consist of any natural or synthetic mineral aggregate such as sand, gravel, crushed rock, crushed stone or slag, which shall be so graded as to meet the gradation requirements specified herein for each particular use.

### 2.3 GRANULAR MATERIAL GRADATION CLASSIFICATIONS

- A. Granular materials furnished for use in foundation bedding in areas where the geotechnical engineer indicates that foundation bedding is required shall conform to MN/DOT 3149.2.H Coarse Filter Aggregate.
- B. Granular materials required for use as backfill in wet or submerged conditions shall be coarse sand with less than 50 percent of the particles by weight passing the #40 sieve and less than 5 percent of the particles by weight passing the #200 sieve.

- C. Granular bedding provided for plastic pipe and fittings where a foundation bedding or coarse sand is not required, as specified above, shall meet the requirements of MN/DOT 3149.2.B.2 Select Granular Material. The pipe shall be installed and bedded in accordance with ASTM D2321. The granular materials shall be placed 6-inches below the bottom of the pipe to a point 12-inches above the top of pipe.

## 2.4 PIPE STABILIZATION MATERIALS

- A. The materials for base stabilization shall be sand-gravel material or binder stone as described in these Specifications. The type of material to be used is as specified herein.
  - 1. Sand-Gravel Material:
    - a. This material shall be used for pipe bedding and/or trench backfill wherever peat, clay or other unsuitable bearing material is encountered as determined by the Engineer. It shall be clean, granular material with gravel larger than one (1") inch (where used as pipe bedding) and not more than 50 percent passing the No. 40 sieve. The material shall be composed such that proper compaction under the "Specified Density Method" (ASTM D698) is achieved.
    - b. The material shall be placed to a depth as determined by the Engineer, with a minimum depth of six (6") inches below the bottom of the pipe and extending at least one (1') foot beyond the sides of the pipe and one (1') foot above the pipe.
  - 2. Binder Stone:
    - a. Binder stone shall consist of durable crushed stone or graded aggregate. All materials shall pass a one and one-half (1½") inch sieve and shall be retained on a three-fourth (¾") inch sieve. This material shall be used for pipe bedding and/or roadway restoration as directed by the Engineer.

## 2.5 OTHER MATERIALS

- A. Provide and install other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer. This includes City or County right-of-way work.

## 2.6 SOURCE QUALITY CONTROL

- A. Refer to Division One specifications for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided .
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Examine the areas and conditions under which the Work of this section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 COLD WEATHER OPERATION

- A. No pipe shall be placed when the temperatures fall below 30° Fahrenheit, without approval of the Engineer.

### 3.3 OFF SITE DISPOSAL

- A. The Contractor will be required to dispose of all bituminous, concrete and other undesirable debris to an approved landfill located outside the project limits with no direct compensation made therefore.

### 3.4 CLASSIFICATION AND DISPOSITION OF MATERIALS

- A. Excavated materials will be classified for payment only to the extent that the removal of materials classified as rock, by the Engineer, will be paid for separately from other unclassified materials as an Extra Work Item. All other materials encountered in the excavations will be considered as Unclassified Excavation and no additional compensation will be provided for removal of wood, debris, boulders, stone, masonry, concrete or rock fragments less than one (1) cubic yard in volume, together with other miscellaneous matter that can be removed effectively with power-operated excavators without resorting to drilling and blasting.
- B. Rock excavation is defined to include all hard, solid rock in ledge formation, bedded deposits and unstratified masses; all natural conglomerate deposits so firmly cemented as to present all the characteristics of solid rock; and any boulder stone, masonry or concrete fragments exceeding one (1) cubic yard in volume. Materials such as shale, hard pan, soft or disintegrated rock which can be dislodged with a hand pick or removed with a power-operated excavator will not be classified as rock excavation.

- C. Excavated materials will be classified by the Independent Testing Lab for re-use as being either suitable or unsuitable for backfill or other specified use, subject to selective controls. All suitable materials shall be reserved for backfill to the extent needed and any surplus remaining shall be utilized for other construction of the project as may be specified or ordered by the Engineer. To the extent practicable, granular materials and topsoil shall be segregated from other materials during the excavating and stockpiling operations so as to permit best use of the available materials at the time of backfilling. Material handling as described above shall be considered part of the Base Bid Contract with no additional compensation provided.
- D. All excavated materials reserved for backfill or other use on the project shall be stored at locations approved by the Engineer that will cause a minimum of inconvenience to public travel, adjacent properties and other special interests. The material shall not be deposited so close to the edges of the excavations creating hazardous conditions, nor shall any material be placed so as to block access to emergency services. All materials considered unsuitable by the Laboratory Inspector or Engineer, for use on the project, shall be immediately removed from the project and be disposed of as arranged for by the Contractor at no extra cost to the contract.

### 3.5 SHEETING AND BRACING

- A. Sheet and brace trenches in accordance with Chapter 66, Trench Bracing, of the Minnesota Regulations relating to Industrial Safety, to a safe angle of repose. The angle of repose shall be no less than the repose required by the Accident Prevention Division of the Minnesota State Industrial Commission or the requirements of the Occupational Safety and Health Act (OSHA), whichever is more restrictive.
- B. The Contractor, to prevent the disturbance or settlement of adjacent road surfaces, structures or other improvements, shall furnish and install all sheeting and bracing necessary to provide good working conditions and prevent damage and delay to the Work. The Contractor shall be responsible for the strength and sufficiency of all sheeting and bracing.
- C. Bracing shall be so arranged as to provide ample working space and so as not to interfere with the Work and so as not to place any strain on the structures being constructed until such structures are of ample strength to withstand such strain. All sheeting and bracing, unless otherwise specified or ordered to be left in place by the Engineer, shall be removed from the Work at no additional compensation.
- D. Any damage to Work under this Contract or to adjacent structures or property caused by settlement, water or earth pressures, slides, cave-ins or other causes due to failure or lack of sheeting and bracing or improper bracing, through negligence or fault of the Contractor in any manner, shall be repaired by the Contractor without delay.
- E. The Contractor shall be solely responsible for the safety of the excavation relating to angle of repose and/or bracing.

### 3.6 TRENCH EXCAVATION

- A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

- B. Work shall be done by open trench excavation except jacked or augered pipe designated on the plans or as directed by the Engineer, City.
- C. Topsoil shall be stripped from the trench and stockpiled for reuse over all disturbed areas to be seeded or sodded. Stripping, stockpiling and respreading topsoil will be considered part of the Base Bid Contract.
- D. Trench excavation shall be dug to the alignment and depth shown on the plans and only one hundred (100') feet in advance of the pipe laying. The trench shall be braced and drained so that workmen may work safely and efficiently therein.
- E. Trench water shall be drained from the trench into natural drainage channels or storm sewers, if acceptable, and shall be considered part of the Base Bid Contract. Draining trench water into sanitary sewers will not be permitted. Prior to draining trench water directly into any natural drainage channel or storm sewer, the Contractor is to contact the proper City, County and State agencies to obtain permission. Dewatering operations shall be monitored for sedimentation and treated prior to discharge to public storm water conveyance systems.
- F. Braced and sheeted trenches shall be put in place and maintained as may be required to support the side of the excavation and to prevent any movement which may in any way endanger personnel or injure or delay the Work or endanger adjacent buildings or other structures. Where sheeting and bracing are used, the trench width shall be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid, tested for defects and repaired if necessary, and the earth around it compacted to a depth of one (1') foot over the top of the pipe. It shall be the Contractor's responsibility for compliance therein.
- G. Excavated material shall be piled in a manner that will not endanger the Work and that will avoid obstructing sidewalks, driveways and drainage. Gutters shall be kept clear or other satisfactory provisions made for street drainage.
- H. The maximum width of the trench at the top of the pipe shall be thirty-six (36") inches or two times the pipe diameter plus eighteen (18") inches, whichever is greater.
- I. Unless otherwise specified on the plans, all pipes shall be placed in a flat bottom trench with tamped backfill. The sides of the trench shall slope back to provide a stable slope for the particular type of soil in the trench.
- J. If the trench is excavated to a greater width than authorized, the Engineer may direct the Contractor to provide a higher class of bedding, a higher strength pipe or both, than that required by the Contract, without additional compensation therefore, as the Engineer may deem necessary to satisfy the design requirements.
- K. Faulty grade of the trench below grade lines shall be corrected with approved material thoroughly compacted without additional compensation to the Contractor.
- L. When excavation is encountered that is unsuitable for backfill, it shall be removed as directed by the Geotechnical Engineer.
- M. The Contractor shall be solely responsible for the safety of the excavation relating to angle of repose and/or bracing.

### 3.7 PREPARATION OF SOIL DURING PIPE LAYING

- A. At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connections, but they shall be no larger than would be adequate. No pipe material shall be laid in water or when the trench or bedding conditions are otherwise unsuitable or improper.
- B. If trench bottom conditions are encountered which appear to require stabilization, the Engineer shall be informed. The trench conditions shall be examined by the Independent Testing Lab to determine the nature of such instability. If it is determined that the trench bottom cannot support the pipe, a further depth and/or width shall be excavated and refilled to the pipe foundation grade with granular foundation material and thoroughly compacted.
- C. If the examination by the Engineer reveals that the above-described conditions are caused by the Contractor's manipulation of the soils in the presence of excessive moisture or lack of proper dewatering, the Contractor shall take such steps as are necessary to stabilize the trench bottom including the use of pipe support material and improved dewatering methods. In such a case, the cost of necessary measures shall be borne by the Contractor.
- D. When the bottom of the trench consists of material suitable to properly support the pipe, the following methods of bedding shall apply:
  - 1. Granular bedding material shall be placed below the midpoint of the pipe, prior to the pipe installation, to facilitate proper shaping and achieve uniform pipe support, using hand compaction methods.
  - 2. Granular backfill material at the pipe zone shall be free from rock, boulders or other unsuitable substances and shall be deposited into the trench simultaneously on both sides of pipe for the full width of the trench in six (6") inch lifts thoroughly compacted to a minimum elevation of one (1') foot above the top of the pipe. Compaction shall be accomplished by mechanical tamping.
  - 3. The backfill material shall be placed to the top of the trench of subgrade elevation in level, successive layers, having a thickness of not greater than twelve (12") inches. Each successive layer shall be thoroughly compacted as specified prior to the placement of additional layers. If the specified compaction is not being attained utilizing the equipment and materials available, the thickness of the layers shall be reduced. The addition of water to the backfill materials should be limited to achieving satisfactory moisture content for compaction control, if necessary. Compaction of the backfill should be attained using vibratory, non-vibratory or mechanical rammer-type compactors. The type of compactor is dependent on the type of backfill material used. Precautionary measures should be taken to assure that the compaction equipment will not damage the underlying pipe.
  - 4. Backfilling shall not take place at any time unless approved compaction equipment is available at the site.

- E. Ledge rock, boulders and large stones shall be removed to provide a clearance of at least six (6") inches below the outside barrel of the pipe or fittings, and to a clear width of six (6") inches on each side of the pipe and appurtenances for pipes sixteen (16") inches or less in diameter; for pipes larger than sixteen (16") inches, a clearance of nine (9") inches below and a clear width of nine (9") inches on each side of outside diameter of pipe shall be provided. Adequate clearance for properly jointing pipe laid in rock trenches shall be provided at bell holes. All costs associated with removing and disposing of ledge rock, boulders and large stones are considered part of the Base Bid Contract.
- F. Excavations below subgrade in rock or in boulders shall be refilled to subgrade with material approved by the Independent Testing Lab and thoroughly compacted.
- G. Where trench excavation is encountered which is unsuitable for backfill, such material shall be replaced with granular backfill to be supplied by the Contractor at the direction of the Independent Testing Lab. All costs of importing granular backfill are part of the Base Bid Contract.
- H. Where pipes are of sufficient size to create an excess of backfill material, the excess shall be hauled off the site. Hauling and grading of the excess backfill will be considered part of the Base Bid Contract.
- I. Any deficiency in the quantity of material for backfilling the trenches or for filling depressions caused by settlement shall be supplied by the Contractor with no extra compensation allowed.
- J. Backfill in trenches in areas to be paved shall be placed to an elevation that will permit the placement of base and surfacing materials.
- K. Trench backfill in pavement areas shall be placed in lifts no greater than eight (8") inches thick, at a moisture content within two (2) percentage points of optimum, to a compacted relative density of at least 95 percent of Standard Proctor Density ASTM D698 at depth, with the upper three (3') feet compacted to 100 percent of Standard Proctor Density.
- L. Trench backfill in unpaved areas shall be placed in lifts no greater than twelve (12") inches thick, at moisture content within two (2) percentage points of optimum and compacted to a relative density of at least 90 percent of Standard Proctor Density.
- M. Trench backfill compaction around all utility structures shall be accomplished as follows:
  - 1. Within five (5') feet of all utility structures, backfill compaction by mechanical roller vibrators will not be allowed, but shall be accomplished by using whatever mechanical means the Laboratory Inspector deems appropriate and shall be compacted in layers with material not to exceed eight (8") inches in depth.

### 3.8 FIELD QUALITY CONTROL

- A. Refer to Division One specifications for general requirements for field inspection and testing.
- B. Field-testing and inspection shall be performed by qualified parties as specified herein and in accordance with the provisions of Division One Specifications.

- C. Conventional testing and inspection services herein describe those items not specifically required by the State Building Code but are considered essential to the proper performance of the building systems.
- D. Classification of materials used and encountered during construction will be performed in accordance with ASTM D2487 and ASTM D2488.
- E. Perform compaction density testing on compacted fill in accordance with ASTM D1556/D1556M, ASTM D2167, or ASTM D6938.
- F. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 (Standard Proctor).
- G. Document presence of ground water within excavations. Verify cut and fill slopes if specified in the Contract Documents.
- H. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner or the Owner's Representative.
- I. Frequency of Tests:
  - 1. Compaction tests shall be performed at the rate of one (1) test per one hundred (100') feet of trench or portion thereof and two (2) tests at each structure with one (1) test below the upper three (3') feet of backfill and one (1) test in the upper three (3') feet of backfill. The majority of the trench backfill tests shall be below the upper three (3') feet.
- J. Proof roll compacted fill surfaces within trenches.
- K. The Contractor shall make, or provide for, all repairs and replacements to improvements affected by settlement of backfill within 30 days after notice from the Engineer or the Owner.

### 3.9 CLEAN-UP

- A. Remove unused stockpiled materials; leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION



SECTION 32 1122  
AGGREGATE BASES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Sub-grade preparation.
- C. Testing rolling equipment and procedures.
- D. Aggregate base course.
- E. Coordination with earthwork specification.
- F. All installations related to the above materials.

1.2 RELATED SECTIONS

- A. Section 02 4113 - Selective Site Demolition.
- B. Section 31 0000 - Earthwork.
- C. Section 31 1000 - Site Clearing.
- D. Section 32 1216 - Asphalt Concrete Paving.
- E. Section 32 1313 - Exterior Concrete Paving.

1.3 REFERENCES

- A. ASTM D75/D75M - Standard Practice for Sampling Aggregates; 2014(2014).
- B. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction; 2012 (Reapproved 2022).
- C. ASTM D2726/D2726M - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures; 2019.
- D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).

- E. Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction" . Only applicable portions of construction methods and materials apply. References to methods of measurement or payment are not applicable.

- 1. MN/DOT 3138 - Aggregate for Surface and Base Courses

- F. All materials and products used shall comply with Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction".

#### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.

- B. Conform to all applicable code for materials and installation of the Work of this Section.

- C. Verify that survey benchmark and intended elevations for the Work are as indicated.

- D. The Contractor is responsible for coordinating construction schedule and required testing with testing agency prior to start of construction.

- E. General: In addition to other specified conditions, comply with the following minimum requirements:

- 1. Subcontractor's Qualifications: The construction of the stabilized aggregate base shall be done by a responsible Subcontractor having the necessary equipment and experience to perform the work.

- F. Governing Codes: The Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations and orders of any public authority having jurisdiction. All work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.

#### 1.5 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.

- B. Protection of Persons: The Owner's activities will continue about the site during construction. Install barricade fencing (snow fence), as necessary, to provide a safe environment between construction work and pedestrian circulation.

- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  - 2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
  - 3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
  - 4. Locate, excavate, and expose all existing underground lines in advance of trenching operations.
  - 5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.
- E. Traffic Control:
  - 1. Maintain vehicular and pedestrian traffic as required for construction activities.
  - 2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.
  - 3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.
- F. Grade Control: Establish and maintain the required lines and grades, including crown and cross slope, for each course during construction operations.

## 1.6 WARRANTY

- A. Provide one (1) year warranty. The warranty shall be in addition to, and run concurrent with, other warranties required by the Contract Documents, including the Division One Specifications. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under the requirements of the Contract Documents.
- B. Warranty: All materials and workmanship provided are guaranteed against defects after completion and final acceptance of the Work. Defects due to faulty materials or workmanship developed during the guarantee period shall be satisfactorily repaired or replaced by the Contractor at their expense.

## PART 2 PRODUCTS

### 2.1 AGGREGATE BASE MATERIALS

- A. Stabilized Aggregate Base: Aggregate shall meet the requirements of MN/DOT Specification 3138, gradation Class 5, containing up to 100% recycled aggregate, minimum 10 percent crushed.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine the areas and conditions under which the Work of this Section will be performed. Correct conditions detrimental to the timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify substrate has been inspected, gradients and elevations are correct, and at suitable moisture content.
  - 1. Do not proceed until unsatisfactory conditions have been corrected.
- C. Coordinate with the related specification 31 0000 Earthwork to confirm that the sub-grade is at the proper elevation, densities, and material types. Proceeding with work indicates acceptance of the conditions constructed by the related specification section.

### 3.2 SUBGRADE PREPARATION

- A. Correct irregularities in the substrate gradient and elevation by scarifying, reshaping, and recompacting.
- B. Do not fill on soft, muddy, or frozen surfaces.
- C. Remove loose and foreign material from compacted subbase surfaces immediately before paving application. Do not disturb subbase material.

### 3.3 TEST ROLLING SUBGRADE

- A. Test rolling shall be used when verifying stability and uniformity of subgrade.
- B. Use test rolling equipment conforming to the following description:
  - 1. Tandem axle, dual wheel dump truck.
  - 2. Tire width maximum of 17 inches for the front axle tires.
  - 3. Tire width maximum of 11 inches for the rear axle tires.

4. Tire pressure shall be no less than 2 psi of tire or vehicle manufacturer's maximum psi rating. The minimum psi rating must be 80 psi.
  5. Minimum legal capacity of 52,000 pounds.
  6. Minimum front axle capacity of 20,000 pounds.
  7. Front axle is loaded to a minimum of 16,000 pounds.
  8. Minimum gross weight is a minimum of 50,000 pounds.
  9. Provide weigh slip to testing laboratory inspector.
- C. Test Rolling Procedures shall be performed as follows:
1. Operate equipment at a rate not to exceed 2.5 to 5 mph or at a comfortable walking pace.
  2. Adjust speed to allow testing laboratory inspector to measure any deflections and areas of rutting.
  3. Operate proof roller equipment in a pattern so that affected areas are loaded with at least one pass.
  4. After proof rolling, check subgrade for conformance to drawings, and correct all surface irregularities. Re-shape subgrade within tolerances specified.
- D. Limited access areas
1. The above description is typical for road and walk construction. Some areas use of a roller may be impractical, use largest compaction equipment that is practical under the observation of the soils testing representative.
- E. Test Rolling Evaluation:
1. Rutting up to 1-inch is acceptable. Rutting in excess of 1-inch but not more than 6-inches shall be considered a failure and will require that soil be reworked and compacted to required density.
  2. Deflection (Pumping):
    - a. For granular & non-granular materials, deflection is acceptable to a maximum of six-tenths (0.6 in) inches.
    - b. For aggregate surfacing, full-depth reclamation, aggregate base, and shoulder aggregate base, deflection is acceptable to a maximum of four-tenths (0.4 in) inches.
    - c. For stabilized full depth reclamation, deflection is acceptable to a maximum of three-tenths (0.3 in) inches.
  3. Rutting and deflection in excess of 6-inches will require review and recommendation for corrective action by an approved Geotechnical Engineer.

4. Any failing test creates a hold point, where no additional material may be placed until Corrective action and passing retest(s) have occurred or accepted by the Engineer. Any additional material placed before corrective action and passing retest(s) occur constitutes as unauthorized work per MN/DOT 1512.2.
5. After remedial work is performed, a final test roll shall be performed the day following the completion of compaction per MN/DOT 2215. If remedial work is performed as directed, a second test roll may be required at discretion of testing laboratory inspector.

### 3.4 AGGREGATE BASE PLACEMENT

- A. Subgrade: The area to be paved shall be graded to the elevation of the underside of the stabilized base. Pre-compact soils beneath the stabilized base to 100 percent of Standard Proctor Density ASTM D698. Recompact as necessary to provide the specified density for the subgrade.
- B. Remove all castings set by others that are within the paving area and replace with metal covers. The castings shall be reset as outlined in 321216 Asphalt Concrete Paving and 321313 Exterior Concrete Paving.
- C. Spread aggregate base over prepared base to a total compacted thickness as indicated on the Drawings.
- D. Place aggregate base in maximum three (3") inch layers and roller compact.
- E. Level and contour surfaces to elevations and gradients indicated on the Drawings.
- F. Compact placed aggregate materials to achieve compaction to 100 percent of its Standard Proctor Density ASTM D698.
- G. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- H. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- I. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.
- J. The aggregate base shall be placed under the concrete curb and gutter by the Paving Contractor. Coordinate all work with the Exterior Concrete Pavement Contractor.

### 3.5 TOLERANCES

- A. Flatness: Maximum variation of one-fourth (1/4") inch measured with a ten (10') foot straight edge.
- B. Scheduled Compacted Thickness: Within one-fourth (1/4") inch.
- C. Variation from True Elevation: Within one-fourth (1/4") inch.

END OF SECTION

SECTION 32 1216  
ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Asphalt concrete paving above aggregate base course; as indicated on the drawings, specified herein, and complete with all accessories.
- C. Bituminous tack coat
- D. Asphalt concrete paving; wear course and non-wearing course surfaces.
  - 1. Street pavement.
  - 2. Driveway pavement.

1.2 RELATED SECTIONS

- A. Section 02 4113 - Selective Site Demolition.
- B. Section 31 0000 - Earthwork.
- C. Section 32 1122 - Aggregate Bases.
- D. Section 32 1313 - Exterior Concrete Paving.

1.3 REFERENCES

- A. ASTM C117 - Standard Test Method for Materials Finer than 75-nm (No. 200) Sieve in Mineral Aggregates by Washing; 2017.
- B. Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction" . Only applicable portions of construction methods and materials apply. References to methods of measurement or payment are not applicable.
  - 1. MN/DOT 3138 - Aggregate for Surface and Base Courses
  - 2. MN/DOT 3139 - Graded Aggregate for Bituminous Mixtures
  - 3. MN/DOT 3151 - Bituminous Material
  - 4. MN/DOT 2357 - Bituminous Tack Coat

5. MN/DOT 2360 - Plant Mixed Asphalt Pavement

- C. All materials and products used shall comply with Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction".

1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. The Contractor is responsible for coordinating construction schedule and required testing with testing agency prior to start of construction.
- E. General: In addition to other specified conditions, comply with the following minimum requirements:
1. Subcontractor's Qualifications: The construction of bituminous paving shall be done by a responsible Paving Subcontractor having the necessary equipment, plant and experience to perform the work.
- F. Governing Codes: The Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations and orders of any public authority having jurisdiction. All work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.

1.5 SUBMITTALS

- A. Submit under the provisions of Division One Specifications.
1. Certificates: The Contractor and the Asphalt Concrete Producer shall jointly provide certificates certifying that materials comply with the specification requirements.
  2. Job Mix Design: The bituminous mix plant shall have on file a report prepared by an approved testing laboratory that indicates the proportions of materials used in each type of bituminous courses being provided and the temperature of the mix. The job mix design shall be submitted to the Engineer for acceptance prior to placing the bituminous mix.

1.6 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified



prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.

- B. Protection of Persons: The Owner's activities will continue about the site during construction. Install barricade fencing, as necessary, to provide a safe environment between construction work and pedestrian circulation.
- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  - 2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
  - 3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
  - 4. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.
- E. Traffic Control:
  - 1. Maintain vehicular and pedestrian traffic as required for construction activities.
  - 2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.
  - 3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.
- F. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.
- G. Weather Limitations:
  - 1. Apply bituminous tack coat only when the ambient temperature is at least 50 degrees Fahrenheit (10 degrees C), and when the temperature has not been below 35 degrees Fahrenheit (2 degrees C) for twelve (12) hours immediately prior to application.
  - 2. Do not apply materials when the base surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.

3. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees Fahrenheit (4 degrees C), when the underlying base is dry and when weather is not rainy.
4. Refer to “Minimum Placement Temperature Chart” prepared by the National Asphalt Pavement Association for minimum bituminous placement temperatures.
5. Paving shall not take place when, in the opinion of the Independent Testing Laboratory, the weather or surface conditions are considered unfavorable.

#### 1.7 MATERIAL REQUIREMENTS

##### A. Mix Criteria:

1. Provide mix formulas for each required asphalt-aggregate mixture.
2. Establish a single percentage of aggregate passing each required sieve size, a single percentage of asphalt cement to be added to aggregate, and a single temperature at which asphalt concrete is to be produced.
3. Comply with the mix requirements of the Minnesota Department of Transportation (MN/DOT) standards.
4. Maintain material quantities within allowable tolerances of the governing standards.

##### B. Prepare and keep on file the mix formula for each course.

##### C. The base course shall be tested and approved by the Independent Testing Laboratory immediately prior to placement of the asphalt concrete course.

##### D. The Contractor will be responsible for all drainage of the finish surface. Any “bird baths” will be considered unacceptable and shall be remedied by the Contractor at their expense to the satisfaction of the Engineer.

#### 1.8 SYSTEM DESCRIPTIONS

##### A. Design Requirements: Refer to plan details for pavement section thicknesses. Follow the City of Chaska’s requirements according to the City Standard Plates provided in the Details on the Drawings.

#### 1.9 WARRANTY

##### A. Provide one (1) year warranty. The warranty shall be in addition to, and run concurrent with, other warranties required by the Contract Documents, including the Division One Specifications. Manufacturer’s disclaimers and limitations on product warranties do not relieve Contractor of obligations under the requirements of the Contract Documents.

- B. Warranty: All materials and workmanship provided are guaranteed against defects after completion and final acceptance of the Work. Defects due to faulty materials or workmanship developed during the guarantee period shall be satisfactorily repaired or replaced by the Contractor at their expense.

## PART 2 PRODUCTS

### 2.1 AGGREGATE BASE MATERIAL

- A. Reference related specification section 32 1122 - Aggregate Bases

### 2.2 ASPHALT CONCRETE MATERIALS

- A. Bituminous Tack Coat: The bituminous tack coat shall be RC liquid asphalt or emulsified asphalt. The tack coat shall meet the requirements of MN/DOT Specification 2357.
- B. Bituminous Material for mix shall meet the requirements of MN/DOT 3151, PG (Performance Grade) 58-28 for all non-wear virgin and recycled non-wear or wear and PG 64-28 for all virgin mix wear layers.
- C. Non-wear Course Mix: MN/DOT 2360, Type SP; thickness indicated on Drawings.
  - 1. Mixture shall conform to current DOT requirements.
- D. Wear Course Mix: MN/DOT 2360, Type SP; thickness indicated on Drawings.
  - 1. Mixture shall conform to current DOT requirements.

### 2.3 GRADED AGGREGATES FOR BITUMINOUS MIXTURES

- A. Graded aggregates shall conform to MN/DOT 2360.
- B. Gradation shall conform to:
  - 1. Non-wear Course: MN/DOT 2360, Gradation B.
  - 2. Wear Course: MN/DOT 2360. Gradation A.

### 2.4 SOURCE QUALITY CONTROL

- A. Provide mix design for asphalt under the provisions of Division One Specifications.
- B. Submit proposed mix design of each class of mix for review and approval prior to commencement of the Work.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine the areas and conditions under which the Work of this Section will be performed. Correct conditions detrimental to the timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Coordinate with the related specification sections 31 0000 Earthwork and 32 1122 Aggregate Bases to confirm that the sub-grade is at the proper elevation, densities, and material types. Proceeding with work indicates acceptance of the conditions constructed by the related specification section.

### 3.2 SURFACE PREPARATION

- A. Sub-grade
  - 1. Reference related specification Section 31 0000
- B. Aggregate Bases
  - 1. Reference related specification Section 32 1122
- C. Remove loose and foreign material from compacted subbase surfaces immediately before paving application. Do not disturb subbase material.

### 3.3 TACK COAT:

- A. Apply to contact surfaces of previously constructed portland cement concrete surfaces and similar surfaces.
- B. Apply at rate of five-hundredths (0.05) to fifteen-hundredths (0.15) gallons per square yard of surface.
- C. Apply tack coat by brush to contact surfaces of concrete curbs, gutters, manholes and other structures projecting into or abutting asphalt concrete pavement.
- D. Allow surfaces to dry until material is at condition of tackiness and ready to receive pavement.

### 3.4 PLACING THE MIX - DOUBLE COURSE

- A. Place asphalt concrete mixture on prepared surfaces; spread and strike-off using paving machine.
- B. Inaccessible and small areas may be placed by hand if approved by the Civil Engineer. Prior to hand placement, the Contractor shall contact the Engineer to obtain written permission to proceed.

- C. Place each course at thickness so that when compacted it will conform to the indicated grade, cross-section, finish thickness and density indicated.
- D. Pavement Placing:
1. Unless otherwise directed, begin placing non-wear course at high side of section on one-way slope.
  2. After first strip has been placed and rolled, place succeeding strips.
  3. Complete non-wear courses for a section before placing wearing courses.
  4. Place mixture in continuous operation as practicable.
  5. Place tack coat before placing wear course.
  6. Non-wear course shall be swept as required before placing wear course.
- E. Hand Placed:
1. Spread, tamp and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to the Geotechnical Engineer.
  2. Place mixture at a rate that will ensure handling and compaction before mixture becomes cooler than acceptable working temperature.
- F. Joints:
1. Gradually make joints between old and new pavements, or between successive day's work, to ensure a continuous bond between adjoining work.
  2. Construct joints to have the same texture, density and smoothness as adjacent sections of asphalt concrete course.
  3. Clean contact surfaces free of sand, dirt or other objectionable material and apply tack coat.
  4. Offset transverse joints in succeeding courses not less than five (5') feet.
  5. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.
  6. Offset longitudinal joints in succeeding courses no less than six (6") inches.
  7. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory section to expose as even, vertical surface for the full course thickness.

### 3.5 COMPACTING THE MIX

- A. Provide sufficient number of rollers to obtain the required pavement density of 93 percent for non-wear and 92 percent for wear course mix and no more than 97 percent on any layer based on the maximum specific gravity in accordance with the gyratory mix design.
- B. Begin rolling operations as soon after placing mix when the mixture will bear weight of roller without excessive displacement.
- C. Do not permit heavy equipment, including rollers, to stand on the finished surface before it has thoroughly cooled or set.
- D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.
- F. Do not roll the centers of section first under any circumstances.
- G. Breakdown Rolling:
  - 1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
  - 2. Operate rollers as close as possible to the paving machine without causing pavement displacement.
  - 3. Check crown, grade and smoothness after breakdown rolling.
  - 4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.
- H. Second Rolling:
  - 1. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.
  - 2. Continue second rolling until mixture has been thoroughly compacted.
- I. Patching:
  - 1. Any patching of defective areas shall be discussed with the Civil Engineer prior to proceeding with work.
  - 2. Remove and replace defective areas.
  - 3. Cut-out and fill with fresh, hot asphalt concrete.
  - 4. Compact by rolling to specified surface density and smoothness.

5. Remove deficient areas for full depth of course.
6. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
7. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

### 3.6 MANHOLE AND GATE VALVE PROTECTION

- A. Cover manholes, catch basins and gate valves lying within the surface to be sealed to as to prohibit the bituminous material from being placed thereon.
- B. Clean the surface of these structures following the application of the cover aggregate.

### 3.7 ADJUSTING CASTINGS

- A. Castings shall be raised after the bituminous base course is placed and prior to installing the wear course.
- B. The bituminous base shall be saw cut around the cover plate. The bituminous aggregate and cover plate shall be removed.
- C. The casting shall be set to final grade using adjusting rings and mortar. No blocks will be allowed.
- D. The aggregate base shall be placed to the design depth around the casting. The bituminous patch mix shall be placed and tamped around the casting to bring the grade up to the surface of the bituminous base.
- E. The final grade of castings in paved areas shall be one-fourth (1/4") inch to one-half (1/2") inch below the top of the completed wear course. The castings shall be set to the contour of the finished surface so that the required tolerance is uniform around the circumference of the casting. The one-fourth (1/4") inch to one-half (1/2") inch tolerance shall be measured at the immediate edge of the casting and no "straightedge" measurements shall be accepted. A plywood template, one-half (1/2") inch thick, shall be fastened to the top of all non-adjustable castings during placing and rolling of the wear course to ensure that the required tolerances are met.
- F. All final adjustments to the adjustable castings shall be made by means of the casting adjustment bolts.
- G. All castings, which do not meet the required tolerances, shall be removed and re-adjusted at the Contractor's expense.

### 3.8 CLEANING

- A. After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of the Engineer.

3.9 PROTECTION

- A. The Contractor shall be required to protect all adjacent concrete surfaces from chipping and damage during the asphalt pavement placement.
- B. Protect all concrete surfaces from staining or discoloration during placement of asphalt materials or vehicle trucking during construction.
- C. Immediately after placement of asphalt paving, provide traffic cones, barricades and other devices needed to protect pavement and marking paint from mechanical injury for a minimum of seven (7) days.

END OF SECTION



SECTION 32 1313  
EXTERIOR CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Exterior concrete pavement systems above base course; as indicated on the Drawings, specified herein, and complete with all accessories.
- C. Granular base under exterior concrete sidewalk Work is specified under the provisions of Section 31 0000.
- D. Exterior Concrete Work:
  - 1. Concrete curb and gutter.
  - 2. Aprons and Driveway slabs.
  - 3. Sidewalks.
  - 4. Concrete pavement.
  - 5. Pedestrian curb ramps.
- E. Joint Sealant and Joint Backing.

1.2 RELATED SECTIONS

- A. Section 31 0000 - Earthwork.
- B. Section 32 1122 - Aggregate Bases

1.3 REFERENCES

- A. ACI 301 - Specifications for Concrete Construction; 2020.
- B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- C. ACI 305R - Guide to Hot Weather Concreting; 2020.
- D. ACI 306R - Guide to Cold Weather Concreting; 2016.

- E. ACI 325.9R - Guide for Construction of Concrete Pavement; 2015.
- F. ACI 330.1 - Specification for Unreinforced Concrete Parking Lots and Site Paving; 2014.
- G. ACI 330R - Guide for the Design and Construction of Concrete Parking Lots; 2013.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- I. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.
- J. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- K. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.
- L. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- M. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements; 2021.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2024.
- O. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types); 2023.
- P. ASTM D5893/5893M - Standard Specifications for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements; 2016.
- Q. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- R. Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction" . Only applicable portions of construction methods and materials apply. References to methods of measurement or payment are not applicable.
  - 1. MN/DOT 2301 Concrete Pavement
  - 2. MN/DOT 2521 Walks
  - 3. MN/DOT 2531 Concrete Curbing
  - 4. MN/DOT 3137 Coarse Aggregate for Portland Cement Concrete
- S. ACI 309R - Guide for Consolidation of Concrete, American Concrete Institute; 2005.

#### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. The Contractor is responsible for coordinating construction schedule and required testing with testing agency prior to start of construction.
- E. Perform the Work in accordance with ACI 325.9R and ACI 330R.
- F. Acquire cement and aggregate from same source for all Work.
- G. The complete exterior concrete Work shall give the appearance of uniformity in surface contour and texture and shall be accurately constructed to line and grade. The required joints shall show neat workmanship.
- H. The Owner shall employ the services of an independent testing lab to perform the specified field quality control.
- I. Quality Control:
  - 1. Do not commence placement of concrete until mix design has been reviewed and approved by the Architect/Engineer and until copies are at the jobsite, the batch plant and the building inspection department.
- J. Governing Codes: The Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations and orders of any public authority having jurisdiction. All work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Division One Specifications.
- B. Submit under the provisions of Division One Specifications.
  - 1. Delivery Tickets: Submit one copy to Architect indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump and time of batching for each load delivered.
  - 2. Product Data: Provide manufacturer's data on joint filler and curing compounds.

3. Test Reports and Mix Designs: Contractor shall submit mix designs and aggregate test reports, directly from testing laboratory. Submit mix designs and aggregate test reports at least 14 days prior to placing. Do not place concrete until the Architect/Engineer has reviewed mix designs and aggregate test reports. Mix identification designation.
- C. The independent testing laboratory will submit concrete compression tests, entrained air test, and slump test reports.

## 1.6 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.
- B. Protection of Persons: The Owner's activities will continue about the site during construction. Install barricade fencing, as necessary, to provide a safe environment between construction work and pedestrian circulation.
- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
  3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
  4. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.
- E. Traffic Control:
1. Maintain vehicular and pedestrian traffic as required for construction activities.
  2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.

3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.
- F. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.
- G. Cold Weather Protection: Place and protect concrete in accordance with ACI 306R, and the following:
1. When the mean daily temperature is 40°F or lower, provide suitable protection for concrete work as required to maintain minimum concrete temperature of 50°F for five (5) days, or 70°F for three (3) days.
    - a. So as to avoid thermal shock to the finished work, following protection period, do not allow concrete to cool more than 20°F each successive day.
- H. Hot Weather Protection: Place and protect concrete in accordance with ACI 305R. Employ suitable means to prevent too-rapid drying. Shade fresh concrete as soon as is possible without marring surface.
- I. Wet Weather Protection: Do not place concrete in rain, sleet, or snow, without providing adequate protection.

#### 1.7 DELIVERY STORAGE AND HANDLING

- A. Furnish delivery tickets with each load of concrete delivered to the Project. Information on each ticket shall be as follows:
1. Name of ready-mix batch plant.
  2. Ticket number
  3. Date.
  4. Truck number.
  5. Project name and location.
  6. Type of concrete (mix number).
  7. Amount of concrete.
  8. Weights of all ingredients.
  9. Time loaded or time of first mixing.
  10. Maximum aggregate size.
  11. Type, brand, and amount of admixtures.

12. Total water in the batch and maximum amount of water that can be added at the site without exceeding design mix proportions.

13. Amount of water added at site and initials of person adding water.

B. The Contractor shall retain delivery tickets for the duration of construction.

## 1.8 FIELD MEASUREMENTS

A. Verify actual locations of exterior concrete work and other construction to which concrete work must fit, by accurate field measurements before installation. Show recorded measurements on final Shop Drawings. Coordinate installation schedule with construction progress to avoid delay of the Work.

B. The Contractor is to employ the services of a registered land surveyor to perform the specified layout work.

## 1.9 WARRANTY

A. Provide one (1) year warranty. The warranty shall be in addition to, and run concurrent with, other warranties required by the Contract Documents, including the Division One Specifications. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under the requirements of the Contract Documents.

B. Warranty: All materials and workmanship provided are guaranteed against defects after completion and final acceptance of the Work. Defects due to faulty materials or workmanship developed during the guarantee period shall be satisfactorily required or replaced by the Contractor at their expense.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### A. Cement

1. Cement for normal weight structural concrete: ASTM C150/C150M, Type I.

2. Blended cement: ASTM C595/C595M, Type IL.

3. Use only one type and brand of Portland Cement for all exposed concrete. Architect's permission is required to change brands.

#### B. Aggregates

1. Fine aggregates for normal weight structural and non-structural concrete: ASTM C33/C33M

- a. Alkali Silicate Reactivity: Expansion of fine aggregate tested per ASTM C1260 shall not exceed 0.15%. If fly ash or other pozzolans are used to reduce shrinkage to meet this requirement, expansion of fine aggregate tested per ASTM C1260 without fly ash or other pozzolans shall not exceed 0.25%.
  2. Coarse aggregates for normal weight structural and non-structural concrete: MN/DOT 3137.2.D.2, Class A aggregates
    - a. Limits for deleterious substances and physical properties of coarse aggregate for concrete shall meet the requirements of MN/DOT 3137.2.D.2, Class A aggregates.
  3. Maximum nominal size of coarse aggregate shall be  $\frac{3}{4}$ " for all concrete.
- C. Water: Clean and free from deleterious amounts of acids, alkalis or organic materials.
- D. An air entraining admixture, conforming to ASTM C260/C260M, shall be used for all concrete.

## 2.2 ACCESSORIES

- A. Curing Materials
1. Moisture-Retaining Cover: ASTM C171, waterproof paper or polyethylene film.
  2. Liquid Membrane Curing Compound: ASTM C309, Type 2, Class B.
- B. Form Release Agent: Commercial product to facilitate stripping without staining or damaging concrete or impairing future concrete treatment.
- C. Expansion Joint and Isolation Joint Filler: ASTM D1751, preformed, resilient, non-extruding, asphalt impregnated joint filler, 1/2" thick unless otherwise indicated.
- D. Provide stabilized aggregate base under all concrete sidewalks, ramps and stairs as specified under the provisions of Section 32 1122 Aggregate Bases
- E. Provide stabilized aggregate base under all concrete curb and gutters as specified under the provisions of Section 32 1122 Aggregate Bases.
- F. Provide stabilized aggregate base under all concrete pavements as specified under the provisions of Section 32 1122 Aggregate Bases.
- G. Pavement Joint Sealing Compound:
1. Provide silicone joint sealant meeting the requirements of ASTM D5893/5893M and the following:
    - a. Primer-less.
    - b. Low modulus.
    - c. Does not contain solvents or diluents that can cause shrinkage or expansion during curing.
    - d. Smooth and uniform in appearance with a consistency that allows application with air pressure guns or hand caulking applicators.

- e. Capable of withstanding repeated joint movement from negative fifty (-50) to one hundred (100) percent without losing adhesion to the concrete and without cohesion failure.
  - 2. Joint Backing: As recommended by sealant manufacturer.
- H. Evaporation Retardants
- 1. An evaporation-retarding agent may be used during the concrete finishing operation to control plastic cracking of the fresh concrete.
  - 2. Acceptable materials are:
    - a. "Confilm", by Master Builders
    - b. "Eucobar", by Euclid Chemical Co.

## 2.3 PRODUCTS

- A. Concrete Walks: MN/DOT Spec 2521, as detailed and dimensioned on the Drawings.
- B. Concrete Curbs/Gutters: MN/DOT Spec 2531, as detailed and dimensioned on the Drawings.
- C. Exterior on-grade Concrete Pavement: MN/Dot Spec 2461, as detailed and dimensioned on the Drawings. See section 2.04 for compressive strength requirements.

## 2.4 CONCRETE MIXES

- A. Provide mixes meeting the following minimum requirements. Submit concrete mix design for each type of concrete. Mix designs must be reviewed prior to pouring concrete. Review is for conformance with specification requirements only. Contractor is responsible for performance.
  - 1. 28-day Compressive Strength: 4,500 psi.
  - 2. Maximum Aggregate Size: 3/4", MN/DOT 3137.2.D.2, Class A aggregate.
  - 3. Slump Range: 2"-5".
  - 4. Air Content ASTM C231: 6.5%  $\pm$ 1-1/2%
  - 5. Maximum Water/Cement Ratio:
    - a. 0.45 for unreinforced concrete.
- B. Concrete shall conform to the requirements of ASTM C94/C94M.
- C. Provide concrete with workability such that it will fill the forms, without voids or honeycombs, when properly vibrated, without permitting materials to separate or excess water to collect on the surface.



## 2.5 FORM MATERIALS

- A. The forms shall be of metal, wood or other suitable material, and shall be capable of sustaining the concrete in its proper position until set. Do not use aluminum materials in contact with concrete. Concrete form materials must be used in a manner to provide the surface finish specified.
- B. Form Coating Material: Coat forms with a non-staining form release agent that will not discolor or deface the surface of the concrete.
- C. Side forms shall have a height at least equal to the edge thickness of concrete being formed.
- D. Flexible or curved forms shall be used on curves having a radius of 150 feet or less.
- E. Face forms for curbing shall conform to the shape and design of the curb.

## 2.6 SOURCE QUALITY CONTROL

- A. Provide concrete mix design under the provisions of Division One Specifications
- B. Submit proposed mix design of each class of concrete to appointed firm for review prior to commencement of work.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine the areas and conditions under which the Work of this Section will be performed. Correct conditions detrimental to the timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Coordinate with the related specification sections 31 0000 Earthwork and 32 1122 Aggregate Bases to confirm that sub-grade, granular base, and aggregate base is at the proper elevation, densities, and material types. Proceeding with work indicates acceptance of the conditions constructed by the related specification section.

### 3.2 SURFACE PREPARATION

- A. Sub-grade
  - 1. Reference related specification Section 31 0000
- B. Aggregate Bases
  - 1. Reference related specification Section 32 1122

C. Base Placement

1. Spread granular cushion as specified in Section 31 0000 over prepared base to a total compacted thickness as indicated on the Drawings.
  2. Place granular cushion base in maximum three (3") inch layers and roller compact.
  3. Level and contour surfaces to elevations and gradients indicated on the Drawings.
  4. Compact placed aggregate materials to achieve compaction to 100 percent of its maximum dry density in accordance with ASTM D698.
  5. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
  6. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.
- D. Remove loose and foreign material from compacted subbase surfaces immediately before paving application. Do not disturb subbase material.
- E. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.
- F. The Contractor shall notify the Architect/Engineer and the Independent Inspection Agency a minimum of twenty-four (24) hours prior to commencement of concrete operations.

3.3 ADJUST CASTINGS

- A. The casting shall be set to final grade using adjusting rings and mortar. No blocks will be allowed.
- B. The aggregate base shall be placed to the design depth around the casting.
- C. The final grade of castings in paved areas shall be one-fourth (1/4") inch to one-half (1/2") inch below the top of the completed concrete pavement. The castings shall be set to the contour of the finished surface so that the required tolerance is uniform around the circumference of the casting. The one-fourth (1/4") inch to one-half (1/2") inch tolerance shall be measured at the immediate edge of the casting and no "straightedge" measurements shall be accepted. A plywood template, one-half (1/2") inch thick, shall be fastened to the top of all non-adjustable castings during placement of the concrete to ensure that the required tolerances are met.
- D. All final adjustments to the adjustable castings shall be made by means of the casting adjustment bolts.
- E. All castings, which do not meet the required tolerances, shall be removed and re-adjusted at the Contractor's expense.

3.4 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.

- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.
- D. Install forms to allow continuous progress of Work and so that forms can remain in place at least twenty-four (24) hours after concrete placement.
- E. Slipform equipment may be used if the resulting curb and gutter conforms to the shape as specified on the drawings and the finish is satisfactory to the Architect/Engineer.

### 3.5 JOINTING

#### A. General Joint Requirements:

1. All joints shall be vertical and straight.
2. Transverse joints shall be placed at right angles to the longitudinal axis of the Work.
3. Joints shall align with similar joints in adjoining work where practicable.
4. The panels shall be square where practicable.
5. The maximum length to width ratio shall be one and one-quarter to one (1.25:1).
6. Eliminate or minimize acute angle panels (especially less than sixty (60) degrees) provide reinforcing steel if this is not possible.
7. Unless provided elsewhere in the construction documents (I.E. architectural/landscape plans) contractor shall submit a jointing plan to the architect/engineer prior to start of construction. The jointing plan shall clearly indicate the location of control joints, construction joints, and isolation joints.
8. All joint work shall coordinate precisely with grids, modules and radials as prescribed on the Drawings.

#### B. Expansion/Isolation Joints:

1. Provide isolation joints at the following locations:
  - a. At the beginning and end of all curved sections.
  - b. Where new concrete surrounds, adjoins or abuts any fixed objects, such as fire hydrants, valve boxes, manholes, light poles, flag poles, curbs, walks or other rigid structures.
  - c. At sixty (60') foot maximum spacing for sidewalks or as indicated in the drawings.
  - d. Between curb and gutter and immediately adjacent slabs behind curb and gutter.
2. Joints shall be filled with one-half (1/2") inch thick pre-formed joint filler material except as noted below.
  - a. Joint filler material shall not be provided between concrete slabs and curb and gutter except under the following circumstances.

- 1) Where concrete slabs behind the curb and gutter are immediately adjacent to the curb and the concrete extends behind the curb and gutter by more than 12-feet.
  - 2) Where concrete slabs are constrained from lateral movement by other objects such as asphalt pavement, curbs, or other fixed objects.
- b. Joints and filler material shall be equal in depth to the full thickness of the slab.

C. Contraction (Control) Joints:

1. Curbing shall be provided with contraction joints at ten (10') feet on center or as indicated on the Drawings.
2. Sidewalks shall be provided with contraction joints at a maximum interval of one-half (1.5) times the sidewalk thickness, unless otherwise approved by engineer. (For Example: Four (4") Inch thick sidewalk x one-half (1.5) = six (6') foot joint spacing.)
3. Pavements shall be provided with contraction joints at a maximum interval of twenty-four (24) times the pavement thickness, with a maximum interval of fifteen (15') feet. (For Example: Six (6") Inch thick pavement x twenty-four (24) = twelve (12') foot joint spacing)

D. Hand Tooled Joints:

1. Hand tooled joints shall be provided for the following concrete work:
  - a. Sidewalks.
  - b. Curbs.
2. All joints and edges, including against isolation/expansion joints, shall be rounded with a one-fourth (1/4") inch radius tool.
3. Contraction joints shall extend to at least twenty-five (25%) percent of the concrete thickness. (t/4)
4. Contraction joints in curbs shall extend to at least two (2") inches deep.
5. Contraction joints shall be five-eighths (5/8") inch wide, width includes both radii.

E. Sawcut Joints:

1. Sawcut joints shall be provided for the following concrete work:
  - a. Pavements.
2. Sawcut joints shall extend to at least twenty-five (25%) percent of the pavement thickness. (t/4)
3. Contractor shall sawcut joints as soon as concrete is hard enough such that sawing does not ravel joint edges or dislodge coarse aggregate particles. The maximum time to wait prior to sawing shall be twelve (12) hours or less.

### 3.6 PLACING CONCRETE

- A. Place concrete in accordance with ACI 330.1 and comply with the requirements for mixing and placing concrete as herein specified.
- B. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- C. Immediately before concrete placement, dampen base to reduce absorption. Standing water will not be permitted.
- D. Do not place concrete on frozen ground.
- E. Incorporate all concrete admixtures into the concrete at the ready-mix plant.
- F. Reject concrete not placed within 90 minutes of initial mix.
- G. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- H. Place concrete to pattern indicated on the Drawings or as directed by the Architect/Engineer.
- I. Place concrete by methods that prevent segregation of the mix. Consolidate concrete along the face of the forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, and side forms.
- J. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

### 3.7 CONCRETE FINISHING

- A. After striking off and consolidating concrete, smooth surfaces by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- B. After floating and before final finishing, check the concrete with a ten (10') foot steel straightedge to ensure there is no variation greater than three-sixteenth (3/16") inch from the straightedge.
- C. Work edges of slabs, gutters top edge of back of curbs and formed joints with an edging tool, and round to one-half (1/2") inch radius, unless otherwise indicated. Eliminate tool marks on concrete surfaces.
- D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surfaces as follows:
  - 1. Sidewalks: Light broom, radius edges to one (1") inch and trowel joint edges.
  - 2. Curb and Gutters: Light broom.

3. Straight Curbs: Light broom, radius edges to one (1") inch and trowel joint edges.
4. Inclined Ramps: Light broom perpendicular to slope.
5. Pavements: Light broom.

### 3.8 CONCRETE CURING

- A. Unformed Surfaces: Apply curing materials as soon as finishing operations are complete and the concrete's sufficiently hard to be undamaged by the curing process.
  1. Waterproof paper or polyethylene film: Use appropriate color of film based on ambient temperature. Sprinkle concrete with water as necessary during application of covering. Lap edges and ends at least 6 inches, and seal laps. Weight down covering to prevent movement. Patch holes and tears that occur during the curing period.
- B. Compound Application:
  1. Apply a membrane-curing compound to the exposed surface of the concrete within one (1) hour of finishing the concrete.
  2. The compound shall be thoroughly mixed before it is applied.
  3. If forms are removed in less than seventy-two (72) hours after placing the concrete, the curing compound shall be applied immediately to the exposed surfaces.
  4. The curing compound shall be applied by an approved airless spraying machine at the approximate rate of one (1) gallon of compound to 150 square feet of surface curing area.
  5. In all cases, the Contractor shall be responsible for the protection of the concrete from frost during the cure period.

### 3.9 PAVEMENT JOINT SEALING

- A. Prior to sealing, the joint faces shall be cleaned and dried.
- B. Prepare joints and sealing compounds in accordance with the manufacturer's installation instructions.
- C. Install sealing compounds in accordance with manufacturer's instructions in the following locations:
  1. At all construction and expansion/isolation joints.
- D. The top of sealer shall be flush to one eighth (1/8") inches below top of concrete surface.

3.10 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures and mechanical injury.

END OF SECTION

SECTION 33 1000  
WATER DISTRIBUTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Water distribution system for domestic consumption and firefighting as indicated on the drawings, herein specified and required for a complete and proper installation.
  - 1. Water Distribution Pipe.
    - a. Ductile Iron.
    - b. Polyethylene.
  - 2. Pipe Fittings.
  - 3. Tracer wire for non-conductive pipe.
  - 4. Fire Hydrants.
  - 5. Valves and boxes.
    - a. Gate Valves.
    - b. Curb Stop and Box.
    - c. Corporation Stop.
  - 6. Gaskets.
  - 7. Electrical bonding of joints.
  - 8. Granular materials.
  - 9. Tapping sleeves.

1.2 RELATED SECTIONS

- A. Section 02 4113 - Selective Site Demolition.
- B. Section 31 2333 - Trenching and Backfilling.
- C. Section 33 3000 - Sanitary Sewerage Utilities.
- D. Section 33 4000 - Storm Drainage Utilities.



### 1.3 REFERENCES

- A. AWWA B300 - Hypochlorites; 2018.
- B. AWWA B301 - Liquid Chlorine; 2018.
- C. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings; 2022.
- D. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
- E. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
- F. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.
- G. AWWA C153/A21.53 - Ductile-Iron Compact Fittings; 2019.
- H. AWWA C502 - Dry-Barrel Fire Hydrants; 2018.
- I. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2023.
- J. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2023.
- K. AWWA C651 - Disinfecting Water Mains; 2023.
- L. AWWA C800 - Underground Service Line Valves and Fittings; 2021.
- M. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service; 2020.
- N. Minnesota Department of Labor and Industry - Minnesota State Building Code.
- O. City Engineers Association of Minnesota Construction Standards Specification 2023.

### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. The Contractor is responsible for coordinating construction schedule and required testing with testing agency prior to start of construction.
- E. Construction of water main and building service pipelines utilizing plant fabricated pipe and other appurtenant materials, installed for conveyance of potable water. Relocation or adjustment of existing facilities as may be indicated on the Drawings.

- F. Removal of existing facilities, trench excavation and backfill, and restoration is included in Section 31 2333.
- G. All references to MN/DOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation Standard Specifications for Construction, as modified by any MN/DOT Supplemental Specification edition published prior to the date of advertisement for bids. All reference to other Specifications of AASHTO, ASTM, ANSI, AWWA, etc.
- H. All references to Cast Iron material shall be construed to include both Gray Iron and Ductile Iron products, except where one or the other is specified. All references to "structure" shall include any man-made object that is not otherwise exempted by special terminology or definition.
- I. Regulatory Requirements:
  - 1. State of Minnesota Building Code Division.
  - 2. Minnesota Department of Labor and Industry.
  - 3. Local Codes and Ordinances.
  - 4. Local Authority having Jurisdiction.
- J. Record Drawings:
  - 1. Refer to "Submittals" and "Field Quality Control" of this Section.
- K. Perform Work in accordance with the City of Chaska's requirements.

#### 1.5 FIELD MEASUREMENTS

- A. Verify actual locations of water distribution systems with other construction in which water distribution systems must fit by accurate field measurements before installation. Coordinate installation schedule with construction progress to avoid delay of the Work. No additional compensation will be given for problems resulting from Contractor's failure to verify and/or coordinate storm sewer work.

#### 1.6 SUBMITTALS

- A. Submit under the provisions of Division One Specifications.
- B. Shop Drawings: The Contractor shall submit a Shop Drawing portfolio showing all piping, valves, fittings, accessories, etc. provided under this Section prior to construction.
- C. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe discovery of uncharted utilities.

- D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.

#### 1.8 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.
- B. Protection of Persons: The Owner's activities will continue about the site during construction. Install barricade fencing, as necessary, to provide a safe environment between construction work and pedestrian circulation.
- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  - 2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
  - 3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
  - 4. Locate, excavate, and expose all existing underground lines in advance of trenching operations.
  - 5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.
- E. Traffic Control:
  - 1. Maintain vehicular and pedestrian traffic as required for construction activities.

2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.
3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.

#### 1.9 CONFLICTING UTILITIES

- A. When alterations to existing utilities are shown to avoid conflicts, make alterations at no cost to the Owner.

#### 1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, handle and protect products to the site under the provisions of Division One Specifications.
- B. Deliver new packaged materials, well-marked and identified, clean, dry and protected against dampness, freezing and damage.
- C. Storage of Ductile Iron Pipe Materials:
  1. Store in unit packages as received from manufacturer until just prior to use.
  2. Stack units in such a manner as to prevent deformation to pipe barrel and bells.
  3. Protect from direct sunlight by covering with opaque material if storage period will exceed six (6) weeks.
- D. Avoid severe impact blows, gouging or cutting by metal surfaces or rocks.

#### 1.11 WARRANTY

- A. Provide one (1) year warranty. Warranty shall be in addition to, and run concurrent with, other warranties required by the Contract Documents, including the Division One Specifications. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under the requirements of the Contract Documents.
- B. Warranty: All materials and workmanship provided are guaranteed against defects after completion and final acceptance of the Work. Defects due to faulty materials or workmanship developed during the guarantee period shall be satisfactorily repaired or replaced by the Contractor at their expense.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Materials required for this Work shall be new material conforming to the requirements of the referenced Specifications for the class, kind, type, size, grade and other details indicated in these Specifications. Unless otherwise indicated, all required materials shall be furnished by the Contractor. If any options are provided for, as to type, grade, or design of the material, the choice shall be limited as may be stipulated in the Plans and Specifications.
- B. Manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Plans. Otherwise, the Engineer may require advance approval of material suppliers, product design or other unspecified details as he deems desirable for maintaining adopted standards.

### 2.2 WATER DISTRIBUTION PIPE

#### A. Ductile Iron Pipe:

- 1. Ductile iron pipe shall be Class 52 and shall conform to AWWA C151/A21.51. Mechanical joints shall conform to AWWA C111/A21.11.
- 2. All ductile iron pipe shall cement lined on the inside in accordance with AWWA C104/A21.4. All exterior surfaces of the pipe and fittings shall have an asphaltic coating at least one mil thick. Spotty or thin seal coating, or poor coating adhesion, shall be cause for rejection.

#### B. Polyethylene (PE) Pressure Pipe and Fittings:

- 1. Unless otherwise specified, the dimensions and tolerances of the pipe barrel shall conform to Ductile Iron Pipe equivalent outside diameters (DIPS) for pipe diameters greater than three inches (3"). The method of joining material shall be by the Thermal Butt Heat Fusion Method in accordance with ASTM D3261.
- 2. The minimum "quick-burst" strength of the fittings shall not be less than that of the pipe with which the fitting is to be used.
- 3. Trace wire shall be laid with all PE water main and shall be #12 copper-insulated and rated for underground service.
- 4. Saddles for Polyethylene Pipe shall conform to the requirements of AWWA C800 and shall be thermal fusion polyethylene type; ductile iron with dual stainless-steel straps, spring washers, bolts and washers; or stainless-steel sleeve type, with stainless steel bolts, nuts, and spring washers. Stainless steel bolts, nuts, and washers. Spring washers shall be manufactured from type 304 stainless steel, special "spring grade". Saddles shall include threaded outlet tapping sleeves and Nitrile Butadiene Rubber (NBR) gaskets.

## 2.3 PIPE FITTINGS

### A. Ductile Iron Fittings:

1. Ductile iron fittings shall have mechanical joints and shall be Class 350 and shall conform to AWWA C110/A21.10. AWWA C153/A21.53 Class 350 compact fittings are considered equal. Mechanical joints shall conform to AWWA C111/A21.11.
2. All fittings shall be tar coated on the outside and cement lined on the inside in accordance with AWWA C104/A21.4.
3. The fittings shall be furnished with steel nuts and bolts and spray-coated with a bituminous coal tar supplied by the manufacturer.

### B. Polyethylene Fittings:

1. Installation of Polyethylene Pipe and their appurtenances shall conform to the requirements of AWWA M55 and to the bedding and backfill conditions specified by the Manufacturer, Plans, and Specifications.
2. Polyethylene pipe joints shall conform to the requirements of AWWA C906 and shall be made by the Thermal Butt Heat Fusion Method, Mechanical Flange Adaptor Method, Mechanical Joint Adaptor Method and Mechanical Transition Fittings. Mechanical joints shall include stainless steel pipe stiffeners. Compression fittings are not allowed for pipe diameters greater than two inches (2") in diameter

## 2.4 TRACER WIRE FOR NON-CONDUCTIVE PIPE

- A. Tracer wire for use with thermoplastic pipe types shall be rated for direct burial applications. Tracer wire shall be a minimum 12 AWG copper clad steel rated to 30 volts, High Molecular Weight Polyethylene (HMWPE) meeting ASTM D1248, with designation identified on the outside of the wire casing.
- B. Tracer wire boxes shall be a minimum of twelve (12") inches in height and two and three-eighths (2 3/8") inches inside diameter, constructed of ABS plastic, flared to prevent pull out or settlement, and furnished with a cast iron cover/lid assembly. There shall be two solid stainless steel terminals within each box.

## 2.5 FIRE HYDRANTS

- A. Dry Barrel - AWWA C502.
- B. Furnish a fire hydrant as specified by the City of Chaska .
- C. Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.
- D. Verify fitting and thread requirements with the local Fire Marshal.

- E. Provide for seven and one-half (7.5') feet of bury or as indicated on Drawings.
- F. Finish: Primer and two coats of enamel in color required by utility company.

## 2.6 VALVES AND BOXES

### A. Gate Valves:

1. Gate Valves shall conform to AWWA C509 for Resilient Seated Valves and shall comply with the following supplementary requirements:
  - a. Working pressure rating of 200 psig for all sized
  - b. Two-inch square operating nut opening counterclockwise (left).
  - c. Double "O" ring stem seal, one above and below the stem seal.
  - d. Weather seal on bonnet cover.
  - e. Non-rising stem.
  - f. Mechanical Joints.
  - g. Valves shall be Tyler Series 6860 or approved equal.

### B. Curb Stop and Box

1. One inch curb stop and box shall be type as specified by the City of Chaska with inverted key and shall have inlet and outlet for connection to copper water service pipe.
2. Curb Box: Extension type with brass screw in the cover, replaceable brass nut and enclosed base that screws into the threaded portion of the curb cock. Boxes shall have a 12-inch adjustment with an 8-foot length when fully extended and having a 1-1/4 inch upper lid section conforming to AWWA standards.

### C. Corporation stop shall be as specified by the City of Chaska with an AWWA inlet thread and an AWWA copper service pipe outlet.

### D. Valve Boxes:

1. All valves smaller than twelve (12") inches in diameter are to be provided with vertical valve boxes.
2. Valve boxes shall be cast iron of the three-piece type suitable for a depth of seven and one-half (7.5') feet of cover over the top of the pipe or to a depth as shown on the Drawings. Shafts shall be five and one-fourth (5-1/4") inch diameter; bases may be round or oval with a minimum internal diameter of seventeen and one-eighth (17-1/8") inches; and length adjustment shall be screw type. Valve boxes shall be Tyler 6860 or approved equal. The minimum valve box extension shall be one (1') foot.
3. Drop covers on valve boxes shall bear the word "WATER" on the top and be Tyler 6860 covers with extended skirt or approved equal.
4. Valve boxes shall have a minimum of a six (6") inch adjustment above and below specified depth of pipe.

## 2.7 GASKETS

- A. Rubber gaskets for mechanical joints and push-on joints shall conform to ASA A21.11 and shall be designed and manufactured to exact dimensions to assure a liquid-tight joint.

## 2.8 ELECTRICAL BONDING OF JOINTS

- A. Conductive gaskets with copper inserts as manufactured by American Ductile Iron pipe.
- B. Each joint on ductile iron pipe, valves, hydrants or fittings, whether "push-on" or mechanical joint type shall be electrically bonded with an external copper jumper capable of carrying 600 amperes of current for an extended period of time to provide integral electric thawing capabilities.
- C. These copper jumpers can be either shop or field applied in accordance with these Specifications. For field applied copper jumpers, either the "Burndy-Thermoweld" as supplied by Burndy Corporation, Norwalk, Connecticut, or "Cadweld" by Erico Products Company, Cleveland, Ohio will be permitted.
- D. The Contractor shall submit the proposed method to be used for approval by the Engineer prior to construction.
- E. The copper jumper shall be a minimum 48 ounce, soft, 1/16" x 3/4" wide flat strip or equal cross section round copper wire in the annealed condition conforming to ASTM Specification B152-58 Type DHP.
- F. The copper jumpers shall be welded to the pipe and fittings by the metallic-arc welding process, if shop applied or by the exothermic welding process if field applied.
- G. The copper jumper can be applied as a single strip welded at each end across the joint or by multiple strips with bolted connections in the middle. 5/16" x 3/4" silicon bronze hex head bolts and nuts shall be used on all bolted connections.
- H. All welded connections shall be made on a clean metal surface that has been ground to remove coating and oxide. The area at the connection, including the weld, shall be refinished with its original coating or other suitable protective coatings as specified.
- I. The assembled copper jumper across the joints shall be so installed so that expansion, contraction, or relative pipe movement incidental to normal service will not damage the connection to such an extent that electrical resistance will vary across the joint.
- J. The completed water main system shall be tested for electrical conductivity according to these specifications.

## 2.9 GRANULAR MATERIALS

- A. Granular materials furnished for foundation, bedding, backfill or other purposes as may be specified shall consist of any natural or synthetic mineral aggregate such as sand, gravel,



crushed rock, crushed stone or slag that shall be so graded as to meet the gradation requirements specified in Section 31 2333.

## 2.10 ACCESSORIES

- A. Concrete for Thrust Blocks: Concrete type specified in Section 32 1313 or 03 3000.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.
- B. Examine the areas and conditions under which the Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 INSPECTION AND RESPONSIBILITY OF MATERIALS

- A. During the process of unloading, the Contractor shall inspect all pipe and accessories for damage. Notify the Engineer of all material found that has cracks, flaws or other defects. The Engineer shall inspect the damaged material and have the right to reject any materials he/she finds unsatisfactory. Promptly remove all rejected material from the site.
- B. Pipe and other accessories shall, unless otherwise directed by the Engineer, be unloaded at the point of delivery, hauled to and distributed at the site of the project by the Contractor. They shall at all times be handled with care to avoid damage.
- C. The Contractor shall be responsible for all material furnished and shall replace at their own expense all such material that is found to be defective in manufacture or that has become damaged in handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work.
- D. The Contractor's responsibility for material furnished by the Owner shall begin at the point of delivery by the manufacturer, or Owner, and upon acceptance of the material by the Contractor. The Contractor shall examine all material furnished by the Owner at the time and place of delivery and shall reject all defective material.
- E. The Contractor at their own expense shall replace any material furnished by the Owner that becomes damaged after acceptance by the Contractor.
- F. The Contractor shall be responsible for the safe storage of material furnished by or to him/her, and accepted by him/her, and intended for the Work until it has been incorporated in the completed project.

### 3.3 REMOVALS, TRENCH EXCAVATION AND BACKFILL AND RESTORATION

- A. Removal of existing facilities, trench excavation and backfill and restoration shall be in accordance with the provisions of Section 31 2333.

### 3.4 WATER MAIN PIPE LAYING OPERATIONS

- A. Prior to start of water main construction, the Contractor is to verify with the Building Mechanical Contractor the exact location and elevation at the building. No additional compensation will be allowed for work not coordinated.
- B. A registered Land Surveyor employed by the Contractor shall perform the primary line and grade. No deviation from the required line or grade will be allowed except with the consent of the Engineer.
- C. Trench excavation and bedding preparations shall precede ahead of the pipe placement as will permit proper placement and joining of the pipe and fittings at the prescribed grade and alignment without unnecessary hindrance. Every reasonable precaution shall be taken to prevent foreign materials from entering the pipe while it is being placed in the line. The water main materials shall be carefully lowered into laying position by the use of suitable restraining devices. Under no circumstances shall the pipe be dropped or dumped into the trench.
- D. Before being lowered into laying position, the Contractor shall make a thorough visual inspection of each pipe section and appurtenant units to detect damage, foreign matter needing removal or unsound conditions that may need corrective action or be the cause for rejection. Inspection procedure shall be as approved by the Engineer, with special methods being required as he deems necessary to check out suspected defects more definitely. The Contractor shall inform the Engineer of any defects discovered and the Engineer will prescribe the required corrective actions or order rejection and prompt removal from the site.
- E. Immediately before placement, the joint surfaces of each pipe section and fitting shall be inspected for the presence of foreign matter, coating blisters, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair as needed.
- F. At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connections, but they shall be no larger than would be adequate. No pipe material shall be laid in water or when the trench or bedding conditions are otherwise unsuitable or improper. Unless otherwise permitted by the Engineer, bell and spigot pipe shall be laid with the bell end facing upgrade and the laying shall start at the downgrade end, proceeding upgrade.
- G. When placement or handling precautions prove inadequate, in the Engineer's opinion, the Contractor shall provide and install suitable plugs or a cap effectively closing the open ends of each pipe section before it is lowered into laying position, and they shall remain so covered until removal is necessary for connection of an adjoining unit.
- H. As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to the correct line and grade. The pipe shall be securely in place with approved backfill material, which shall be thoroughly compacted around the pipe. The joint areas shall remain exposed and precautions shall be taken to prevent

the soil from entering the joint space, until the joint seal has been established. All valve stems and hydrant barrels shall be plumb.

- I. All openings along the line of the water main shall be securely closed, as directed, and at the suspension of work at any time, suitable stops shall be placed to prevent earth or any substances from entering the water main. If water is present in the trench, the seals shall remain in place until the trench is pumped completely dry.
- J. The water main shall generally be placed with seven and one half (7.5') feet of cover. However, a slightly greater depth may be required to clear existing storm and sanitary sewer services. Accordingly, the pipe will be laid to the depth substantially as shown on the plans. Minor adjustments to this may be required in the field, and no unit of measurement or payment shall apply for such variation.
- K. In certain locations where the water main is in direct conflict with the storm or sanitary sewer, the water main shall be constructed under the sewer. Where it is necessary to use vertical bends to avoid sewer mains, no extra compensation will be made for this construction.
- L. Water mains crossing storm sewers or sanitary sewers shall be laid to provide a separation of at least eighteen (18") inches between the bottom of the water main and the top of the sewer. When local conditions prevent a vertical separation as described, the following construction shall be used:
  - 1. Sewers passing over or under water mains shall be constructed of materials equal to water main standards of construction.
  - 2. Water main passing under sewers shall, in addition, be protected by providing:
    - a. A vertical separation of at least eighteen (18") inches between the bottom of the sewer and the top of the water main;
    - b. Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking of the water mains;
    - c. That the length of water pipe be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.
- M. Water mains shall be laid at least ten (10') feet horizontally from any sanitary sewer, storm sewer or sewer manhole, whenever possible. When local conditions prevent a horizontal separation of ten (10') feet a water main may be laid closer to a storm or sanitary sewer provided that:
  - 1. The bottom of the water main is at least eighteen (18") inches above the top of the sewer.
  - 2. Where this vertical separation cannot be obtained, the sewer shall be constructed of materials and with joints that are equivalent to water main standards of construction and shall be pressure tested to assure water tightness prior to backfilling.
- N. The Contractor shall not operate any valve or other control on the existing system for any purpose without approval by the City.
- O. Give the City at least two (2) days' notice when it is necessary to take a water main out of service. Disruption of service shall be during the time of day when the least inconvenience will be caused to the customer.

- P. Where pipe cannot be placed by open trench excavation, the method for placing shall be approved by the Engineer.

### 3.5 **INSTALLATION OF TRACER WIRE FOR NON-CONDUCTIVE PIPE**

- A. Tracer wire shall be installed along the length of all non-conductive mainline pipe, laterals, and services.
- B. Provide vertical riser to the surface and terminate tracer wire in an adjacent (within eighteen (18") inches) tracer wire access box:
  - 1. Gate valve boxes.
  - 2. Hydrants.
  - 3. Curb boxes.
- C. Installation of the wire shall be after the initial backfilling and shall be located directly above and within six (6") inches of the pipe.
- D. Splicing tracer wire shall be by mechanical split bolt type or a crimp type compression fitting fully encased in approved electrical insulation putty. A twelve (12") inch tracer wire loop shall be provided on each side of a spliced connection.
- E. Tracer wire boxes shall be flush with the finished grade and turf.
- F. Contractor shall leave sufficient slack in the wire to allow the wire to reach three (3') feet above the tracer wire box.

### 3.6 **WATER MAIN FITTINGS AND ACCESSORIES**

- A. Wet Tapping a Lateral to a Main:
  - 1. When tapping a lateral water main or service to an existing water main, the Contractor shall expose the water main sufficiently to facilitate the connection and shall furnish the necessary materials, including tapping sleeves and valves.
- B. Setting Valves, Valve Boxes, Hydrants, Fittings and Curb Stops and Boxes
  - 1. Gate valves and pipe fittings shall be set and jointed in new pipe in the manner heretofore specified for cleaning, laying and jointing pipe.
  - 2. Valve boxes shall be firmly supported and maintained centered and plumb over the wrench nut of the gate valve, with box cover flush with the surface of the finished pavement or such other level as may be directed.
  - 3. Hydrants shall be installed plumb and at the proper grade height. Any hydrant extensions or hydrant lowering to meet proper grade requirements are the contractor's responsibility.
- C. Joint Restraint:

1. Retainer glands shall be used for joint restraint on all bends having a deflection of twenty-two and one-half (22-1/2) degrees or greater, tees, crosses, plugs, valves at the end of a line, all hydrant valves and all hydrants. Retained joints cast onto the pipe by the manufacturer (Iok-Tyton, Fastite, etc.), will be considered as being equivalent to the use of retainer glands. If retainer glands are not available, thrust blocking may be used with the approval of the City.
2. The use of zinc-coated tie rods suitably attached by half-circle clamps may be utilized with the Engineer's permission.
3. Where valves are located on dead ends, the plug may be tied or lugged across the valves with tie rods. Hydrants shall not be tied across the valve.
4. Plugged tees and crosses in a straight run do not require restraint. For restrained joints, the number of feet of tied pipe required shall be in accordance with the following table:

5. TABLE OF RESTRAINED OR TIED PIPE REQUIRED ON EACH SIDE OF THE BEND

4' Cover					6' Cover				8' Cover			
Bend Sizes by Degrees					Bend Sizes by Degrees				Bend Sizes by Degrees			
Pipe Size	22.5	45	67.5	90	22.5	45	67	90	22.5	45	67.5	90
3"	NR	NR	NR	NR	1'	3'	4'	8'	1'	2'	3'	4'
4"	NR	NR	NR	NR	2'	4'	5'	13'	1'	3'	4'	5'
6"	NR	NR	NR	NR	3'	6'	8'	9'	2'	4'	5'	6'
8"	NR	NR	NR	NR	4'	7'	9'	11'	3'	5'	7'	9'
12"	NR	NR	NR	NR	6'	10'	14'	17'	5'	8'	10'	12'
16"	NR	NR	NR	NR	7'	13'	18'	21'	6'	10'	14'	17'
20"	12'	22'	30'	37'	9'	15'	22'	27'	7'	12'	17'	20'
24"	14'	25'	37'	43'	10'	18'	26'	30'	NR	NR	NR	NR
30"	17'	30'	45'	52'	12'	21'	30'	37'	NR	NR	NR	NR
36"	19'	35'	50'	61'	14'	25'	35'	43'	NR	NR	NR	NR

6. Notes: (1) Table based on sand excavation, for silt, increase 50%
  - a. (2) If polyethylene wrapping is used, increase value by 100%
  - b. NR = Not Recommended
7. The table was determined from the "Cast Iron Pipe News" published by the Cast Iron Research Association.

D. Jointing of Pipe

1. Before laying the pipes, the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean and dry. Pipe ends shall be kept clean until joints are made.
2. All jointing of mechanical joint pipe and push-on pipe shall be in accordance with the requirements of the AWWA C600.

3. Ductile iron pipe shall be cut only by sawing, milling or torch cutting in accordance with the manufacturer's recommendations, provided the cut joint is properly ground.

### 3.7 FIELD QUALITY CONTROL

- A. Record Drawings: The Contractor shall retain the services of a Registered Land Surveyor to prepare a utility verification survey as required in Section 33 1000 - Submittals. The surveyor shall check the following:
  1. Horizontal and vertical verification of water main and appurtenances.
  2. The surveyor shall supply a reproducible record drawing and an AutoCAD compatible record drawing.
- B. Field inspection testing and compaction testing shall be performed in accordance with the Specifications.
- C. If tests indicate that the Work does not meet the specified requirements, remove the Work, replace and re-test at no cost to the Owner.

### 3.8 METHODS OF TESTING AND DISINFECTION

- A. The Contractor shall perform all testing and disinfecting in the Engineer's presence.
- B. Hydrostatic Pressure Test:
  1. Before a new water main can be filled for testing, or flushing, a "48" hour notice must be given to the City. A permit may be issued for this purpose when Water Department personnel are not available for valve operation, but only after a "48" hour-notice has been given.
  2. If it becomes necessary to interrupt water service because of new utility construction, sufficient notice must be given to the City so that written notice may be given to the affected customers "48" hours prior to interruption of service. When notified, the City will take the responsibility for customer notification.
  3. If a Contractor, acting on their own, operates a fire hydrant or water main valve without a valid permit in their possession, the City and the Public Safety Department will seek the maximum allowable penalty because of the potential for jeopardizing the safety and health of the public.
  4. After the pipe has been laid including fittings, services, valves and hydrants, and the line has been backfilled in accordance with these Specifications, all newly laid pipe, or any valved section thereof including building services unless otherwise directed by the Engineer, shall be subjected to a hydrostatic pressure test.
  5. Each isolated section of pipe shall be slowly filled with water. The specified test pressure, measured at the lowest point of elevation, shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection, gauges and the

Contractor shall furnish all necessary apparatus. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, if necessary, at points of highest elevation and afterward tightly plugged.

6. The test pressure shall be brought to one hundred fifty (150psi) pounds per square inch for domestic water services and two hundred (200 psi) pounds per square inch for fire services. Thereafter, the test shall be considered satisfactory if without additional water, the pressure remains constant for a period of two (2) hours at the specified pressure. The maximum pressure drop allowed for a domestic water service is two (2 psi) pounds per square inch during the last hour of the two hour test. The maximum pressure drop allowed for a fire service is five (5 psi) pounds per square inch during the last hour of the two hour test.
7. Any cracked or defective pipes, fittings, valves or hydrants discovered due to the consequence of the pressure test shall be removed and replaced by the Contractor and the test shall be repeated until satisfactory to the Engineer. All costs for removing, replacing and re-testing are considered part of the Base Bid Contract.

C. Electrical Conductivity Test:

1. After the hydrostatic test has been completed, a conductivity test shall be conducted in accordance with the following specifications:
  - a. The system (pipeline and hydrants) shall be tested for electrical continuity and current capacity. The electrical test shall be made after the hydrostatic pressure test. Backfilling shall have been completed. The line may be tested in sections of convenient length as approved by the Engineer.
  - b. Direct current of three hundred (350) amperes, +10 percent, shall be passed through the pipe line for five (5) minutes. Current flow through the pipe shall be measured continuously on a suitable ammeter and shall remain steady without interruption or excessive fluctuation throughout the five (5) minute test period.
  - c. Insufficient current or intermittent current or arcing, indicated by large fluctuation of the ammeter needle, shall be evidence of defective electrical contact in the pipeline. The cause shall be isolated and corrected. Thereafter, the section in which the defective test occurred shall be retested as a unit and shall meet the requirements. All costs of removing, replacing and re-testing are part of the Base Bid Contract.
2. Sources of D.C. current for these tests may be motor generators, batteries, arc welding machines, etc. D.C. arc welding machines will probably be the usual source. These machines are available in adequate capacity for these tests and are equipped with controls for regulating the current output.
3. Cables from the power source to the section of the system under test should be of sufficient size to carry the test current without overheating or excessive voltage drop. Usable sizes will probably be in the range of 2/0 to 4/0 A.W.G.
4. Connections for the test shall be made at hydrants. The hydrants shall be in the open position with the caps on during the test. The cable shall be clamped to the top-operating nut. Note: After the test, the hydrant shall be shut off and a cap loosened to allow hydrant drainage. Tighten cap after drainage.

5. A hook-on type D.C. ammeter placed on one of the cables leading to the hydrant is a convenient method of measuring current.
6. In using arc-welding machines, the current control should be set at a minimum before starting. After starting the machine, advance the control until the current indicated on the ammeter is at the desired test valve. Caution: In case of open circuits at joints or connection, the voltage across the defective joint or connection will be in the order of 50 - 100 volts.

D. Disinfection of Water Mains:

1. General: All pipelines installed shall be disinfected with a strong chlorine solution according to AWWA C651. Disinfecting may be done concurrently with pressure and leakage testing or after pressure and leakage testing at the option of the Contractor. Each section line that is repaired shall be disinfected after such repairs are made. The Contractor shall provide all necessary disinfection equipment and materials.
2. Flushing: The pipeline shall be flushed at a velocity of at least two and one-half (2-1/2') feet per second immediately prior to disinfection. A 48-hour notice is required to the City Water Department for pipeline flushing. The pipe shall be flushed with clean, potable water until potable water appears at the points of outlet.
3. Disinfectants: Disinfection shall be performed using either chlorine gas or calcium hypochlorite solution. Chlorine gas shall conform to AWWA B301 and shall be handled under pressure as an aqueous solution. Calcium hypochlorite shall conform to AWWA B300 and shall be granules with 70 percent available chlorine.
4. Feeding: Chlorine gas shall be used only as a solution. Introduction of chlorine gas into the pipeline directly will not be permitted. When chlorine is used, a chlorinator and booster pump with injector shall be provided.
5. Calcium hypochlorite shall be made into a solution and pumped into the pipeline with a suitable chemical feed pump.
6. Application: Pipelines shall be disinfected by either the continuous feed method or the slug method.
7. In using the continuous feed method, chlorine feed shall be proportional to the rate of flow into the pipe so that the entering water contains at least 50 mg/l of available chlorine. Chlorine application shall be continuous until the entire pipeline is filled with the chlorine solution. The treated water shall be retained in the pipeline for at least 24 hours and the chlorine residual at the end of the period shall be at least 10 mg/l.
8. In using the slug method, chlorine shall be fed at a rate that will produce at least 300 mg/l in the water entering the pipeline and a sufficient quantity of water shall be chlorinated so that all parts of the pipeline will be exposed to chlorine concentration of 300 mg/l for at least three (3) hours.
9. Following the allowed standing time, the system shall be flushed with clean, potable water until the chlorine residual in the water coming from the system does not exceed the chlorine residual in the flushing water.



10. During disinfection all valves and hydrants shall be operated to ensure that all appurtenances are disinfected.

E. Bacteriological Tests:

1. Bacteriological testing of the water main shall be performed according to AWWA C651.
2. Following disinfection and final flushing and before the new main is connected to the distribution system, two consecutive sets of samples, taken at least 24 hours apart, must be collected from the new water main. At least one set of samples shall be collected from every 1,200 feet of main, plus one set from the end of line, and at least one set from each branch. The Contractor shall collect the samples and the cost of these tests paid for by the Contractor. A "48" hour notice is required to the City Water Department for pipeline flushing.
3. Repeat Testing: If initial disinfection fails to produce satisfactory bacteriological samples, the disinfection shall be repeated until satisfactory bacteriological samples are obtained. Costs for additional disinfection shall be borne by the Contractor.
4. Inspection: a qualified Inspector furnished by the City or Owner shall supervise the above operation. The City or Owner shall have at least a 48 hour notice for said inspection.

F. Tracer Wire:

1. All new tracer wire installations shall be located using typical low frequency (512Hz) line tracing equipment. The contractor shall complete a preliminary verification line tracing locate of all tracer wire systems upon completion of rough grading.
2. Continuity testing in lieu of actual line tracing shall not be acceptable.

**END OF SECTION**

SECTION 33 3000  
SANITARY SEWERAGE UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Site sanitary sewerage construction to within five feet from building. Municipal sanitary drains; including fittings, accessories and bedding.
- C. Sanitary drainage piping:
  - 1. Polyvinyl Chloride (PVC) pipe.
    - a. Schedule 40
- D. Tracer wire for non-conductive pipe.
- E. Sanitary sewer structures, covers, grates and frames.
  - 1. Manholes
  - 2. Cleanouts
- F. Bulkheading open end pipes.
- G. Connection of sanitary drainage system to existing sewer mains.

1.2 RELATED SECTIONS

- A. Section 02 4113 - Selective Site Demolition.
- B. Section 31 2333 - Trenching and Backfilling.
- C. Section 33 1000 - Water Distribution.
- D. Section 33 4000 - Storm Drainage Utilities.

1.3 REFERENCES

- A. AASHTO M105 - Standard Specification for Gray Iron Castings; 2018.
- B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
- C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

- D. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- E. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections; 2019.
- F. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals; 2018.
- G. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable; 2016.
- H. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2020.
- I. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- J. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.
- K. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.
- L. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- M. Minnesota Department of Labor and Industry - Minnesota State Building Code.
- N. Plumbing and Drainage Institute (PDI).
- O. City Engineers Association of Minnesota.
- P. Minnesota State Health Department.

#### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. The Contractor is responsible for coordinating construction schedule and required testing with testing agency prior to start of construction.
- E. Submit documents under the provisions of Division One Specifications.

- F. Record location of pipe sizes, materials and runs, connections, manholes, cleanouts and invert elevations.
- G. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- H. The Contractor is to employ the services of a Registered Land Surveyor to perform the specified layout work.

#### 1.5 FIELD MEASUREMENTS

- A. Verify actual locations of sanitary sewage systems with other construction to which sewage systems must fit by accurate field measurements before installation. Coordinate installation schedule with construction progress to avoid delay of the Work. No additional compensation will be given for problems resulting from the Contractors failure to verify and/or coordinate sanitary sewer work.

#### 1.6 SUBMITTALS

- A. Submit under provisions of Division One Specifications.
- B. Shop Drawings: The Contractor shall submit a Shop Drawing portfolio showing all piping, fittings, manholes, covers, etc., provided under this section prior to construction.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.
  - 1. Minnesota Department of Labor and Industry.
  - 2. Local Codes and Ordinances.
  - 3. Local Authority having Jurisdiction.

#### 1.8 COORDINATION

- A. Prior to construction and start of building plumbing, the Contractor shall coordinate all work with the Building Mechanical Contractor and any public agency where connections are to be made. The Contractor is to verify all pipe sizes, material and invert elevations at connections. No additional compensation will be allowed for work not verified or not coordinated.

## 1.9 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.
- B. Protection of Persons: The Owner's activities will continue about the site during construction. Install barricade fencing, as necessary, to provide a safe environment between construction work and pedestrian circulation.
- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.
  - 2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
  - 3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
  - 4. Locate, excavate, and expose all existing underground lines in advance of trenching operations.
  - 5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.
- E. Traffic Control:
  - 1. Maintain vehicular and pedestrian traffic as required for construction activities.
  - 2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.
  - 3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.

1.10 CONFLICTING UTILITIES

- A. When alterations to existing utilities are shown to avoid conflicts, make alterations at no cost to the Owner.

1.11 **DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store, handle and protect products to the site under the provisions of Division One Specifications.

1.12 WARRANTY

- A. Provide one (1) year warranty. Warranty shall be in addition to, and run concurrent with, other warranties required by the Contract Documents, including the Division One Specifications. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under the requirements of the Contract Documents.
- B. Warranty: State that all materials and workmanship provided are guaranteed against defects after completion and final acceptance of the Work. Defects due to faulty materials or workmanship developed during the guarantee period shall be satisfactorily repaired or replaced by the Contractor at their expense.

PART 2 PRODUCTS

2.1 **PIPE AND MATERIAL**

- A. General:
  - 1. Materials required for this Work shall be new materials conforming to the requirements of the referenced Specification for the class, kind, type, size, grade and other details indicated on the drawings.
  - 2. Wherever connection of dissimilar materials or design is required, the method of joining and any special fittings employed shall be subject to approval by the Architect/Engineer.
  - 3. The Drawings indicate various lengths of sanitary sewer. These dimensions are from center of structure to center of structure. The Contractor is to verify the pipe lengths prior to bidding.
- B. PVC Pipe (Schedule 40): Pipe and fittings shall conform to the requirements of ASTM D2665, Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings, Schedule 40.
  - 1. Polyvinyl Chloride Pipe joints shall be bell and spigot type with solvent cement meeting the requirements of ASTM D2564 and applied according to the manufacturer's recommendation and ASTM D2855.

## 2.2 TRACER WIRE FOR NON-CONDUCTIVE PIPE

- A. Tracer wire for use with thermoplastic pipe types shall be rated for direct burial applications. Tracer wire shall be a minimum 12 AWG copper clad steel rated to 30 volts, High Molecular Weight Polyethylene (HMWPE) meeting ASTM D1248, with designation identified on the outside of the wire casing.
- B. Tracer wire boxes shall be a minimum of twelve (12") inches in height and two and three-eighths (2 3/8") inches inside diameter, constructed of ABS plastic, flared to prevent pull out or settlement, and furnished with a cast iron cover/lid assembly. There shall be two solid stainless steel terminals within each box.

## 2.3 PRECAST CONCRETE MANHOLE SECTIONS

- A. Precast concrete riser sections and appurtenant units (grade rings, top and base slabs, special sections, etc.) used in the construction of manhole structures shall conform with the requirements of ASTM C478, subject to the following supplementary provisions:
  - 1. The precast sections and appurtenant units shall conform to all requirements as shown on the Detailed Drawings.
  - 2. The joints of manhole riser sections shall be tongue and groove with rubber "O" ring joints provided on the sanitary sewer manholes. The sanitary sewer inlet and outlet pipes shall be joined to the manhole with a gasketed, flexible, watertight connection in accordance with ASTM C923.
  - 3. Air-entrained concrete shall be used in the production of all units. Air content shall be maintained within the range of 5 to 7 percent.
  - 4. A Certificate of Compliance shall be furnished with each shipment of precast manhole sections stating that the materials furnished have been tested and are in compliance with the specification requirements.
  - 5. Lift holes will be permitted in precast manholes.
- B. Manhole Steps
  - 1. All manhole steps shall conform to Neenah Foundry Step No. R-1981J in dimension and strength. Manhole steps shall be spaced 16" on center on the downstream face of the manhole unless specified otherwise. Cast iron manhole steps shall be manufactured from high test metal having a minimum tensile strength of 35,000 pounds per square inch. Provide steps having non-skid top surfaces, safety stops at each end, minimum width of ten (10") inches and not less than five (5") inches projections from the wall.
  - 2. Aluminum manhole steps of a design similar to the cast iron steps specified may be used. Aluminum manhole steps shall be made of Apex Ternalloy No. 5 aluminum alloy. Aluminum steps shall support one thousand (1,000) pound load at center with no deformation, coat embedded ends with bituminous paint.
  - 3. Copolymer Polypropylene plastic manhole steps (PSI-PF) or equal may be used.

C. Frames and Covers:

1. Provide gray iron castings, complying with ASTM A48/A48M / AASHTO M105, Class 30 iron.
2. Casting assemblies or dimensions, details, weights and class shall be as indicated in the Detailed Drawings for the design designation specified. The castings shall be Class 30 or better unless otherwise specified.
3. Lid-to-frame surfaces on round casting assemblies shall be machine milled to provide true bearing around the entire circumference.
4. Casting weight shall be not less than 95 percent of theoretical weight for a unit cast to exact dimensions, based on 442 pounds per cubic foot.
5. A Certificate of Compliance shall be furnished with each shipment of castings stating that the materials furnished have been tested and are in compliance with the specification requirements.
6. Sanitary sewer manholes in areas subject to flooding by surface water shall have self-sealing lids and recessed pick holes unless otherwise specified.
7. The standard manhole casting shall be Neenah Foundry No. R-1733, or approved equal, and have two concealed pick holes. The minimum allowable weight shall be 360 pounds.
8. Lettering on the manhole castings shall be "Sanitary Sewer" in two (2") inch high letters.
9. Covers must fit closely on the adjusting rings so there will be no rocking from pressure applied on the cover.

2.4 MORTAR

- A. Mortar shall consist of a mixture of one (1) part Portland Hydraulic Cement and three (3) parts of clean washed sand by volume. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but shall not exceed five and one-half (5-1/2) gallons of water per sack of cement.
- B. Sand shall conform to ASTM C144.
- C. Portland cement shall conform to ASTM C150/C150M.

PART 3 EXECUTION

3.1 **EXAMINATION**

- A. Examine the areas and conditions under which the Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.



- B. Verify that building service connection and municipal utility sanitary sewer size, location, and invert are as indicated.

- C.

### 3.2 LAYING OUT WORK

- A. Provide all materials, labor, instruments, etc. required to lay out the Work.
- B. The Contractor is to employ the services of a Registered Land Surveyor to perform specified layout work.
- C. Promptly inform the Engineer of discrepancies found, in order that proper corrections may be made.

### 3.3 BEDDING

- A. Install and bed PVC pipe in accordance with ASTM D2321, Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe. Embedment materials shall be Class I or Class II. These materials shall pass a one and three-fourths (1-3/4") inch sieve and not more than 12 percent shall pass a No. 200 sieve. Compact embedment materials in six (6") inch lifts to twelve (12") inches above the pipe and to a density of at least 95 percent of Standard Proctor Density described by ASTM D698. Test embedment materials for compliance with the above specification and forward test results to the Architect/Engineer.

### 3.4 MATERIAL HANDLING

- A. Proper and adequate implements, tools and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the Work. During the process of unloading, the Contractor shall inspect all pipe and accessories for damage. The Contractor shall notify the Engineer of all material found to have cracks, flaws or other defects. The Engineer shall inspect the damaged materials and have the right to reject any materials found to be unsatisfactory. The Contractor shall promptly remove all rejected material from the site. All materials shall be handled carefully to prevent damage to protective coatings, linings and joint fillings; preclude contamination of interior areas; and avoid jolting contact, dropping or dumping.
- B. All work and materials are subject to tests by the Owner at such frequency as may be determined by the Engineer. The Owner shall pay for such tests.
- C. While suspended and before being lowered into laying position, each pipe section and appurtenant unit shall be inspected by the Contractor to detect damage or unsound conditions that may need corrective action or be cause for rejection. The Contractor shall inform the Engineer of any defects discovered and the Engineer will prescribe the required corrective actions or order rejection.

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

### 3.5 **INSTALLATION OF SANITARY PIPING**

#### A. Trenching, Backfilling and Compacting.

- 1. Trenching and backfilling shall be constructed in accordance with Section 31 2333 - Trench Excavation and Backfill for Utilities.

#### B. Installing Piping and Appurtenances:

- 1. Provide and use the proper implements, tools and facilities for the safe and convenient prosecution of the Work.
- 2. Unload and distribute materials at the site carefully to prevent materials from being damaged, minimize handling and not hamper construction activities. In no case shall materials be thrown or dumped from the truck.
- 3. Lower pipe into trench carefully to prevent damage to pipe and protective coatings and linings. Under no circumstances shall pipe be dumped into the trench.

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

- D. Pipe shall be laid using laser equipment or grade boards. Grade boards shall be furnished and set by the Contractor according to the established grade stakes. No pipe shall be laid unless there is a minimum of four (4) grade boards set to check the proper grade and alignment ahead. Provide and use a suitable grade rod to ensure the proper grade of the pipe. Grade boards shall be no more than twenty-five (25') feet apart.

- E. Pipe shall not be laid in water or when the trench conditions are unsuitable for work. Protect the exposed ends of all pipes with a board or approved stopper to prevent earth or substances from entering the pipe.

- F. At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connections, but they shall be no larger than would be adequate. Bell and spigot pipe shall be laid with the bell ends facing upgrade and the laying shall start at the downgrade end and proceed upgrade.

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

- H. Carefully clean the interior of the sewer from dirt, cement or superfluous material of every description as the work progresses. If necessary, thoroughly flush pipe at the completion of the Work.
- I. When existing utility structures or branch connections leading to main sewers or to main drains present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated or reconstructed.
- J. When water main, water services and sewer services, whether lowered or existing, are in danger of freezing due to proximity of storm sewers, catch basin leads or storm sewer structures, the Engineer may direct the placement of insulation between the storm sewer and the water main or service pipe at no additional cost to the Owner or the Owner's representative.
- K. The interior of all pipe shall, as the work progresses, be cleaned of all dirt and superfluous materials. The exposed end of the pipe shall be protected with suitable temporary covers. Pipe laid in place shall be protected from injury and disturbance.

### 3.6 **INSTALLATION OF TRACER WIRE FOR NON-CONDUCTIVE PIPE**

- A. Tracer wire shall be installed along the length of all non-conductive mainline pipe, laterals, and services except for;
  - 1. Straight line storm sewer pipe between two manholes.
- B. Provide vertical riser to the surface and terminate tracer wire in an adjacent tracer wire access box at;
  - 1. Stubs.
  - 2. Laterals.
  - 3. Services.
- C. Installation of the wire shall be after the initial backfilling and shall be located directly above and within six (6") inches of the pipe.
- D. Splicing tracer wire shall be by mechanical split bolt type or a crimp type compression fitting fully encased in approved electrical insulation putty. A twelve (12") inch tracer wire loop shall be provided on each side of a spliced connection.
- E. Tracer wire boxes shall be flush with the finished grade and turf.
- F. Contractor shall leave sufficient slack in the wire to allow the wire to reach three (3') feet above the tracer wire box.

### 3.7 PIPE JOINTING

- A. Make joints for PVC by the use of push-on rubber gaskets. Jointing procedures shall be in accordance with the recommendations of the pipe manufacturer. Spigot ends shall be marked as necessary to indicate the point of complete closure.
- B. Watertight and airtight joints are required, without concrete encasement, the joints shall be sealed as follows; subject to such other approved method as the Engineer may authorize as being an acceptable alternative:
  - 1. ASTM D2665 Poly (Vinyl Chloride) (PVC) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings - joints shall be made by using solvent cement.
- C. Watertight and airtight joints are required.

### 3.8 INSTALLATION - CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe and sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

### 3.9 BULKHEADING OPEN PIPE ENDS

- A. All pipe and fitting ends left open for future connection shall be bulkheaded by approved methods prior to backfilling. Unless otherwise specified or approved, all openings of twenty-four (24") inches in diameter or less shall be closed off with prefabricated plugs or caps and all openings larger than twenty-four (24") inches in diameter shall be closed off with masonry bulkheads.
- B. Prefabricated plugs and caps shall be of the same material as the pipe material or an approved alternate material and they shall be installed with watertight seal as required for the pipeline joints. Masonry bulkheads shall be constructed with clay or concrete brick to a wall thickness of eight (8") inches.
- C. Bulkheads installed for temporary service during construction may be constructed with two (2") inch timber planking securely fastened together and adequately braced, as an alternate to the masonry construction.
- D. Pipes designated for abandonment shall be thoroughly bulk headed at all exposed pipe ends for a minimum pipe length equivalent to one pipe diameter.

### 3.10 CONNECTION TO EXISTING SEWER

- A. The Contractor shall be required to make the connection at elevations indicated on the plan documents and provide for watertight seal.
- B. The Contractor shall be required to remove curb and pavement and repair per the City standards and specifications.
- C. The Contractor shall be responsible for providing traffic control and signage as required when performing this Work.

### 3.11 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under the provisions of Division One Specifications.
- B. General:
  - 1. All pipe will be visually inspected.
  - 2. All visible leaks shall be repaired.
  - 3. Broken or cracked pipe, mislaid pipe and other defects shall be corrected.
  - 4. All repairs, relaying of sewers, etc. required to bring the sewers to specified status shall be made at no additional cost to the Owner or the Owner's representative.
  - 5. Testing all manholes and sewer piping must comply with the construction requirements of the Minnesota Plumbing Code.
- C. Inspection:
  - 1. Request inspection prior to and immediately after placing aggregate cover over pipe.
  - 2. Compaction testing will be performed in accordance with ASTM D698.
  - 3. Clean and prepare for inspection each block or section of sewer upon completion, or at such other time as the Engineer may direct.
- D. If tests and inspections indicate that the Work does not meet the specified requirements, remove Work, replace and retest at no cost to the Owner or the Owner's representative.

### 3.12 TESTING/INSPECTION

- A. All testing shall be witnessed by the local Plumbing Inspector and the Owner's Representative or the Engineer. The Contractor shall provide forty-eight (48) hours' notice to the Owner's Representative or the Engineer prior to conducting tests.
- B. Visual Inspection:

1. Sanitary sewer pipes shall be straight and uniform in alignment and grade. Pipe and manholes shall be free of dirt, mortar and other debris.

C. Deflection Test:

1. Deflection tests shall be performed on all plastic gravity sewer pipes. The test shall be conducted after the sewer trench has been backfilled to the desired finished grade and has been in place for 30 days.
2. The deflection test shall be performed by pulling a rigid ball or pointed mandrel through the pipe without the aid of mechanical pulling devices. The ball or mandrel shall have a minimum diameter equal to 95 percent of the actual inside diameter of the pipe. The maximum allowable deflection shall not exceed 5 percent of the pipe's internal diameter. The time of the test, methods of testing and the equipment to be used for the test shall be subject to the approval of the Engineer.
3. The Contractor at their expense shall perform all testing without any direct compensation being made therefore and they shall furnish all necessary equipment and materials required.
4. Test Failure and Remedy: Any test section that fails shall be replaced, with all repair work subject to the approval of the Engineer. The replaced section shall be re-tested for leakage and deflection in conformance with the Specifications contained herein.
5. All repairs, replacement and re-testing shall be at the Contractor's expense.

D. Sanitary Sewer Leakage Testing

1. All sanitary sewer lines, including service connections, shall be substantially watertight and shall be tested for excessive leakage upon completion and before connections are made to the service by others. Each test section of the sewer shall be subjected to exfiltration testing, either by hydrostatic or air test method as described below and at the Contractor's option. The requirements set forth for maximum leakage shall be met as a condition for acceptance of the sewer section represented by the test.
2. If the ground water level is greater than three (3') feet above the invert elevation of the upper manhole and the Engineer so approves, infiltration testing may be allowed in lieu of the exfiltration testing, in which case the allowable leakage shall be the same as would be allowed for the Hydrostatic Test.
3. The Contractor shall perform all testing without any direct compensation being made therefore and the Contractor shall furnish all necessary equipment and materials, including plugs and standpipes as required.
4. Air Test Method:
  - a. The sewer pipe section under test shall be clean at the time of testing but the pipe may be wetted. Pneumatic balls shall be used to plug the pipe ends at the manholes. Low pressure air shall be introduced into the plugged lines until the internal air pressure reaches four (4.0) pounds per square inch greater than the average back pressure of any ground water pressure that may submerge the pipe. At least two (2) minutes shall be allowed for the air temperature to stabilize

before readings are taken and the timing started. During this time the Contractor shall check all plugs with soap solution to detect plug leakage. If plugs are found to leak, air shall be bled off, the plugs shall be re-tightened and the air shall be reintroduced into the line.

- b. The sewer section under test will be accepted as having passed the air leakage test if it does not lose air at a rate to cause the pressure to drop from three and six-tenths (3.6) to three (3.0) pounds per square inch in less time than one-half minute per inch in diameter of the pipe tested.

5. Hydrostatic Test Method:

- a. After bulkheading the test section, the pipe shall be subjected to a hydrostatic pressure produced by a head of water at a depth of three (3') feet above the invert elevation of the sewer at the manhole of the test section. In areas where ground water exists, this head of water shall be three (3') feet above the existing water table.
- b. The water head shall be maintained for a period of one (1) hour during which time it will be presumed that full absorption of the pipe body has taken place and thereafter for an extended period of one (1) hour the water head shall be maintained as the test period. During the one (1) hour test period, the measured water loss within the test section, including service stubs, shall not exceed the Maximum Allowable Loss (in Gallons Per Hour per one hundred (100') feet of Pipe) given below for the applicable Main Sewer Diameter.

Main Sewer Diameter (In Inches)	Maximum Allowable Loss* (In Gallons Per Hour Per 100-feet)
6	0.5
8	0.6

- c. \*Based on 100 gallons per day per pipe diameter inch per mile

E. If measurements indicate exfiltration within a test action section is not greater than the allowable maximum, the section will be accepted as passing the test.

F. Testing Failure and Remedy:

- 1. In the event of test failure on any test section, testing shall be continued until all leakage has been detected and corrected to meet the requirements. All repair work shall be subject to the approval of the Engineer. Introduction of sealant substances by means of the test water will not be permitted.
- 2. Unsatisfactory repairs or test results may result in an order to remove and replace pipe as the Engineer considers necessary for test conformance. All repair and replacement work shall be at the Contractor's expense.

G. Tracer Wire:

- 1. All new tracer wire installations shall be located using typical low frequency (512Hz) line tracing equipment. The contractor shall complete a preliminary verification line tracing locate of all tracer wire systems upon completion of rough grading.
- 2. Continuity testing in lieu of actual line tracing shall not be acceptable.

H. Televising:

1. Sewer line televising may be required by the Engineer, at the cost of the Contractor, if visual inspection, leakage testing or deflection testing indicate the sewer has not been constructed in accordance with these Specifications and the requirements of the Plans, Specifications and Special Provisions.

3.13 PROTECTION

- A. Protect finished installation under the provisions of Division One Specifications.
- B. General Requirements: Protect sanitary drainage system from damage and construction operations until date of Substantial Completion.

END OF SECTION



SECTION 33 4000  
STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Site storm drainage construction to buildings and municipal storm drainage: including all pipes, fittings, attachments and connections needed for a complete and proper installation.
- C. Storm drainage piping for surface, or a combination of surface and subsurface water;
  - 1. Schedule 40 Polyvinyl Chloride (PVC) Pipe.
- D. Tracer wire for non-conductive pipe.
- E. Storm sewer structures, covers, grates and frames.
  - 1. Concrete Catch Basins.
  - 2. Concrete Manholes.
- F. Structures for access to underground pipe.
- G. Protection of completed system against sedimentation during subsequent construction activities.

1.2 RELATED SECTIONS

- A. Section 02 4113 - Selective Site Demolition.
- B. Section 31 2333 - Trenching and Backfilling.
- C. Section 33 1000 - Water Distribution.
- D. Section 33 3000 - Sanitary Sewerage Utilities.

1.3 REFERENCES

- A. AASHTO M 278 - Standard Specification for Class PS46 Poly(Vinyl Chloride) (PVC) Pipe; 2015.
- B. AASHTO M105 - Standard Specification for Gray Iron Castings; 2018.
- C. ACI 301 - Specifications for Concrete Construction; 2020.

- D. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
- E. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- G. ASTM A760/A760M - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains; 2015.
- H. ASTM A762/A762M - Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains; 2015.
- I. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe; 2020.
- J. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- K. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016(2016).
- L. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections; 2019.
- M. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe; 2016.
- N. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- O. ASTM C923/C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals; 2020.
- P. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- Q. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- R. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2020.
- S. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- T. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.
- U. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.

- V. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)); 2012 (Reapproved 2021).
- W. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings; 2022.
- X. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
- Y. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
- Z. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe; 2014 (Reapproved 2021).
- AA. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings; 2021.
- BB. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.
- CC. AWWA C153/A21.53 - Ductile-Iron Compact Fittings; 2019.
- DD. Minnesota Department of Transportation 2020 Edition "Standard Specifications for Construction". Only applicable portions of construction methods and materials apply. References to methods of measurement or payment are not applicable.
  - 1. MN/DOT 3149 - Granular Material
- EE. Minnesota Department of Labor and Industry - Minnesota State Building Code.

#### 1.4 QUALITY ASSURANCE

- A. All Work of this section occurring on public property shall be constructed in accordance with the laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction. All Work required to be constructed by regulatory authorities in a manner differing from the Contract Documents shall be considered part of the Base Bid Contract.
- B. Conform to all applicable code for materials and installation of the Work of this Section.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.
- D. The Contractor is responsible for coordinating construction schedule and required testing with testing agency prior to start of construction.
- E. Record location of pipe sizes, materials and runs, connections, manholes, cleanouts and invert elevations.
- F. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

## 1.5 FIELD MEASUREMENTS

- A. Verify actual locations of storm sewage systems with other construction in which sewage systems must fit by accurate field measurements before installation. Coordinate installation schedule with construction progress to avoid delay of the Work. No additional compensation will be given for problems resulting from Contractor's failure to verify and/or coordinate storm sewer work.

## 1.6 SUBMITTALS

- A. Submit under the provisions of Division One Specifications.
- B. Shop Drawings: The Contractor shall submit a Shop Drawing portfolio showing all piping, fittings, manholes, covers, etc. provided under this Section prior to construction.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.

## 1.8 PROJECT CONDITIONS

- A. The Contractor shall visit the site and review all Drawings and Specifications prior to bidding. No additional compensation will be allowed for items that could have been clarified prior to bidding. Requests for clarifications shall be submitted two (2) weeks prior to the bid closing date.
- B. Protection of Persons: The Owner's activities will continue about the site during construction. Install barricade fencing, as necessary, to provide a safe environment between construction work and pedestrian circulation.
- C. Protection of Existing Property to Remain: Protect existing benchmarks, survey control points, existing structures, fences, sidewalks, paving, curbs, utilities, and other miscellaneous items that are in areas where Work will be performed and which are to remain. Repair or replace existing property that is to remain that is damaged by the Work of this Contract, to the Architect/Engineer's satisfaction and at no cost to the Owner.
- D. Existing Utilities:
  - 1. Existing utilities currently exist within the construction areas, including waterworks, storm drainage, sanitary sewers, gas mains, and other utilities.

2. The approximate locations of certain underground lines and structures are shown on the plans based on the topographic survey provided by the Owner. Other underground lines or structures may not be shown.
3. Locate and mark these and other possible unknown utility lines using Gopher State One Call, electronic pipe finder, contacting property owner or other approved means.
4. Locate, excavate, and expose all existing underground lines in advance of trenching operations.
5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these existing utilities in the execution of their Work under this section. All repairs are part of the Base Bid Contract.

E. Traffic Control:

1. Maintain vehicular and pedestrian traffic as required for construction activities.
2. Provide flag men, barricades, warning signs, and warning lights for the movement of traffic and safety and to cause the least interruption of the Work.
3. When working in public right-of-way, the Contractor is responsible for all traffic control and permit requirements. No additional compensation will be allowed to provide these services.

1.9 CONFLICTING UTILITIES

- A. When alterations to existing utilities are shown to avoid conflicts, make alterations at no cost to the Owner.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, handle and protect products to the site under the provisions of Division One Specifications.

1.11 WARRANTY

- A. Provide one (1) year warranty. Warranty shall be in addition to, and run concurrent with, other warranties required by the Contract Documents, including the Division One Specifications. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under the requirements of the Contract Documents.
- B. Warranty: State that all materials and workmanship provided are guaranteed against defects after completion and final acceptance of the Work. Defects due to faulty materials or workmanship developed during the guarantee period shall be satisfactorily repaired or replaced at no additional expense to the Owner.

## PART 2 PRODUCTS

### 2.1 PIPE AND MATERIAL

#### A. General:

1. Materials required for this Work shall be new materials conforming to the requirements of the referenced Specification for the class, kind, type, size, grade and other details indicated on the Drawings.
2. Wherever connection of dissimilar materials or design is required, the method of joining and any special fittings employed shall be subject to approval by the Engineer.
3. The Drawings indicate various lengths of storm sewer. These dimensions are from center of structure to center of structure and include pipe end sections. The Contractor is to verify the pipe lengths prior to bidding.

#### B. PVC Pipe (Schedule 40): Pipe and fittings shall conform to the requirements of ASTM D2665,

1. Polyvinyl Chloride (PVC) Pipe joints shall be joined with a bell and spigot type joint with solvent cement meeting the requirements with ASTM D2564 and applied according to the manufacturer's recommendation and ASTM D2855. The pipe shall be installed in accordance to ASTM D2321.
2. Schedule 40 pipe and fittings shall be used for building roof drains connections, where sewer is within ten (10') feet of a building, within ten (10') feet of water crossings where pipe crosses over the watermain, and where indicated on plans.

#### C. Concrete: Concrete shall be minimum 4,000 pounds per square inch air-entrained concrete, meeting the requirements of ACI 301.

### 2.2 PRECAST CONCRETE MANHOLE/CATCH BASIN

#### A. Precast concrete riser sections and appurtenant units (grade rings, top and base slabs, special sections, etc.) used in the construction of manhole/catch basin structures shall conform with the requirements of ASTM C478, subject to the following supplementary provisions:

1. The precast sections and appurtenant units shall conform to all requirements as shown on the Detailed Drawings.
2. The joints of structure riser sections shall be tongue and groove with rubber "O" ring joints provided on storm sewer structures. Storm sewer inlet and outlet pipes shall be joined to the structure with a gasketed, flexible, watertight connection or any watertight connection arrangement that allows differential settlement of the pipe and structure wall to take place.
3. Air-entrained concrete shall be used in the production of all units. Air content shall be maintained within the range of 5 to 7 percent.

4. A Certificate of Compliance shall be furnished with each shipment of precast manhole and catch basin sections stating that the materials furnished have been tested and are in compliance with the Specification requirements.
5. Lift holes will be permitted in precast manholes/catch basins.

B. Manhole Steps

1. All manhole steps shall conform to Neenah Foundry Step No. R-1981J in dimension and strength. Manhole steps shall be spaced 16" on center on the downstream face of the manhole unless specified otherwise. Cast iron manhole steps shall be manufactured from high test metal having a minimum tensile strength of 35,000 pounds per square inch. Provide steps having non-skid top surfaces, safety stops at each end, minimum width of ten (10") inches and not less than five (5") inches projections from the wall.
2. Aluminum manhole steps of a design similar to the cast iron steps specified may be used. Aluminum manhole steps shall be made of Apex Ternalloy No. 5 aluminum alloy. Aluminum steps shall support one thousand (1,000) pound load at center with no deformation, coat embedded ends with bituminous paint.
3. Copolymer Polypropylene plastic manhole steps (PSI-PF) or equal may be used.

C. Frames and Covers:

1. Provide gray iron castings, complying with ASTM A48/A48M /AASHTO M105, Class 30 iron.
2. Machine all bearing surfaces.
3. Provide frames weighing not less than 208 pounds with inside opening between twenty-one (21") inches and twenty-four (24") inches.
4. Covers to have the words "STORM SEWER" in two (2") inch high letters cast in the metal.
5. Where indicated on plans, provide watertight covers with a minimum of two "pick" holes conforming to above requirements and with frame tapped for four (4) bolts, countersunk in cover.
  - a. Provide rubber gasket between frame and cover.
6. Unless otherwise specified, provide vented circular cover with a minimum of two "pick" holes and weighing not less than one hundred twenty (120) pounds.
7. Covers must fit closely on the adjusting rings so there will be no rocking from pressure applied on the cover.

- D. Invert Shaping Grout: One part Type 1, ASTM C150/C150M, cement by volume, two parts clean and sharp, ASTM C33/C33M, sand by volume, and 12 parts 1/4" ASTM C33/C33M, aggregate by volume.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine the areas and conditions under which the Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify that building service connection and municipal storm sewer size, location, and invert are as indicated.

### 3.2 LAYING OUT WORK

- A. Provide all materials, labor, instruments, etc. required to lay out the Work.
- B. The Contractor is to employ the services of a Registered Land Surveyor to perform specified layout work.
- C. Promptly inform the Engineer of discrepancies found, in order that proper corrections may be made.

### 3.3 BEDDING

- A. Install and bed PVC pipe in accordance with ASTM D2321, Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe. Embedment materials shall be Class I or Class II. These materials shall pass a one and three-fourths (1-3/4") inch sieve and not more than 12 percent shall pass a No. 200 sieve. Compact embedment materials in six (6") inch lifts to twelve (12") inches above the pipe and to a density of at least 95 percent of Standard Proctor Density described by ASTM D698. Test embedment materials for compliance with the above specification and forward test results to the Architect/Engineer.

### 3.4 **INSTALLATION OF STORM PIPING**

- A. Trenching, Backfilling and Compacting.
  - 1. Trenching and backfilling shall be constructed in accordance with Section 31 2333 - Trench Excavation and Backfill for Utilities.
- B. Installing Piping and Appurtenances:
  - 1. Provide and use the proper implements, tools and facilities for the safe and convenient prosecution of the Work.
  - 2. Unload and distribute materials at the site carefully to prevent materials from being damaged, minimize handling and not hamper construction activities. In no case shall materials be thrown or dumped from the truck.



3. Lower pipe into trench carefully to prevent damage to pipe and protective coatings and linings. Under no circumstances shall pipe be dumped into the trench.
- C. Immediately before placement, the joint surfaces of each pipe section and fitting shall be inspected for the presence of foreign matter, coating blister, rough edges and projections, and any other imperfections so detected shall be corrected by cleaning, trimming or repair as required.
  - D. Pipe shall be laid using laser equipment or grade boards. Grade boards shall be furnished and set by the Contractor according to the established grade stakes. No pipe shall be laid unless there is a minimum of four (4) grade boards set to check the proper grade and alignment ahead. Provide and use a suitable grade rod to ensure the proper grade of the pipe. Grade boards shall be no more than twenty-five (25') feet apart.
  - E. Pipe shall not be laid in water or when the trench conditions are unsuitable for work. Protect the exposed ends of all pipes with a board or approved stopper to prevent earth or substances from entering the pipe.
  - F. At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connections, but they shall be no larger than would be adequate. Bell and spigot pipe shall be laid with the bell ends facing upgrade and the laying shall start at the downgrade end and proceed upgrade.
  - G. As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced hole and brought to correct line and grade. The pipe shall be secured in place with approved backfill material, which shall be thoroughly compacted around the pipe. The joint areas shall remain exposed and precautions shall be taken to prevent soil from entering the joint space.
  - H. Carefully clean the interior of the sewer from dirt, cement or superfluous material of every description as the work progresses. If necessary, thoroughly flush pipe at the completion of the work.
  - I. When existing utility structures or branch connections leading to main sewers or to main drains present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated or reconstructed. Work shall be considered part of the base bid contract.
  - J. When water main, water services and sewer services, whether lowered or existing, are in danger of freezing due to proximity of storm sewers, catch basin leads or storm sewer structures, the Engineer may direct the placement of insulation between the storm sewer and the water main or service pipe at no additional cost to the Owner or the Owner's representative.
  - K. Rigid polystyrene insulation board shall be installed on all storm sewer stubs servicing the building where less than 5-feet of cover exists over the top of the pipe.
  - L. Openings along the line of the storm sewer shall be securely closed, and at the suspension of the Work at any time, suitable stops shall be placed to prevent earth or any substance from entering the storm sewer. If water is present in the trench, the seals shall remain in place until the trench is completely dry.

- M. The interior of all pipe shall, as the work progresses, be cleaned of all dirt and superfluous materials. The exposed end of the pipe shall be protected with suitable temporary covers. Pipe laid in place shall be protected from injury and disturbance.

### 3.5 MANHOLE/CATCH BASIN PRECAST STRUCTURES

- A. Set bases level so that walls will be plumb.
- B. Apply joint sealer or ring gasket to wall section(s) and set firmly in place to assure watertight joints.
- C. Form manhole invert channels directly in the concrete of the structure base, with mortar. Smooth the floor of the manhole outside the channels, and slope toward the channels at not less than one (1") inch per foot and not more than two (2") inches per foot.
  - 1. Shape the invert channels to be smooth and semicircular, conforming to the inside of the adjacent sewer section.
  - 2. Make changes in direction of flow with a smooth curve of as large a radius as the size of the manhole will permit.
  - 3. Make changes in size and grade of channels smoothly and evenly.
  - 4. Slope invert uniformly from invert of inlet to invert of outlet.
- D. Unless otherwise specified or approved, catch basins and manholes shall be constructed on a precast concrete base and the barrel riser sections, cone section and top adjusting rings shall all be of precast concrete. All units shall be properly fitted and sealed to form a completely watertight structure. Barrel and cone height shall be such as to permit placement of at least two (2) and not more than four (4) standard two (2") inch precast concrete adjusting rings immediately below the casting assembly which shall be set in a mortar bed. Each adjusting ring shall also be set in mortar. A concrete collar shall encase casting and concrete adjusting rings. Concrete shall conform to concrete curb and gutter mix or mortar mix (MNDOT specifications 2506.2B). Do not place concrete on interior of manhole. No blocks will be allowed to raise casting and frame.
- E. All joints and connections in the storm sewer system shall be gastight or watertight in accordance to MN plumbing code. Flexible compression joints located between 12 and 36 inches from the structure must be used to make watertight connections to manholes, catch basins, and other structures. Where permitted by the administrative authority as an alternate installation method, approved resilient rubber joints may be used to make watertight connections to manholes, catch basins, and other structures. Cement mortar joints are permitted only for repairs and connections of existing lines constructed with such joints.

### 3.6 BUILT-IN-PLACE STRUCTURES

- A. All structures are to be precast concrete unless specifically allowed by the Engineer.

### 3.7 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under the provisions of Division One Specifications.
- B. General:
  - 1. All pipes shall be visually inspected.
  - 2. All visible leaks shall be repaired.
  - 3. Broken or cracked pipe, mislaid pipe and other defects shall be corrected.
  - 4. All repairs, relaying of sewers, etc. required to bring the sewers to specified status shall be made at no additional cost to the Owner or the Owner's representative.
  - 5. Testing all manholes, catch basins and storm sewer piping must comply with the construction requirements of the Minnesota Plumbing Code, 712.
- C. Inspection:
  - 1. Request inspection prior to and immediately after placing aggregate cover over pipe.
  - 2. Compaction testing will be performed in accordance with ASTM D1557.
  - 3. Clean and prepare for inspection each block or section of sewer upon completion, or at such other time as the Engineer may direct.
- D. If tests indicate that Work does not meet specified requirements, remove Work, replace and retest at no additional cost to the Owner or the Owner's representative.

### 3.8 ADJUSTING AND CLEANING

- A. Correcting Deficiencies: Correct imperfections and irregularities in Work at no expense to the Owner.
- B. Cleaning Drains: Drains shall be free of silt, debris and other obstructions at the time of final acceptance.
- C. Cleaning Site: Remove excess earth, excess construction materials, construction equipment and construction debris, which is related to this Work, from the site at the completion of the work.
- D. The Contractor shall clean all sumps after final surfaces are established and prior to project closeout.

### 3.9 PROTECTION

- A. Protection of finished work under provisions of Division One Specifications.

- B. General Requirements: Protect storm drainage system from damage and construction operations until date of Substantial Completion.

END OF SECTION